 Flux-Coated Alloys of Silver, Copper, Nickel and Zinc

Material Safety Data Sheet

1. Product And Company Identification
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Supplier
--------
Lucas-Milhaupt, Inc.
A Handy & Harman Company
5656 South Pennsylvania Avenue
Cudahy, WI  53110
Telephone Number: 414-769-6000
FAX Number: 414-769-1093

Supplier Emergency Contacts & Phone Number
---------------------------------------------
Chemtrec:  (800) 424-9300

Manufacturer
------------
Lucas-Milhaupt, Inc.
A Handy & Harman Company
5656 South Pennsylvania Avenue
Cudahy, WI  53110
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FAX Number: 414-769-1093

Manufacturer Emergency Contacts & Phone Number
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Chemtrec:  (800) 424-9300

Issue Date: 06/30/2003
Product Name: Flux-Coated Alloys of Silver, Copper, Nickel and Zinc
CAS Number: Not Established
MSDS Number: 296
Product Code: 39-505 (Braze 505, Flux-Coated)

Product Identification Text
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WARNING: This product contains a chemical(s) known to the State of California to cause cancer.

2. Composition/Information On Ingredients
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Ingredient Name - (CAS Number) - %
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Boric acid (10043-35-3)
Copper (7440-50-8)
Inorganic fluoride compounds (Not Established)
Methyl acrylate (96-33-3)
Nickel (7440-02-0)
Potassium tetraborate (12045-78-2)
Silver (7440-22-4)
Zinc (7440-66-6)
3. Hazards Identification

Primary Routes(s) Of Entry

Inhalation

Eye Hazards

Except for the potential for physical injury, eye contact with these products is not a plausible mode of exposure.

Skin Hazards

Skin contact with this product for extended periods of time may cause irritation and/or contact dermatitis.

Ingestion Hazards

Ingestion of this product, as a solid, is not a plausible mode of exposure.

Inhalation Hazards

Inhalation of the components and decomposition byproducts of this product is not known to present a significant risk to health when used according to instructions and with appropriate protective measures (see Section #8). Inhalation of the components and decomposition byproducts has been reported to cause one or more of the following symptoms and/or effects upon excessively high or prolonged exposure:

COPPER: Acute exposure may cause respiratory tract irritation, fever, muscle ache, chills, cough, weakness, and a metallic taste. Chronic exposure may damage the liver, kidney, spleen, pancreas, and brain.

INORGANIC FLUORIDE COMPOUND: Acute exposure may irritate the nose, throat, and respiratory tract, and may cause cough, nose bleeds, nausea, vomiting, chest tightness, chills, fever, tearing, pneumonitis, and pulmonary edema. Chronic exposure may cause abdominal pain and cramps, liver and kidney damage, impaired pulmonary function, and fluorosis (a disease characterized by mottled teeth, osteosclerosis, and pain and loss of mobility in joints).

BORIC ACID/POTASSIUM TETRABORATE: Inhalation may irritate the nose, throat, and respiratory system. Chronic exposure to boric acid may cause borism, which is characterized by dry skin, skin eruptions, and gastrointestinal disturbances.

METHYL ACRYLATE: This substance has a pungent, unpleasant odor, and is an irritant to the eyes, mucous membranes, respiratory tract, and gastrointestinal system. Case studies have also reported allergic reactions. Ocular edema. Chronic exposure may increase the risk of cancer to the nasopharynx, lungs, prostate, and kidney.

SILVER: Chronic exposure may cause argyria, a blue-gray discoloration of the eyes, skin, and respiratory tract.

ZINC: Acute exposure to zinc oxide may cause respiratory tract irritation and
"metal fume fever", which is characterized by a metallic taste, cough, dry throat, chills, fever, tightness of chest, headache, nausea, shortness of breath, vomiting, and fatigue.

4. First Aid Measures
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Skin
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Remove contaminated clothing. Wash affected area with large quantities of water for at least five minutes. Seek medical attention if necessary. Launder or dry-clean clothing before reuse.

Inhalation
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If signs and symptoms of toxicity are observed, remove subject from area, administer oxygen, and seek medical attention. Keep the subject warm and at rest. Perform artificial respiration if breathing has stopped.

Note To Physician
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None of the components are acutely toxic by ingestion, nor are they absorbed through the skin. Extensive or prolonged skin contact may cause contact or allergic dermatitis. Inhalation of zinc fume may cause severe respiratory illness.

