SAFETY DATA SHEET

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: Safety Silv® 45 Flux Coated
Product Size: ALL

Other means of identification
SDS number: 200000007372

Recommended use and restriction on use
Recommended use: Metal Brazing
Restrictions on use: Not known. Read this SDS before using this product.

Manufacturer/Importer/Supplier/Distributor Information
Company Name: The Harris Products Group
Address: 4501 Quality Place
Mason, OH 45040-1971
USA
Telephone: +1 (513) 754-2000
Contact Person: Safety Data Sheet Questions: custservmason@jwharris.com

Emergency telephone number:
USA/Canada/Mexico +1 (888) 609-1762
Americas/Europe +1 (216) 383-8962
Asia Pacific +1 (216) 383-8966
Middle East/Africa +1 (216) 383-8969

3E Company Access Code: 333988

2. HAZARDS IDENTIFICATION


Hazard Classification
Not classified as hazardous according to applicable GHS hazard classification criteria.

Label Elements
Hazard Symbol: No symbol
Signal Word: No signal word.
Hazard Statement: Not applicable
Precautionary Statements: Not applicable

Other hazards which do not result in GHS classification: Heat rays (infrared radiation) from flame or hot metal can injure eyes. Overexposure to brazing fumes and gases can be hazardous. Read and understand the manufacturer’s instructions, Safety Data Sheets and the precautionary labels before using this product.
Substance(s) formed under the conditions of use:
Fumes produced from use of this product may contain the following constituent(s) and/or their complex metallic oxides as well as solid particles or other constituents from the solder, brazing consumable, flux material or base metal, or base metal coating not listed below.

<table>
<thead>
<tr>
<th>Chemical Identity</th>
<th>CAS-No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon dioxide</td>
<td>124-38-9</td>
</tr>
<tr>
<td>Carbon monoxide</td>
<td>630-08-0</td>
</tr>
<tr>
<td>Nitrogen dioxide</td>
<td>10102-44-0</td>
</tr>
<tr>
<td>Ozone</td>
<td>10028-15-6</td>
</tr>
</tbody>
</table>

3. COMPOSITION / INFORMATION ON INGREDIENTS

Reportable Hazardous Ingredients

Mixtures

<table>
<thead>
<tr>
<th>Chemical Identity</th>
<th>CAS number</th>
<th>Content in percent (%)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silver</td>
<td>7440-22-4</td>
<td>20 - &lt;50%</td>
</tr>
<tr>
<td>Zinc</td>
<td>7440-66-6</td>
<td>20 - &lt;50%</td>
</tr>
<tr>
<td>Copper and/or copper alloys and compounds (as Cu)</td>
<td>7440-50-8</td>
<td>20 - &lt;50%</td>
</tr>
<tr>
<td>Potassium fluoroborate</td>
<td>14075-53-7</td>
<td>10 - &lt;20%</td>
</tr>
<tr>
<td>Boric acid</td>
<td>10043-35-3</td>
<td>5 - &lt;10%</td>
</tr>
<tr>
<td>Methacrylate polymer</td>
<td>9011-14-7</td>
<td>1 - &lt;5%</td>
</tr>
</tbody>
</table>

* All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

Composition Comments: The term “Hazardous Ingredients” should be interpreted as a term defined in Hazard Communication standards and does not necessarily imply the existence of a welding hazard. The product may contain additional non-hazardous ingredients or may form additional compounds under the condition of use. Refer to Sections 2 and 8 for more information.

4. FIRST AID MEASURES

Ingestion: Avoid hand, clothing, food, and drink contact with fluxes, metal fume or powder which can cause ingestion of particulate during hand to mouth activities such as drinking, eating, smoking, etc. If ingested, do not induce vomiting. Contact a poison control center. Unless the poison control center advises otherwise, wash out mouth thoroughly with water. If symptoms develop, seek medical attention at once.

Inhalation: Move to fresh air if breathing is difficult. If breathing has stopped, perform artificial respiration and obtain medical assistance at once.

Skin Contact: Remove contaminated clothing and wash the skin thoroughly with soap and water. For reddened or blistered skin, or thermal burns, obtain medical assistance at once.

Eye contact: Do not rub eye. Any material that contacts the eye should be washed out immediately with water. If easy to do, remove contact lenses. Continue to rinse for at least 15 minutes. Get medical attention promptly if symptoms occur after washing.

Most important symptoms/effects, acute and delayed
Symptoms: Short-term (acute) overexposure to fumes and gases from welding and allied processes may result in discomfort such as metal fume fever, dizziness, nausea, or dryness or irritation of nose, throat, or eyes. May aggravate pre-existing respiratory problems (e.g. asthma, emphysema). Long-term (chronic) overexposure to fumes and gases from welding and allied processes can lead to siderosis (iron deposits in lung), central nervous system effects, bronchitis and other pulmonary effects. Refer to Section 11 for more information.

Hazards: The hazards associated with welding and its allied processes such as soldering and brazing are complex and may include physical and health hazards such as but not limited to electric shock, physical strains, radiation burns (eye flash), thermal burns due to hot metal or spatter and potential health effects of overexposure to fumes, gases or dusts potentially generated during the use of this product. Refer to Section 11 for more information.

