1.0 PRODUCT AND COMPANY IDENTIFICATION

PMX Industries, Inc.
5300 Willow Creek Drive SW
Cedar Rapids, Iowa 52404-4303

Emergency: 319-368-7700

TELEPHONE: 319-368-7700
FAX: 319-368-7701

PRODUCT NAMES: PMX ALLOY # COMMON NAME UNS #/CDA #
706 Copper Nickel 10% C70600
710
713
715 Copper Nickel 30% C71500
725 Copper Nickel Tin C75200

CHEMICAL FAMILY: Copper Alloy

ISSUE DATE: December 15, 2004
SUPERSEDES DATE: May 13, 1999

2.0 HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:
Copper alloy products in the natural state do not present a hazard for emergency response personnel.

POTENTIAL HEALTH EFFECTS:
Copper alloy products in the natural state do not present an inhalation, ingestion, or contact hazard. However, operations such as burning, welding, sawing, brazing, or grinding may release fumes and/or dusts which may present health hazards if occupational exposure limits are exceeded.

LIKELY ROUTES OF EXPOSURE: Inhalation, Eye Contact, Skin Contact

INHALATION: Short-term exposure to fumes/dust may produce irritation of the respiratory system. Exposure to high concentrations of copper or tin oxide fumes may cause metal fume fever.

EYE: Short-term exposure to fumes/dust may produce irritation.

SKIN: Repeated or prolonged exposure to copper dusts or mists may cause irritant or allergic contact dermatitis.

INGESTION: Ingestion of large doses of nickel compounds (1-3 mg/kg) has been shown to cause intestinal disorders, convulsions, and asphyxia.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:
Exposure to fumes or dust may aggravate existing respiratory disease or dermatitis.
TARGET ORGANS:  Upper respiratory tract, eyes, skin

SIGNS AND SYMPTOMS:
Metal fume fever – metallic taste in mouth, dryness, and irritation of the throat, and influenza-like symptoms. The effects may be delayed.
Nickel overexposure – effects on nasal sinuses, including inflammation and ulceration.

CARCINOGENICITY:

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>ACGIH</th>
<th>IARC</th>
<th>NTP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper (fume, dusts &amp; mists)</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Iron oxide dust and fume</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Nickel</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Tin (metal/oxide)</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

See Toxicological Information (Section #11)

POTENTIAL ENVIRONMENTAL EFFECTS:
None known. Product has not been tested for environmental properties.

3.0 CHEMICAL COMPONENTS

NOTE: This MSDS applies to a range of alloys. For actual compositions refer to material test report or specific alloy specification. All percentages are by weight.

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>CAS #</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper</td>
<td>7440-50-8</td>
<td>63 – 97</td>
</tr>
<tr>
<td>Iron</td>
<td>7439-89-6</td>
<td>0.5 – 2.3</td>
</tr>
<tr>
<td>Nickel</td>
<td>7440-02-0</td>
<td>9.5 – 33</td>
</tr>
<tr>
<td>Tin</td>
<td>7440-31-5</td>
<td>2.3 – 8.5</td>
</tr>
</tbody>
</table>

4.0 FIRST AID MEASURES

INHALATION: If exposed to excessive levels of metal fumes, remove to fresh air. Seek medical attention.
EYE: Flush with water for at least 15 minutes.
SKIN: Wash with soap and water.
5.0 FIRE FIGHTING MEASURES

SUITABLE EXTINGUISHING MEDIA: Use extinguishing media appropriate to the surrounding material.

SPECIAL FIREFIGHTING INSTRUCTIONS: Copper alloy products in the solid state present no fire or explosion hazard, but may react with strong acids, bases, or oxidizing agents.

6.0 ACCIDENTAL RELEASE MEASURES

STEPS TO BE TAKEN IN THE EVENT OF SPILLS, LEAKS, OR RELEASES: Not applicable

7.0 HANDLING AND STORAGE

HANDLING: In welding, precautions should be taken for airborne contaminants that may originate from components of the welding rod.

8.0 EXPOSURE CONTROLS/PERSONAL PROTECTION

EXPOSURE GUIDELINES

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>OSHA PEL TWA</th>
<th>ACGIH® TLV® TWA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper dust, mist</td>
<td>1.0 mg/m³</td>
<td>1.0 mg/m³</td>
</tr>
<tr>
<td>Copper fume</td>
<td>0.1 mg/m³</td>
<td>0.2 mg/m³</td>
</tr>
<tr>
<td>Iron oxide</td>
<td>10.0 mg/m³</td>
<td>5.0 mg/m³</td>
</tr>
<tr>
<td>Nickel, elemental</td>
<td>1.0 mg/m³</td>
<td>1.5 mg/m³</td>
</tr>
<tr>
<td>Tin metal/oxide</td>
<td>2.0 mg/m³</td>
<td>2.0 mg/m³</td>
</tr>
</tbody>
</table>

ENGINEERING CONTROLS: Local exhaust ventilation should be utilized when welding, burning, sawing, brazing, grinding, or machining when exposure exceeds occupational exposure limits.

EYE PROTECTION: Safety glasses or goggles should be utilized as required by exposure. Other protective equipment should be utilized as required by welding standards.

SKIN PROTECTION: Wear appropriate personal protective clothing to prevent skin contact with copper dusts and mists.

RESPIRATORY PROTECTION: NIOSH-approved dust or fume respirator should be used to avoid excessive inhalation of particulates when exposure exceeds occupational exposure limits.

