MATERIAL SAFETY DATA SHEET FOR LEGGETT & PLATT WIRE DIVISION
PRODUCTS

Galvanize Wire

MIDWEST FASTENERS, INC
450 RICHARD STREET
MIAMISBURG, OH 45342

WELD PINS
STEP HEAD NAILS

DATE OF PREPARATION: May 1, 2010

SECTION I - COMPONENT DATA:

<table>
<thead>
<tr>
<th>CHEMICAL COMPONENTS</th>
<th>C.A.S. NUMBER</th>
<th>% WT.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Metals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iron</td>
<td>7439-89-6</td>
<td>75-99</td>
</tr>
<tr>
<td>Chromium</td>
<td>7440-47-3</td>
<td>&lt;0.10</td>
</tr>
<tr>
<td>Nickel</td>
<td>7440-02-0</td>
<td>&lt;0.10</td>
</tr>
</tbody>
</table>

SECTION I-A - COATINGS

<table>
<thead>
<tr>
<th>CHEMICAL COMPONENTS</th>
<th>C.A.S NUMBER</th>
<th>% WT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zinc</td>
<td>7440-66-6</td>
<td>1-25</td>
</tr>
</tbody>
</table>

SECTION II - PHYSICAL DATA

BOILING POINT (°F): Not applicable (n/a)
VAPOR PRESSURE (mmHg @ 20°C): n/a
VAPOR DENSITY: (Air = 1): n/a
SOLUBILITY IN WATER: n/a
SPECIFIC GRAVITY (H₂O = 1): Approx. 8
PERCENT VOLATILE BY VOLUME: n/a
EVAPORATIVE RATE (ETHYL ETHER = 1): n/a
pH INFORMATION: n/a
APPEARANCE AND ODOR: Silvery-grayish solid - no odor

SECTION III-FIRE & EXPLOSION HAZARD DATA:

FLASH POINT (*F): N/A
METHOD USED: N/A

FLAMMABILITY LIMITS (%VOL):
LEL: N/A
UEL: N/A

AUTO-IGNITION TEMPERATURE (*F): N/A

EXTINGUISHING MEDIA: water spray, carbon dioxide or foam

UNUSUAL FIRE AND EXPLOSION HAZARDS: May generate smoke if sustained fire in the vicinity of this product ignites the protective coating

SECTION IV-REACTIVITY DATA:

STABILITY: Stable

INCOMPATIBILITY: (materials to avoid): None

HAZARDOUS DECOMPOSITION PRODUCTS: Metal fumes and certain noxious gases such as CO may be produced during welding or burning operations

SECTION V-HEALTH HAZARD DATA:

PRIMARY ROUTE(S) OF ENTRY: Skin contact

EFFECTS OF EXPOSURE: No toxic effects would be expected from its inert solid form.

SECTION VI-SPECIAL HANDLING INFORMATION:

VENTILATION: Ventilation as needed should be provided when welding is taking place.

PROTECTIVE CLOTHING: Use appropriate clothing such as welder’s aprons and gloves when welding or burning.

EYE PROTECTION: USE SHIELD AND OR GOGGLES WHEN WELDING, BURNING OR GRINDING

SECTION VII SPECIAL PRECAUTIONS/ADDITIONAL INFORMATION:

SPILLS: N/A
WASTE DISPOSAL METHOD: N/A

SECTION IX – SPECIAL PRECAUTIONS/ADDITIONAL INFORMATION:

PRECAUTIONS FOR HANDLING AND STORAGE: None

DOT INFORMATION:

Hazardous Material Shipping Name: N/A

Hazard Class: N/A

Identification Number: N/A

WHILE THE INFORMATION AND RECOMMENDATIONS SET FORTH ON THIS DATA SHEET ARE BELIEVED TO BE ACCURATE AS OF THE PRESENT DATE, LEGGETT & PLATT WIRE DIVISION MAKES NO WARRANTY WITH RESPECT THERETO AND DISCLAIMS ALL LIABILITY FROM RELIANCE THEREON.
## SECTION 1. PRODUCT INFORMATION

**PRODUCT:**
STEEL

**USE:**
Manufacture of steel products

**SUPPLIER:**
NATIONAL WIRE PRODUCTS, DIVISION OF ATLANTIC STEEL INDUSTRIES, INC.
8203 Fisher Road
Baltimore, MD 21222 U.S.A.