Indication of immediate medical attention and special treatment needed
Treatment: Treat symptomatically.

5. FIRE-FIGHTING MEASURES

General Fire Hazards: As shipped, this product is nonflammable. However, welding arc and sparks as well as open flames and hot surfaces associated with brazing and soldering can ignite combustible and flammable materials. Read and understand American National Standard Z49.1, “Safety in Welding, Cutting and Allied Processes” and National Fire Protection Association NFPA 51B, “Standard for Fire Prevention during Welding, Cutting and Other Hot Work” before using this product.

Suitable (and unsuitable) extinguishing media
Suitable extinguishing media: Use fire-extinguishing media appropriate for surrounding materials.

Unsuitable extinguishing media: Do not use water jet as an extinguisher, as this will spread the fire.

Specific hazards arising from the chemical: During fire, gases hazardous to health may be formed.

Special protective equipment and precautions for firefighters
Special fire fighting procedures: Use standard firefighting procedures and consider the hazards of other involved materials.

Special protective equipment for fire-fighters: Selection of respiratory protection for fire fighting: follow the general fire precautions indicated in the workplace. Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures: If airborne dust and/or fume is present, use adequate engineering controls and, if needed, personal protection to prevent overexposure. Refer to recommendations in Section 8.

Methods and material for containment and cleaning up: Absorb with sand or other inert absorbent. Stop the flow of material, if this is without risk. Clean up spills immediately, observing precautions in the personal protective equipment in Section 8. Avoid generating dust. Prevent product from entering any drains, sewers or water sources. Refer to Section 13 for proper disposal.
Environmental Precautions: Avoid release to the environment. Prevent further leakage or spillage if safe to do so. Do not contaminate water sources or sewer. Environmental manager must be informed of all major spillages.

7. HANDLING AND STORAGE

Precautions for safe handling: Prevent abrading consumable materials or creating dust. Provide appropriate exhaust ventilation at places where fume or dust is formed. Wear appropriate personal protective equipment. Observe good industrial hygiene practices.


Conditions for safe storage, including any incompatibilities: Store in closed original container in a dry place. Store in accordance with local/regional/national regulations. Store away from incompatible materials.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Control Parameters