5. Fire Fighting Measures
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Fire And Explosion Hazards
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These products may react vigorously or ignite when exposed to incompatible materials (see Section #10). If present in a fire or explosion, they may emit fumes of the constituent metals and/or metal oxides, boron oxide, gaseous and particulate fluorides, acrolein, aldehydes, carbon monoxide, smoke, and irritant combustion byproducts.

Extinguishing Media
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Use dry chemical. Do not use water.

Fire Fighting Instructions
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If fighting a fire in which these products are present, wear a self-contained breathing apparatus with full facepiece operated in pressure-demand or other positive pressure mode.

6. Accidental Release Measures
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Not applicable.

7. Handling And Storage
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Handling Precautions
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No special handling precautions are required.

Storage Precautions
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Do not store in proximity to incompatible materials (see Section #10).

Work/Hygienic Practices
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As good hygiene practice, after using this product wash hands and face before eating, drinking, applying cosmetics, or using tobacco.

8. Exposure Controls/Personal Protection
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Engineering Controls
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Use appropriate ventilation (e.g., dilution, local exhaust) adequate to maintain concentrations of all components and their byproducts to within their respective OSHA PELs or other applicable standards.

Eye/Face Protection
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Wear eye protection adequate to prevent eye injury from the hazards of brazing. Plastic-frame spectacles with side shields and filter lenses (shade #3 or #4) are recommended.

Skin Protection
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Wear appropriate protective gloves and clothing to prevent skin injuries from the hazards of brazing. Avoid flammable fabrics.

Respiratory Protection
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If an exposure level exceeds an applicable exposure standard, use a NIOSH-approved respirator having a configuration (type of facepiece, filter media, assigned protection factor, etc.) appropriate to the concentration of the contaminant(s) generated. For guidance on selection and use of respiratory protection, consult American National Standard Z88.2 (ANSI, New York, NY 10036 USA).

Ingredient(s) - Exposure Limits
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Boric acid
          No OSHA PEL(s)          No ACGIH TLV(s)
Copper
      OSHA PELs: 0.1 mg/m3 TWA (fume); 1 mg/m3 TWA (dusts and mists)
      ACGIH TLVs: 0.2 mg/m3 TWA (fume); 1 mg/m3 TWA (dusts and mists)
Inorganic fluoride compounds
      OSHA PEL: 2.5 mg/m3 TWA (as F-)
      ACGIH TLV: 2.5 mg/m3 TWA (as F-)
Methyl acrylate
      OSHA PEL: 10 ppm TWA "Skin"
      ACGIH TLV: 2 ppm TWA "Skin"
Nickel
      OSHA PEL: 1 mg/m3 TWA
      ACGIH TLV: 1.5 mg/m3 TWA
Potassium tetraborate
      No OSHA PEL(s)
      No ACGIH TLV(s)
Silver
      OSHA PEL: 0.01 mg/m3 TWA
      ACGIH TLV: 0.1 mg/m3 TWA (metal)
Zinc
OSHA PEL: 5 mg/m³ TWA (as ZnO fume)
ACGIH TLVs: 5 mg/m³ TWA; 10 mg/m³ STEL (as ZnO fume)

9. Physical And Chemical Properties
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Appearance
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Color will vary with different alloys.

Chemical Type: Mixture
Physical State: Solid
Percent Volatiles: Not Applicable (N/A)
Vapor Pressure: N/A
Solubility: Insoluble

10. Stability And Reactivity
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Stability: stable
Hazardous Polymerization: will not occur
Conditions To Avoid (Stability)
Silver and copper can form unstable acetylides if in contact with acetylene gas.

Incompatible Materials
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Acetic anhydride; strong acids; alkali and alkali earth metals; zirconium; platinum; bromine trifluoride; ammonia; ammonium nitrate; azides; nitric acid; ethylene imine; chlorine trifluoride; sulfuric acid; inorganic and organic peroxides; peroxyformic acid; oxalic acid; tartaric acid; 1-bromo-2-propyne; permonosulfuric acid; bromates, chlorates, and iodates of alkali and alkali earth metals; halogens; hydrazine; hydrazoic acid; performic acid; phosphorus; selenium; dioxane; sulfur; titaniumplus potassium perchlorate; inorganic nitrates; carbon disulfide; hydrazine mononitrate; hydroxylamine; selenium; tellurium.