**EMERGENCY TELEPHONE NO.:** (410) 477-1700

## SECTION 2. PREPARATION INFORMATION

**PREPARED BY:** Health and Safety Department

**DATE:** January 22, 1993

**REVISED:** April 3, 1995

## SECTION 3. HAZARDOUS INGREDIENTS

### 3.1 Steel

<table>
<thead>
<tr>
<th>HAZARDOUS INGREDIENT</th>
<th>CAS NUMBER</th>
<th>MAXIMUM CONCENTRATION % (weight/weight)</th>
<th>LD$<em>{50}$/LC$</em>{50}$ (Species and route)</th>
<th>EXPOSURE LIMITS TLV ACGIH (mg/m$^3$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron (Fe)</td>
<td>7439-89-6</td>
<td>91-99</td>
<td>LD$_{50}$ rat-oral: 30 g/kg; guinea pig-oral: 20 g/kg \n</td>
<td></td>
</tr>
<tr>
<td>Manganese (Mn)</td>
<td>7439-96-5</td>
<td>1.0-5.0</td>
<td>LD$_{50}$ rat-oral: 9 g/kg \n</td>
<td></td>
</tr>
<tr>
<td>Chrome (Cr)</td>
<td>7440-47-3</td>
<td>1.0-5.0</td>
<td>n/av</td>
<td>TWA: 0.5 (as metal, CrII, CrIII); 0.05 (as CrVI) \n</td>
</tr>
</tbody>
</table>

n/ap = not applicable  
n/av = not available
### SECTION 3. HAZARDOUS INGREDIENTS (cont’d)

<table>
<thead>
<tr>
<th>HAZARDOUS INGREDIENT</th>
<th>CAS NUMBER</th>
<th>MAXIMUM CONCENTRATION % (weight/weight)</th>
<th>LD&lt;sub&gt;50&lt;/sub&gt;/LC&lt;sub&gt;50&lt;/sub&gt; (Species and route)</th>
<th>EXPOSURE LIMITS TLV ACGIH (mg/m&lt;sup&gt;3&lt;/sup&gt;)</th>
</tr>
</thead>
</table>
| Silicon (Si)          | 7440-21-3  | 0.5-1.5                                | LD<sub>50</sub> rat-oral: 3160 mg/kg  
                        |                         | LC<sub>50</sub> n/av                   | TWA: 10  
                        |                         |                                        | STEL: n/av |
| Carbon (C)            | 7440-44-0  | 0.1-1.0                                | LD<sub>50</sub> mouse-iv: 440 mg/kg  
                        |                         | LC<sub>50</sub> n/av                   | TWA: n/av  
                        |                         |                                        | STEL: n/av |
| Nickel (Ni)           | 7440-02-0  | 0.1-1.0                                | n/av                                          | TWA: 1  
                        |                         |                                        | STEL: n/av |
| Molybdenum (Mo)       | 7439-98-7  | 0.1-1.0                                | n/av                                          | TWA: 5 (soluble)  
                        |                         |                                        | STEL: n/av  
                        |                         |                                        | 10 (insoluble) |
| Sulphur (S)           | 7704-34-9  | 0.1-1.0                                | n/av                                          | TWA: n/av  
                        |                         |                                        | STEL: n/av |
| Tin (Sn)              | 7440-31-5  | 0.1-1.0                                | n/av                                          | TWA: 2  
                        |                         |                                        | STEL: n/av |
| Phosphorous (P)       | 7723-14-0  | 0.1-1.0                                | n/av                                          | TWA: 0.1  
                        |                         |                                        | STEL: n/av |
| Copper (Cu)           | 7440-50-8  | 0.1-1.0                                | LD<sub>50</sub> mouse-iv: 3500 µg/kg  
                        |                         | LC<sub>50</sub> n/av                   | TWA: 0.2 (fume)  
                        |                         |                                        | STEL: n/av  
                        |                         |                                        | 1 (dusts & mists, as Cu) |
| Aluminum (Al)         | 7429-90-5  | <0.10                                  | n/av                                          | TWA: 10 (dust)  
                        |                         |                                        | STEL: n/av  
                        |                         |                                        | 5 (welding fume) |
| Titanium (Ti)         | 7440-32-6  | <0.10                                  | n/av                                          | TWA: n/av  
                        |                         |                                        | STEL: n/av |
| Vanadium (V)          | 7440-62-2  | <0.10                                  | LD<sub>50</sub> rabbit-sub cutaneous: 59 mg/kg  
                        |                         | LC<sub>50</sub> n/av                   | TWA: 0.05 (respirable dust/fume, as V<sub>2</sub>O<sub>5</sub>)  
                        |                         |                                        | STEL: n/av |
SECTION 3. HAZARDOUS INGREDIENTS (cont'd)