<table>
<thead>
<tr>
<th>Chemical Identity</th>
<th>Type</th>
<th>Exposure Limit Values</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silver - Dust and fume.</td>
<td>TWA</td>
<td>0.1 mg/m³</td>
<td>US. ACGIH Threshold Limit Values (12 2010)</td>
</tr>
<tr>
<td>Silver - Dust. - as Hg</td>
<td>REL</td>
<td>0.01 mg/m³</td>
<td>US. NIOSH: Pocket Guide to Chemical Hazards (2016)</td>
</tr>
<tr>
<td>Silver - as Ag</td>
<td>PEL</td>
<td>0.01 mg/m³</td>
<td>US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006)</td>
</tr>
<tr>
<td>Copper and/or copper alloys and compounds (as Cu) - Dust and mist. - as Cu</td>
<td>TWA</td>
<td>1 mg/m³</td>
<td>US. ACGIH Threshold Limit Values (03 2014)</td>
</tr>
<tr>
<td>Copper and/or copper alloys and compounds (as Cu) - Fume. - as Cu</td>
<td>TWA</td>
<td>0.2 mg/m³</td>
<td>US. ACGIH Threshold Limit Values (03 2014)</td>
</tr>
<tr>
<td>Copper and/or copper alloys and compounds (as Cu) - Dust and mist. - as Cu</td>
<td>REL</td>
<td>0.1 mg/m³</td>
<td>US. NIOSH: Pocket Guide to Chemical Hazards (2016)</td>
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</tr>
<tr>
<td>Copper and/or copper alloys and compounds (as Cu) - Fume. - as Cu</td>
<td>PEL</td>
<td>1 mg/m³</td>
<td>US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006)</td>
</tr>
<tr>
<td>Potassium fluoroborate - Inhalable fraction.</td>
<td>STEL</td>
<td>6 mg/m³</td>
<td>US. ACGIH Threshold Limit Values (02 2014)</td>
</tr>
<tr>
<td>Potassium fluoroborate - as F</td>
<td>TWA</td>
<td>2 mg/m³</td>
<td>US. ACGIH Threshold Limit Values (02 2014)</td>
</tr>
<tr>
<td>Potassium fluoroborate - as F</td>
<td>REL</td>
<td>2.5 mg/m³</td>
<td>US. NIOSH: Pocket Guide to Chemical Hazards (2005)</td>
</tr>
<tr>
<td>Boric acid - Inhalable fraction.</td>
<td>TWA</td>
<td>2 mg/m³</td>
<td>US. ACGIH Threshold Limit Values (02 2012)</td>
</tr>
<tr>
<td>Potassium fluoroborate - as F</td>
<td>STEL</td>
<td>6 mg/m³</td>
<td>US. ACGIH Threshold Limit Values (02 2012)</td>
</tr>
<tr>
<td>Chemical Identity</td>
<td>Type</td>
<td>Exposure Limit Values</td>
<td>Source</td>
</tr>
<tr>
<td>-------------------</td>
<td>------</td>
<td>-----------------------</td>
<td>--------</td>
</tr>
<tr>
<td>Silver</td>
<td>TWA</td>
<td>0.1 mg/m³</td>
<td>Canada. Alberta OELs (Occupational Health &amp; Safety Code, Schedule 1, Table 2) (07 2009)</td>
</tr>
<tr>
<td>Silver - as Ag</td>
<td>TWA</td>
<td>0.01 mg/m³</td>
<td>Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) (07 2007)</td>
</tr>
<tr>
<td>STEL</td>
<td></td>
<td>0.03 mg/m³</td>
<td>Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) (07 2007)</td>
</tr>
<tr>
<td>Silver - Dust and fume.</td>
<td>TWA</td>
<td>0.1 mg/m³</td>
<td>Canada. Manitoba OELs (Reg. 217/2006, The Workplace Safety And Health Act) (03 2011)</td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>0.1 mg/m³</td>
<td>Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents) (11 2010)</td>
</tr>
<tr>
<td>Silver</td>
<td>8 HR ACL</td>
<td>0.1 mg/m³</td>
<td>Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21) (05 2009)</td>
</tr>
<tr>
<td></td>
<td>15 MIN ACL</td>
<td>0.3 mg/m³</td>
<td>Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21) (05 2009)</td>
</tr>
<tr>
<td>Copper and/or copper alloys and compounds (as Cu) - Fume.</td>
<td>TWA</td>
<td>0.2 mg/m³</td>
<td>Canada. Alberta OELs (Occupational Health &amp; Safety Code, Schedule 1, Table 2) (07 2009)</td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>1 mg/m³</td>
<td>Canada. Alberta OELs (Occupational Health &amp; Safety Code, Schedule 1, Table 2) (07 2009)</td>
</tr>
<tr>
<td>Copper and/or copper alloys and compounds (as Cu) - Dust and mist. - as Cu</td>
<td>TWA</td>
<td>0.2 mg/m³</td>
<td>Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) (07 2007)</td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>1 mg/m³</td>
<td>Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) (07 2007)</td>
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<td>Copper and/or copper alloys and compounds (as Cu) - Fume. - as Cu</td>
<td>TWA</td>
<td>1 mg/m³</td>
<td>Canada. Manitoba OELs (Reg. 217/2006, The Workplace Safety And Health Act) (03 2014)</td>
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<tr>
<td></td>
<td>TWA</td>
<td>0.2 mg/m³</td>
<td>Canada. Manitoba OELs (Reg. 217/2006, The Workplace Safety And Health Act) (03 2014)</td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>0.2 mg/m³</td>
<td>Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents) (06 2015)</td>
</tr>
<tr>
<td>Copper and/or copper alloys and compounds (as Cu) - Fume.</td>
<td>TWA</td>
<td>1 mg/m³</td>
<td>Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents) (11 2010)</td>
</tr>
<tr>
<td>Copper and/or copper alloys and compounds (as Cu) - Dust and fume. - as Cu</td>
<td>8 HR ACL</td>
<td>1 mg/m³</td>
<td>Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21) (05 2009)</td>
</tr>
<tr>
<td>Copper and/or copper alloys and compounds (as Cu) - Fume. - as Cu</td>
<td>15 MIN ACL</td>
<td>0.6 mg/m³</td>
<td>Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21) (05 2009)</td>
</tr>
<tr>
<td>Copper and/or copper alloys and compounds (as Cu) - Dust and mist. - as Cu</td>
<td>15 MIN ACL</td>
<td>3 mg/m³</td>
<td>Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21) (05 2009)</td>
</tr>
<tr>
<td>Copper and/or copper alloys and compounds (as Cu) - Fume. - as Cu</td>
<td>8 HR ACL</td>
<td>0.2 mg/m³</td>
<td>Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21) (05 2009)</td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>0.2 mg/m³</td>
<td>Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment) (12 2008)</td>
</tr>
</tbody>
</table>
### Occupational Exposure Limits: Mexico

<table>
<thead>
<tr>
<th>Chemical Identity</th>
<th>Type</th>
<th>Exposure Limit Values</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silver - Dust and fume.</td>
<td>VLE-PPT</td>
<td>0.1 mg/m³</td>
<td>Mexico. OELs. (NOM-010-STPS-2014 Chemical Pollutants at the Workplace; Assessment and Control) (04 2014)</td>
</tr>
<tr>
<td>Copper and/or copper alloys and compounds (as Cu) - Fume. - as Cu</td>
<td>VLE-PPT</td>
<td>0.2 mg/m³</td>
<td>Mexico. OELs. (NOM-010-STPS-2014 Chemical Pollutants at the Workplace; Assessment and Control) (04 2014)</td>
</tr>
<tr>
<td>Copper and/or copper alloys and compounds (as Cu) - Dust and mist. - as Cu</td>
<td>VLE-PPT</td>
<td>1 mg/m³</td>
<td>Mexico. OELs. (NOM-010-STPS-2014 Chemical Pollutants at the Workplace; Assessment and Control) (04 2014)</td>
</tr>
<tr>
<td>Boric acid - Inhalable fraction.</td>
<td>VLE-PPT</td>
<td>2 mg/m³</td>
<td>Mexico. OELs. (NOM-010-STPS-2014 Chemical Pollutants at the Workplace; Assessment and Control) (04 2014)</td>
</tr>
<tr>
<td></td>
<td>VLE-CT</td>
<td>6 mg/m³</td>
<td>Mexico. OELs. (NOM-010-STPS-2014 Chemical Pollutants at the Workplace; Assessment and Control) (04 2014)</td>
</tr>
</tbody>
</table>