Hazardous Decomposition Products
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Heating to elevated temperatures may liberate metal/metal oxide fume and/or thermal decomposition products of flux components. The latter may include boron oxide, fluorides, carbon monoxide, acrolein, and other aldehydes.

11. Toxicological Information
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Chronic/Carcinogenicity
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Nickel is classified as a potential human carcinogen by the following organizations (with respective subclassifications): (1) IARC (Group 2B); (2) NTP (Group R). No other components of these products are classified as potential or demonstrated carcinogens by IARC, NTP, or OSHA.

Reproductive Effects
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In experimental animal studies, inorganic borate compounds and boric acid have been found to cause decreased sperm production and testicular effects in male rats, and developmental effects in fetuses of exposed female mice. No human reproductive effects attributable to occupational exposure to borates or boric acid have been established. Nickel has produced fetotoxic and teratogenic effects in animal studies.

**Mutagenicity (Genetic Effects)**

Nickel has produced mutagenic responses in mammalian cell cultures. Inorganic fluoride compounds have been demonstrated to induce mutagenic changes in mammalian cell in culture. The significance of these findings to human health risks is unknown.

**Conditions Aggravated By Overexposure**

Pre-existing pulmonary diseases (e.g., bronchitis, asthma) may be aggravated by inhalation overexposure, particularly as fume. Chronic overexposure by inhalation may aggravate pre-existing diseases of the liver, kidneys, gastrointestinal system, nervous system, and musculoskeletal system.

**Ingredient(s) - Toxicological Data**

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<thead>
<tr>
<th>Compound</th>
<th>LD50</th>
<th>LC50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boric acid</td>
<td>2660 mg/kg</td>
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</tr>
<tr>
<td>Copper</td>
<td>3.5 mg/kg</td>
<td>No data available</td>
</tr>
<tr>
<td>Inorganic fluoride compounds</td>
<td>245 mg/kg</td>
<td>No data available</td>
</tr>
<tr>
<td>Methyl acrylate</td>
<td>277 mg/kg</td>
<td>1350 ppm/4h. (rat)</td>
</tr>
<tr>
<td>Nickel</td>
<td>5 gm/kg</td>
<td>No data available</td>
</tr>
<tr>
<td>Potassium tetraborate</td>
<td>No data available</td>
<td>No data available</td>
</tr>
<tr>
<td>Silver</td>
<td>&gt;5 gm/kg</td>
<td>No data available</td>
</tr>
<tr>
<td>Zinc</td>
<td>No data available</td>
<td>No data available</td>
</tr>
</tbody>
</table>

**12. Ecological Information**

In their intended manner of use, these products should not be released into the environment, and adverse effects on ecosystems are not anticipated under recommended conditions of use, storage, and disposal.

**13. Disposal Considerations**

Dispose of unused or unusable product in accordance with applicable Federal, State/Provincial, and local regulations.

**14. Transport Information**
These products are not Hazardous Substances or Dangerous Goods per USDOT/IATA/IMO regulations.

15. Regulatory Information
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SARA Hazard Classes
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Acute Health Hazard; Chronic Health Hazard

Ingredient(s) - U.S. Regulatory Information
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Copper
  SARA Title III - Section 313 Form "R"/TRI Reportable Chemical
Methyl acrylate
  SARA Title III - Section 313 Form "R"/TRI Reportable Chemical
Nickel
  SARA Title III - Section 313 Form "R"/TRI Reportable Chemical
Silver
  SARA Title III - Section 313 Form "R"/TRI Reportable Chemical

Canadian Regulatory Information
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WHMIS Class(es) and Division(s): D1B, D2A, D2B
Component(s) on Ingredients Disclosure List:
  1. Boric acid (CASRN 10043-35-3)
  2. Copper, elemental (CASRN 7440-50-8)
  3. Fluoride compounds, inorganic, n.o.s.
  4. Methyl acrylate (CASRN96-33-3)
  5. Nickel, elemental (CASRN 7440-02-0)
  6. Silver, elemental (CASRN7440-22-4)

16. Other Information
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Revision/Preparer Information
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This MSDS Supersedes A Previous MSDS Dated: 03/11/1998

Disclaimer
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Lucas-Milhaupt, Inc.