<table>
<thead>
<tr>
<th>HAZARDOUS INGREDIENT</th>
<th>CAS NUMBER</th>
<th>MAXIMUM CONCENTRATION % (weight/weight)</th>
<th>LD$<em>{50}$/LC$</em>{50}$ (Species and route)</th>
<th>EXPOSURE LIMITS TLV ACGIH (mg/m$^3$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boron (B)</td>
<td>7440-42-8</td>
<td>&lt;0.10</td>
<td>LD$_{50}$ rat-oral: 650 mg/kg; mouse-oral: 560 mg/kg; rabbit &amp; guinea pig-oral: 310 mg/kg</td>
<td>TWA: n/av STEL: n/av</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LC$_{50}$ n/av</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3.2 Coatings: Wires can be coated with a great variety of metal or nonmetal products. See attached supplementary notes.

SECTION 4. PHYSICAL DATA

<table>
<thead>
<tr>
<th>PHYSICAL STATE:</th>
<th>Solid</th>
<th>EVAPORATION RATE:</th>
<th>n/ap</th>
</tr>
</thead>
<tbody>
<tr>
<td>ODOUR AND APPEARANCE:</td>
<td>No odour, metallic luster</td>
<td>BOILING POINT:</td>
<td>2750°C (approx.)</td>
</tr>
<tr>
<td>ODOUR THRESHOLD:</td>
<td>n/ap</td>
<td>FREEZING POINT:</td>
<td>1530°C (approx.)</td>
</tr>
<tr>
<td>SPECIFIC GRAVITY:</td>
<td>7.86</td>
<td>pH:</td>
<td>n/ap</td>
</tr>
<tr>
<td>VAPOUR PRESSURE:</td>
<td>n/ap</td>
<td>COEFFICIENT OF WATER/OIL DISTRIBUTION:</td>
<td>n/ap</td>
</tr>
<tr>
<td>VAPOUR DENSITY:</td>
<td>n/ap</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SECTION 5. FIRE OR EXPLOSION HAZARD

Not applicable

SECTION 6. REACTIVITY DATA

CONDITIONS UNDER WHICH THE PRODUCT IS CHEMICALLY UNSTABLE: Stable

NAME OF ANY SUBSTANCE OR CLASS OF SUBSTANCE WITH WHICH THE PRODUCT IS INCOMPATIBLE: Acids

CONDITIONS OF REACTIVITY: When in molten state, contact with water or ice can result in violent splashes (release of flammable hydrogen gas).
SECTION 6. REACTIVITY DATA (cont’d)

HAZARDOUS DECOMPOSITION PRODUCTS: Metal oxides of hazardous ingredients listed in Section 3, carbon monoxide

SECTION 7. TOXICOLOGICAL PROPERTIES

ROUTES OF ENTRY:

Skin contact: Yes  Inhalation: Yes
Skin absorption: No  Ingestion: No
Eye contact: Yes

Fumes and/or dusts may be generated from further processing of the product by the user, such as welding, burning, cutting, grinding, machining, melting, crushing, screening or handling activities.