### Additional exposure limits under the conditions of use: US

<table>
<thead>
<tr>
<th>Chemical Identity</th>
<th>Type</th>
<th>Exposure Limit Values</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon dioxide</td>
<td>TWA</td>
<td>5,000 ppm</td>
<td>US. ACGIH Threshold Limit Values (12 2010)</td>
</tr>
<tr>
<td></td>
<td>STEL</td>
<td>30,000 ppm</td>
<td>US. ACGIH Threshold Limit Values (12 2010)</td>
</tr>
<tr>
<td></td>
<td>PEL</td>
<td>5,000 ppm 9,000 mg/m³</td>
<td>US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006)</td>
</tr>
</tbody>
</table>
### Additional exposure limits under the conditions of use: Canada

<table>
<thead>
<tr>
<th>Chemical Identity</th>
<th>Type</th>
<th>Exposure Limit Values</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon dioxide</td>
<td>STEL</td>
<td>30,000 ppm 54,000 mg/m³</td>
<td>Canada. Alberta OELs (Occupational Health &amp; Safety Code, Schedule 1, Table 2) (07 2009)</td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>5,000 ppm 9,000 mg/m³</td>
<td>Canada. Alberta OELs (Occupational Health &amp; Safety Code, Schedule 1, Table 2) (07 2009)</td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>5,000 ppm</td>
<td>Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) (07 2007)</td>
</tr>
<tr>
<td></td>
<td>STEL</td>
<td>15,000 ppm</td>
<td>Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) (07 2007)</td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>5,000 ppm</td>
<td>Canada. Manitoba OELs (Reg. 217/2006, The Workplace Safety And Health Act) (03 2011)</td>
</tr>
<tr>
<td></td>
<td>STEL</td>
<td>30,000 ppm</td>
<td>Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents) (11 2010)</td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>5,000 ppm</td>
<td>Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents) (11 2010)</td>
</tr>
<tr>
<td></td>
<td>8 HR ACL</td>
<td>5,000 ppm</td>
<td>Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21) (05 2009)</td>
</tr>
<tr>
<td></td>
<td>15 MIN ACL</td>
<td>30,000 ppm</td>
<td>Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21) (05 2009)</td>
</tr>
<tr>
<td>Substance</td>
<td>TWA</td>
<td>STEL</td>
<td>Sensory Thresholds</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-----</td>
<td>------</td>
<td>--------------------</td>
</tr>
<tr>
<td>Carbon monoxide</td>
<td>5,000 ppm</td>
<td>30,000 ppm</td>
<td>9,000 mg/m³</td>
</tr>
<tr>
<td></td>
<td>25 ppm</td>
<td>100 ppm</td>
<td>29 mg/m³</td>
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<tr>
<td></td>
<td>25 ppm</td>
<td>3 ppm</td>
<td>25 ppm</td>
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<tr>
<td></td>
<td>25 ppm</td>
<td>5 ppm</td>
<td>190 ppm</td>
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<td>35 ppm</td>
<td>200 ppm</td>
<td>40 mg/m³</td>
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<td></td>
<td>3 ppm</td>
<td>3 ppm</td>
<td>3 ppm</td>
</tr>
<tr>
<td></td>
<td>0.2 ppm</td>
<td>5 ppm</td>
<td>0.2 ppm</td>
</tr>
<tr>
<td></td>
<td>3 ppm</td>
<td>3 ppm</td>
<td>3 ppm</td>
</tr>
<tr>
<td></td>
<td>0.3 ppm</td>
<td>0.3 ppm</td>
<td>0.6 mg/m³</td>
</tr>
<tr>
<td></td>
<td>0.1 ppm</td>
<td>0.1 ppm</td>
<td>0.2 mg/m³</td>
</tr>
<tr>
<td>Chemical Identity</td>
<td>Type</td>
<td>Exposure Limit Values</td>
<td>Source</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------</td>
<td>-----------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Carbon dioxide</td>
<td>VLE-CT</td>
<td>30,000 ppm</td>
<td>Mexico. OELs. (NOM-010-STPS-2014 Chemical Pollutants at the Workplace; Assessment and Control) (04 2014)</td>
</tr>
<tr>
<td></td>
<td>VLE-PPT</td>
<td>5,000 ppm</td>
<td>Mexico. OELs. (NOM-010-STPS-2014 Chemical Pollutants at the Workplace; Assessment and Control) (04 2014)</td>
</tr>
<tr>
<td>Carbon monoxide</td>
<td>VLE-PPT</td>
<td>25 ppm</td>
<td>Mexico. OELs. (NOM-010-STPS-2014 Chemical Pollutants at the Workplace; Assessment and Control) (04 2014)</td>
</tr>
<tr>
<td>Nitrogen dioxide</td>
<td>VLE-PPT</td>
<td>0.2 ppm</td>
<td>Mexico. OELs. (NOM-010-STPS-2014 Chemical Pollutants at the Workplace; Assessment and Control) (04 2014)</td>
</tr>
<tr>
<td>Ozone</td>
<td>VLE-P</td>
<td>0.1 ppm</td>
<td>Mexico. OELs. (NOM-010-STPS-2014 Chemical Pollutants at the Workplace; Assessment and Control) (04 2014)</td>
</tr>
</tbody>
</table>
**Appropriate Engineering Controls**