OTHER PREVENTIVE MEASURES: Do not eat, drink, or smoke during work. Wash hands before eating or smoking.
9.0 PHYSICAL AND CHEMICAL PROPERTIES

**APPEARANCE:** Salmon-colored, lustrous metal

**ODOR:** None

**PH:** Not applicable

**PHYSICAL STATE:** Solid

**VAPOR DENSITY (AIR = 1):** Not applicable

**PERCENT VOLATILE:** Not applicable

**EVAPORATION RATE:** Not applicable

**SPECIFIC GRAVITY:** 8.94

**SOLUBILITY IN WATER:** Not applicable

**DENSITY, LB/IN³:** Not available

**MELTING POINT:** >2,050 °F

**FLASH POINT:** Not applicable

**LOWER EXPLOSIVE LIMIT (%):** None

**AUTOIGNITION TEMPERATURE:** Not applicable

**UPPER EXPLOSIVE LIMIT (%):** None

10.0 STABILITY AND REACTIVITY

**CHEMICAL STABILITY:** Stable

**CONDITIONS TO AVOID:** None

**INCOMPATIBLE MATERIALS:** Mercury, ammonia, acetylene acids. Contact with strong acids, bases, or oxidizing agents

**HAZARDOUS DECOMPOSITION PRODUCTS:** Metallic dust or fumes may be produced during welding, burning, grinding, and machining.

**POSSIBILITY OF HAZARDOUS REACTIONS:** Will not occur

11.0 TOXICOLOGY INFORMATION

**ACUTE TOXICITY DATA FOR COMPONENTS**

- **Copper**
  - TDLo: 120 µg/kg (human, oral—gastrointestinal effects)
  - LD₅₀: 0.07 mg/kg (mouse, intraperitoneal)

- **Iron**
  - TDLo: 77 mg/kg (human, oral—behavioral and gastrointestinal effects)
  - LD₅₀: 30 gm/kg (rat, oral)
  - LD₅₀: 20 gm/kg (guinea pig, oral)

- **Nickel**
  - LD₅₀: 250 mg/kg (rodent, intraperitoneal)

- **Tin**
  - TDLo: 250 mg/kg (human, oral—gastrointestinal effects)
CHRONIC EFFECTS:
Repeated or prolonged overexposure to copper fume may cause the skin and hair to change color.
Hypersensitivity to nickel is common and may cause allergic contact dermatitis, pulmonary asthma, and conjunctivitis.
Repeated or prolonged overexposure to tin dusts or fumes may cause stannosis.

12.0 ECOLOGICAL INFORMATION
Not applicable

13.0 DISPOSAL CONSIDERATIONS
WASTE DISPOSAL METHODS:
According to local, state, and federal regulations.

14.0 TRANSPORT INFORMATION
Not applicable

15.0 REGULATORY INFORMATION
GLOBAL INVENTORIES

<table>
<thead>
<tr>
<th></th>
<th>COPPER</th>
<th>IRON</th>
<th>NICKEL</th>
<th>TIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSCA: United States</td>
<td>Included</td>
<td></td>
<td>Included</td>
<td>Included</td>
</tr>
<tr>
<td>DSL: Canada</td>
<td>Included</td>
<td></td>
<td>Included</td>
<td>Included</td>
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<tr>
<td>EINECS: European Union</td>
<td>Included</td>
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<td>Included</td>
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</tr>
</tbody>
</table>

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355):
These alloys are not regulated under Section 302 of SARA and 40 CFR 355.

SARA TITLE III SECTION 311/312 HAZARDOUS CATEGORIZATION (40 CFR 370):
OSHA defines these alloys as hazardous under 29 CFR 1910.1200(d).

SARA TITLE III SECTION 313 TOXIC CHEMICALS (40 CFR 372):
These alloys may contain the following toxic chemical(s) subject to reporting requirements under this section of SARA and of 40 CFR 372:

<table>
<thead>
<tr>
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<th>% BY WEIGHT</th>
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<td>9.5 – 33</td>
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</tbody>
</table>
## OTHER LISTS

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CA Prop 65 Chemical</th>
<th>MA Toxic Substance List</th>
<th>MI Critical Materials Register</th>
<th>NJ Hazardous Substances List</th>
<th>PA Right-to-Know List</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Iron</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
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<td>Yes</td>
</tr>
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<td>Nickel</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Tin</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

## 16.0 OTHER INFORMATION

## REFERENCES

ACGIH® Threshold Limit Values (TLV®) (2004)

Agency for Toxic Substances and Disease Registry (ATSDR):
- Toxicological Profile for Copper, September 2002
- Draft Toxicological Profile for Nickel, September 2003
- Draft Toxicological Profile for Tin, September 2003

International Agency for Research on Cancer (IARC) Monographs

National Library of Medicine (NLM) Databases:
- ChemID
- Integrated Risk Information (IRIS)
- International Toxicity Estimates for Risk (ITER)
- Chemical Carcinogenesis Risk Information System (CCRIS)
- Hazardous Substances Data Bank (HSDB)

National Toxicology Program (NTP) Reports


NIOSH/OSHA Occupational Health Guideline for Copper Fume

NIOSH/OSHA Occupational Health Guideline for Copper Dusts and Mists

NIOSH/OSHA Occupational Health Guideline for Iron Oxide Fume

NIOSH/OSHA Occupational Health Guideline for Nickel Metal and Soluble Nickel Compounds

NIOSH/OSHA Occupational Health Guideline for Inorganic Tin Compounds (as Tin)

OSHA General Industry Standards (29 CFR 1910)

Registry of Toxic Effects of Chemical Substances (RTECS®)
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