EFFECTS OF ACUTE EXPOSURE TO PRODUCT:

Overexposure to dust or fume formed when further processing the product may be an irritant to eyes, skin and respiratory tract. An overexposure by inhalation to decomposition products may cause metal fume fever characterized by fever and chills.

EFFECTS OF CHRONIC EXPOSURE TO PRODUCT:

Iron: Siderosis
Manganese: May adversely affect central nervous system (CNS) and respiratory system (e.g., asthma)
Chrome: Dermatitis, skin ulcerations, allergic reactions, respiratory symptoms (e.g., asthma), lung cancer
Silicon: Considered a nuisance particulate
Carbon: Eye and respiratory tract irritant
Nickel: Allergic dermatitis ("nickel itch"), lung inflammation, asthma, cancer of the respiratory system
Molybdenum: Weight loss, diarrhea, loss of coordination, pneumoconiosis, breathing difficulties
Sulphur: Mucous membranes irritation
Tin: Stannosis
Phosphorous: Cough, bronchitis, pneumonia
Copper: Skin and hair discoloration, metallic or sweet taste
Aluminum: Shaver's disease (fibrotic lung)
Titanium: Mucous membranes irritation
Vanadium: Inflammation of respiratory passages, asthma, cardiac palpitations, gastrointestinal discomfort, renal damage, nervous depression
Boron: Conjunctivitis
SECTION 7. TOXICOLOGICAL PROPERTIES (cont'd)

EXPOSURE LIMITS: Refer to Section 3.

IRRITANCY OF PRODUCT: n/ap

SENSITIZATION TO PRODUCT: n/ap

CARCINOGENICITY:

The National Toxicology Program (NTP) and the International Agency for Research on Cancer (IARC) list certain hexavalent chromium compounds under the category "confirmed human carcinogen" and certain nickel compounds under the category "suspected human carcinogen".

REPRODUCTIVE TOXICITY: n/av

TERATOGENICITY: n/av

MUTAGENICITY: n/av

NAME OF TOXICOLOGICALLY SYNERGISTIC PRODUCTS: n/av

SECTION 8. PREVENTIVE MEASURES

PERSONAL PROTECTIVE EQUIPMENT TO BE USED:

Eye Protection: Use safety glasses and/or other protective eyewear when exposure to eye or face hazards exists, such as flying objects, molten metal and injurious light radiation (e.g., welding and burning).

Skin Protection: Use protective gloves and/or other personal protective equipment when welding, burning or handling.

Respiratory Protection: When engineering controls are not feasible or sufficient to lower exposure levels below the applicable exposure limit, use a NIOSH-approved respirator which protects against dusts and metal fume in accordance with manufacturers' instructions and use limitations.

SPECIFIC ENGINEERING CONTROLS TO BE USED:

Avoid creating dust/fumes. General or local exhaust ventilation is recommended near source when fumes or dusts are emitted.

PROCEDURES TO BE FOLLOWED IN CASE OF LEAK OR SPILL: n/ap

WASTE DISPOSAL:

Product can be recycled for further use, disposed in an appropriately permitted waste landfill or by other methods in accordance with local, state, provincial and federal regulations.
SECTION 8. PREVENTIVE MEASURES (cont’d)

HANDLING PROCEDURES AND EQUIPMENT:
Use lifting and work devices with rated capacities and in accordance with manufacturers’ instructions.

STORAGE REQUIREMENTS: n/ap

SPECIAL SHIPPING INFORMATION: n/ap

SECTION 9. FIRST AID MEASURES

SPECIFIC FIRST AID MEASURES:
Skin: Wash with mild soap and maintain good personal hygiene. Seek medical attention if conditions persist.

Eyes: Treat for foreign body in the eye. Seek medical attention.

Inhalation: For overexposure to dust/fumes, remove to fresh air. Seek medical attention if necessary.