**Ventilation:** Use enough ventilation and local exhaust at the arc, flame or heat source to keep the fumes and gases from the worker's breathing zone and the general area. Train the operator to keep their head out of the fumes. **Keep exposure as low as possible.**

**Individual protection measures, such as personal protective equipment**

**General information:**

**Exposure Guidelines:** Threshold Limit Values (TLVs) and Biological Exposure Indices (BEIs) are values published by the American Conference of Government Industrial Hygienists (ACGIH). ACGIH Statement of Positions Regarding the TLVs® and BEIs® states that the TLV-TWA should be used as a guide in the control of health hazards and should not be used to indicate a fine line between safe and dangerous exposures. See Section 10 for information on potential fume constituents of health interest. Threshold Limit Values are figures published by the American Conference of Government Industrial Hygienists.

**Eye/face protection:**

Wear helmet, face shield or eye protection with filter lens shade number 2 for torch soldering and 3-4 for torch brazing, and follow the recommendations as specified in ANSI Z49.1, Section 4, based on your process details. Shield others by providing appropriate screens and eye protection.

**Skin Protection**

**Hand Protection:**

Wear protective gloves. Suitable gloves can be recommended by the glove supplier.

**Other:**

**Protective Clothing:** Wear hand, head, and body protection which help to prevent injury from radiation, open flames, hot surfaces, sparks and electrical shock. See Z49.1. At a minimum, this includes welder's gloves and a protective face shield when welding, and may include arm protectors, aprons, hats, shoulder protection, as well as dark substantial clothing when welding, brazing and soldering. Wear dry gloves free of holes or split seams. Train the operator not to permit electrically live parts or electrodes from contacting the skin . . . or clothing or gloves if they are wet. Insulate yourself from the work piece and ground using dry plywood, rubber mats or other dry insulation.

**Respiratory Protection:**

Keep your head out of fumes. Use enough ventilation and local exhaust to keep fumes and gases from your breathing zone and the general area. An approved respirator should be used unless exposure assessments are below applicable exposure limits.

**Hygiene measures:**

Do not eat, drink or smoke when using the product. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Determine the composition and quantity of fumes and gases to which workers are exposed by taking an air sample from inside the welder's helmet if worn or in the worker's breathing zone. Improve ventilation if exposures are not below limits. See ANSI/AWS F1.1, F1.2, F1.3 and F1.5, available from the American Welding Society, www.aws.org.

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**9. PHYSICAL AND CHEMICAL PROPERTIES**

**Appearance:** Flux coated brazing consumable.

**Physical state:** Solid

**Form:** Solid
10. STABILITY AND REACTIVITY

Reactivity: The product is non-reactive under normal conditions of use, storage and transport.

Chemical Stability: Material is stable under normal conditions.

Possibility of hazardous reactions: None under normal conditions.

Conditions to avoid: Avoid heat or contamination.


Hazardous Decomposition Products: Fumes and gases from welding and its allied processes such as brazing and soldering cannot be classified simply. The composition and quantity of both are dependent upon the metal to which the joining or hot work is applied, the process, procedure - and where applicable - the electrode or consumable used. Other conditions which also influence the composition and quantity of the fumes and gases to which workers may be exposed include: coatings on the metal being welded or worked (such as paint, plating, or galvanizing), the number of operators and the volume of the work area, the quality and amount of ventilation, the position of the operator's head with respect to the fume plume, as well as the presence of
contaminants in the atmosphere (such as chlorinated hydrocarbon vapors from cleaning and degreasing activities.)

In cases where an electrode or other applied material is consumed, the fume and gas decomposition products generated are different in percent and form from the ingredients listed in Section 3. Decomposition products of normal operation include those originating from the volatilization, reaction, or oxidation of the materials shown in Section 3, plus those from the base metal and coating, etc., as noted above. Reasonably expected fume constituents produced during arc welding and brazing include the oxides of iron, manganese and other metals present in the welding consumable or base metal. Hexavalent chromium compounds may be in the welding or brazing fume of consumables or base metals which contain chromium. Gaseous and particulate fluoride may be in the fume of consumables or flux materials which contain fluoride. Gaseous reaction products may include carbon monoxide and carbon dioxide. Ozone and nitrogen oxides may be formed by the radiation from the arc associated with welding.

11. TOXICOLOGICAL INFORMATION

<table>
<thead>
<tr>
<th>Information on likely routes of exposure</th>
<th>Inhalation:</th>
<th>Inhalation is the primary route of exposure. In high concentrations, dust, vapors, fumes or mists may irritate nose, throat and mucus membranes.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin Contact:</td>
<td>Moderately irritating to skin with prolonged exposure.</td>
<td></td>
</tr>
<tr>
<td>Eye contact:</td>
<td>HEAT RAYS (INFRARED RADIATION) from flame or hot metal can injure eyes.</td>
<td></td>
</tr>
<tr>
<td>Ingestion:</td>
<td>Avoid ingestion - wear gloves and other appropriate personal protection - wash hands thoroughly following use or handling.</td>
<td></td>
</tr>
</tbody>
</table>

Symptoms related to the physical, chemical and toxicological characteristics

| Inhalation: | Short-term (acute) overexposure to fumes and gases from brazing and soldering may result in discomfort such as metal fume fever, dizziness, nausea, or dryness or irritation of nose, throat, or eyes. May aggravate pre-existing respiratory problems (e.g. asthma, emphysema). Long-term (chronic) overexposure to fumes and gases from brazing and soldering can lead to siderosis (iron deposits in lung), central nervous system effects, bronchitis and other pulmonary effects. Products which contain lead or cadmium have additional specific health hazards - refer to Sections 2, 8 and 11 of this SDS. Depending on specific product composition, some products may produce hazardous concentrations of airborne oxides of cadmium, lead, zinc or fluoride compounds. Use adequate ventilation and respiratory protection during use. Avoid breathing fumes. Avoid ingestion - wear gloves and other appropriate personal protection - wash hands thoroughly following use or handling. Inhalation of fumes may cause upper respiratory tract irritation and systemic poisoning with early symptoms including headache, coughing, and a metallic taste as well as metal fume fever. Chronic cadmium exposure causes lung and kidney damage. Chronic exposure to lead causes damage to lungs, liver, kidney, nervous system as well as blood and musculoskeletal disorders. Exposures to high levels of cadmium or lead dust or fume may be immediately dangerous to life or health and can cause delayed pneumonitis with fever and chest pain, and pulmonary edema resulting in death. |
Information on toxicological effects

Acute toxicity (list all possible routes of exposure)

Oral
Product: Not classified
Specified substance(s):
- Copper and/or copper alloys and compounds (as Cu)
- Boric acid
  - LD 50 (Rat): 481 mg/kg
  - LD 50 (Rat): 2,660 mg/kg

Dermal
Product: Not classified

Inhalation
Product: Not classified

Repeated dose toxicity
Product: Not classified

Skin Corrosion/Irritation
Product: Not classified

Serious Eye Damage/Eye Irritation
Product: Not classified

Respiratory or Skin Sensitization
Product: Not classified

Carcinogenicity
Product: Arc rays: Skin cancer has been reported.

- IARC Monographs on the Evaluation of Carcinogenic Risks to Humans:
  No carcinogenic components identified

- US. National Toxicology Program (NTP) Report on Carcinogens:
  No carcinogenic components identified

  No carcinogenic components identified

Germ Cell Mutagenicity
In vitro
Product: Not classified

In vivo
Product: Not classified

Reproductive toxicity
Product: Not classified

Specific Target Organ Toxicity - Single Exposure
Product: Not classified

Specific Target Organ Toxicity - Repeated Exposure
Product: Not classified

Aspiration Hazard
Product: Not classified
Symptoms related to the physical, chemical and toxicological characteristics under the condition of use

Additional toxicological Information under the conditions of use:

**Acute toxicity**
**Inhalation**
**Specified substance(s):**
- Carbon dioxide: LC Lo (Human, 5 min): 90000 ppm
- Carbon monoxide: LC 50 (Rat, 4 h): 1,300 mg/l
- Nitrogen dioxide: LC 50 (Rat, 4 h): 88 ppm
- Ozone: LC Lo (Human, 30 min): 50 ppm

**Other effects:**
**Specified substance(s):**
- Carbon dioxide: Asphyxia
- Carbon monoxide: Carboxyhemoglobinemia
- Nitrogen dioxide: Lower respiratory tract irritation

12. ECOLOGICAL INFORMATION

**Ecotoxicity**

**Acute hazards to the aquatic environment:**

**Fish**
- **Product:** Not classified
- **Specified substance(s):**
  - Silver: LC 50 (Rainbow trout, donaldson trout (Oncorhynchus mykiss), 96 h): 0.013 mg/l
  - Zinc: LC 50 (Fathead minnow (Pimephales promelas), 96 h): 1.277 - 3.649 mg/l
  - Copper and/or copper alloys and compounds (as Cu): LC 50 (Fathead minnow (Pimephales promelas), 96 h): 1.6 mg/l
  - Boric acid: LC 50 (Pimephales promelas, 96 h): 79.7 mg/l

**Aquatic Invertebrates**
- **Product:** Not classified
- **Specified substance(s):**
  - Silver: LC 50 (Water flea (Daphnia pulex), 48 h): 0.014 mg/l
  - Zinc: EC 50 (Water flea (Daphnia magna), 48 h): 2.8 mg/l
  - Copper and/or copper alloys and compounds (as Cu): EC 50 (Water flea (Daphnia magna), 48 h): 0.102 mg/l
  - Boric acid: LC 50 (Hyalella azteca, 96 h): 64 mg/l

**Chronic hazards to the aquatic environment:**

**Fish**
- **Product:** Not classified

**Aquatic Invertebrates**
- **Product:** Not classified

**Toxicity to Aquatic Plants**
- **Product:** Not classified
- **Specified substance(s):**
  - Copper and/or copper alloys and compounds (as Cu): LC 50 (Green algae (Scenedesmus dimorphus), 3 d): 0.0623 mg/l
Persistence and Degradability

Biodegradation

Product: No data available.

Bioaccumulative potential

Bioconcentration Factor (BCF)

Product: No data available.

Specified substance(s):
- Zinc: Brown shrimp (Penaeus aztecus), Bioconcentration Factor (BCF): > 400 - < 600 (Static)
- Copper and/or copper alloys and compounds (as Cu): Blue-green algae (Anacystis nidulans), Bioconcentration Factor (BCF): 36.01 (Static)

Mobility in soil: No data available.

13. DISPOSAL CONSIDERATIONS

General information: The generation of waste should be avoided or minimized whenever possible. When practical, recycle in an environmentally acceptable, regulatory compliant manner. Dispose of non-recyclable products in accordance with all applicable Federal, State, Provincial, and Local requirements.

Disposal instructions: Dispose of this material and its container to hazardous or special waste collection point.

Contaminated Packaging: Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

14. TRANSPORT INFORMATION

DOT
UN Number: NOT DG REGULATED
UN Proper Shipping Name: NOT DG REGULATED
Transport Hazard Class(es) Class: NR
Label(s): –
Packing Group: –
Marine Pollutant: No

IMDG
UN Number: NOT DG REGULATED
UN Proper Shipping Name: NOT DG REGULATED
Transport Hazard Class(es) Class: NR
Label(s): –
EmS No.: –
Packing Group: –
Marine Pollutant: No

IATA
UN Number: NOT DG REGULATED
Proper Shipping Name: NOT DG REGULATED
Transport Hazard Class(es) Class: NR
Label(s): –
Packing Group: –
Marine Pollutant: No
Cargo aircraft only: Allowed.

TDG
UN Number: 
UN Proper Shipping Name: NOT DG REGULATED
Transport Hazard Class(es)
Class: NR
Label(s): –
Packing Group: –
Marine Pollutant: No

15. REGULATORY INFORMATION

US Federal Regulations
TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Chemical Identity | Reportable quantity
--- | ---
Zinc | De minimis concentration: 1.0% One-Time Export Notification only.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)
None present or none present in regulated quantities.

CERCLA Hazardous Substance List (40 CFR 302.4):

Chemical Identity | Reportable quantity
--- | ---
Silver | 1000 lbs.
Zinc | 1000 lbs.
Copper and/or copper alloys and compounds (as Cu) | 5000 lbs.

Superfund Amendments and Reauthorization Act of 1986 (SARA)
Hazard categories
Not classified
Not classified

SARA 302 Extremely Hazardous Substance
None present or none present in regulated quantities.

SARA 304 Emergency Release Notification

Chemical Identity | Reportable quantity
--- | ---
Silver | 1000 lbs.
Zinc | 1000 lbs.
Copper and/or copper alloys and compounds (as Cu) | 5000 lbs.

SARA 311/312 Hazardous Chemical

Chemical Identity | Threshold Planning Quantity
--- | ---
Silver | 10000 lbs
Zinc | 10000 lbs
Copper and/or copper alloys and compounds (as Cu) | 10000 lbs
Potassium fluoroborate | 10000 lbs
Boric acid | 10000 lbs
Methacrylate polymer | 10000 lbs
SARA 313 (TRI Reporting)

<table>
<thead>
<tr>
<th>Chemical Identity</th>
<th>Reporting threshold for other users</th>
<th>Reporting threshold for manufacturing and processing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silver</td>
<td>10000 lbs</td>
<td>25000 lbs.</td>
</tr>
<tr>
<td>Zinc</td>
<td>10000 lbs</td>
<td>25000 lbs.</td>
</tr>
<tr>
<td>Copper and/or copper alloys and compounds (as Cu)</td>
<td>10000 lbs</td>
<td>25000 lbs.</td>
</tr>
</tbody>
</table>

Clean Water Act Section 311 Hazardous Substances (40 CFR 117.3)
None present or none present in regulated quantities.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130):
None present or none present in regulated quantities.

US State Regulations
US. California Proposition 65
No ingredient regulated by CA Prop 65 present.

WARNING: This product contains or produces a chemical known to the State of California to cause cancer and birth defects (or other reproductive harm). (California Health & Safety Code Section 25249.5 et seq.)

US. New Jersey Worker and Community Right-to-Know Act
Chemical Identity
Silver
Zinc
Copper and/or copper alloys and compounds (as Cu)
Boric acid

US. Massachusetts RTK - Substance List
No ingredient regulated by MA Right-to-Know Law present.

US. Pennsylvania RTK - Hazardous Substances
Chemical Identity
Silver
Zinc
Copper and/or copper alloys and compounds (as Cu)

US. Rhode Island RTK
No ingredient regulated by RI Right-to-Know Law present.

Canada Federal Regulations
List of Toxic Substances (CEPA, Schedule 1)
Chemical Identity
Zinc
Potassium fluoroborate

Export Control List (CEPA 1999, Schedule 3)
Not Regulated

National Pollutant Release Inventory (NPRI)
Canada. National Pollutant Release Inventory (NPRI) Substances, Part 5, VOCs with Additional Reporting Requirements
NPRI PT5 Not Regulated

Canada. Canadian Environmental Protection Act (CEPA). National Pollutant Release Inventory (NPRI) (Parts 1-4)
NPRI Not Regulated
### Greenhouse Gases
Not Regulated

### Controlled Drugs and Substances Act

<table>
<thead>
<tr>
<th>CA CDSI</th>
<th>Not Regulated</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA CDSII</td>
<td>Not Regulated</td>
</tr>
<tr>
<td>CA CDSIII</td>
<td>Not Regulated</td>
</tr>
<tr>
<td>CA CDSIV</td>
<td>Not Regulated</td>
</tr>
<tr>
<td>CA CDSV</td>
<td>Not Regulated</td>
</tr>
<tr>
<td>CA CDSVII</td>
<td>Not Regulated</td>
</tr>
<tr>
<td>CA CDSVIII</td>
<td>Not Regulated</td>
</tr>
</tbody>
</table>

### Precursor Control Regulations
Not Regulated

### Mexico. Substances subject to reporting for the pollutant release and transfer registry (PRTR): not applicable

### Inventory Status:

<table>
<thead>
<tr>
<th>Inventory</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia AICS</td>
<td>On or in compliance with the inventory</td>
</tr>
<tr>
<td>Canada DSL Inventory List</td>
<td>One or more components are not listed or are exempt from listing.</td>
</tr>
<tr>
<td>EINECS, ELINCS or NLP:</td>
<td>One or more components are not listed or are exempt from listing.</td>
</tr>
<tr>
<td>Japan (ENCS) List:</td>
<td>One or more components are not listed or are exempt from listing.</td>
</tr>
<tr>
<td>China Inv. Existing Chemical Substances:</td>
<td>On or in compliance with the inventory</td>
</tr>
<tr>
<td>Korea Existing Chemicals Inv. (KECI):</td>
<td>One or more components are not listed or are exempt from listing.</td>
</tr>
<tr>
<td>Canada NDSL Inventory:</td>
<td>One or more components are not listed or are exempt from listing.</td>
</tr>
<tr>
<td>Philippines PICCS:</td>
<td>On or in compliance with the inventory</td>
</tr>
<tr>
<td>US TSCA Inventory:</td>
<td>One or more components are not listed or are exempt from listing.</td>
</tr>
<tr>
<td>New Zealand Inventory of Chemicals:</td>
<td>One or more components are not listed or are exempt from listing.</td>
</tr>
<tr>
<td>Japan ISHL Listing:</td>
<td>One or more components are not listed or are exempt from listing.</td>
</tr>
<tr>
<td>Japan Pharmacopoeia Listing:</td>
<td>One or more components are not listed or are exempt from listing.</td>
</tr>
<tr>
<td>Mexico INSQ:</td>
<td>One or more components are not listed or are exempt from listing.</td>
</tr>
<tr>
<td>Ontario Inventory:</td>
<td>One or more components are not listed or are exempt from listing.</td>
</tr>
<tr>
<td>Taiwan Chemical Substance Inventory:</td>
<td>One or more components are not listed or are exempt from listing.</td>
</tr>
</tbody>
</table>

### 16. OTHER INFORMATION

#### Definitions:

**Revision Date:** 04/04/2018

**Further Information:** Additional information is available by request.

**Disclaimer:**

The Lincoln Electric Company urges each end user and recipient of this SDS to study it carefully. See also www.lincolnelectric.com/safety. If necessary, consult an industrial hygienist or other expert to understand this information and safeguard the environment and protect workers from potential hazards associated with the handling or use of this product. This information is believed to be accurate as of the revision date shown above. However, no warranty, expressed or implied, is given. Because the conditions or methods of use are beyond Lincoln Electric’s control, we assume no liability resulting from the use of this product. Regulatory requirements are subject to change and may differ between various locations. Compliance with all applicable Federal, State, Provincial, and local laws and regulations remain the responsibility of the user.
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