SECTION 10. ADDITIONAL GENERAL INFORMATION

Disclaimer

The information contained in this material safety data sheet is based on information available to the Company and is believed to be accurate. Where this information is based on data developed by third parties, the Company expressly denies liability. The Company makes no warranty, expressed or implied, regarding the accuracy of this information or data or the results obtained from its use. All recommendations are made without guarantee, since the conditions of use of this product are beyond the Company’s control. The Company assumes no responsibility for any damages resulting from the use of this product described herein.

Please consult National Wire Products, Division of Atlantic Steel Industries, Inc. for further information.
SUPPLEMENTARY NOTES ON STEEL COATINGS

STEEL COATINGS

Wires can be coated with a great variety of metal or non-metal products. Concentrations used for these products are such that they do not need to be disclosed in the material safety data sheet of this product. Following is a general description of effects on health and preventive measures concerning metal and non-metal coatings.

NON-METAL COATINGS

1) Dry Lubricants

This class of coatings includes products made of lime, borates and carbonates that may irritate the skin, eyes and respiratory system. The risk of inhalation caused by the quantity of product that could remain on the steel is very small. Preventive measures for the skin and eyes must be taken.

2) Coatings and Petroleum-based Lubricants

This class of coatings includes oils of different viscosities with or without minor additive elements. These elements include:

- corrosion inhibitors (phosphate)
- emulsifiers (fatty acids)
- detergents (sulphonates)

These products may irritate the skin, eyes and respiratory system. Contact with skin is the main element concerning this class of coatings. Lighter oils, like kerosene, can affect fatty tissues and cause redness and dermatosis after prolonged contact. Heavier oils can clog up skin pores and cause an inflammation resembling acne.

Preventive measures for the skin and eyes must be taken. It is necessary to maintain a good personal hygiene, that is to wash with water and mild soap the hands and other body parts that are exposed.

METAL COATINGS

This class of coatings can present health hazards only if the welding, cutting, heating or grinding operations are not done properly.

ZINC

Certain types of wires can be zinc-coated (CAS No. 7440-66-5). The weight of the coating varies between 60 and 200 g/m², according to a sampling done on wires of different diameters.

Overexposure to zinc fumes generated as a result of welding, heating or cutting operations can cause an acute affection called metal fume fever. This illness presents flu-like symptoms, such as fever, chills, nausea and vomiting. Symptoms appear from 4 to 6 hours after exposure to fumes and can last from 12 to 18 hours. No case of health hazards resulting from a chronic exposure of zinc dusts or fumes has been reported.

Make sure that there is appropriate ventilation.
STEEL

RISKS

- May cause health effects during dust/fume generating activities.
- May cause respiratory system effects when dust/fumes are inhaled.
- May cause skin irritation when in prolonged contact with surface.

PRECAUTIONARY MEASURES

- Limit skin contact. Wear protective gloves.
- Avoid creating dust/fumes.
- During dust/fumes generating activities, provide mechanical ventilation or wear personal protective equipment (i.e., eye protection, protective clothing and appropriate NIOSH-approved respirator).

FIRST AID

Inhalation: For overexposure to dust/fumes, remove to fresh air.
Skin: Wash with mild soap and maintain good personal hygiene.
Eyes: Treat for foreign body in the eye.

In all cases, seek medical attention if necessary.

Refer to material safety data sheet for further information.

NATIONAL WIRE PRODUCTS, DIVISION OF ATLANTIC STEEL INDUSTRIES, INC.
8203 FISHER ROAD, BALTIMORE, MD 21222 U.S.A.
Material Safety Data Sheet

I. INGREDIENTS

<table>
<thead>
<tr>
<th>Base Metal</th>
<th>CAS Number</th>
<th>% Weight</th>
<th>Exposure Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron (Fe)</td>
<td>7439-99-6</td>
<td>Balance</td>
<td>OSHA PEL (mg/m³)</td>
</tr>
<tr>
<td>Alloyming Elements</td>
<td></td>
<td></td>
<td>ACGIH TLV (mg/m³)</td>
</tr>
<tr>
<td>Carbon (C)</td>
<td>7440-44-0</td>
<td>0.1% - 1.5%</td>
<td>10 (Fe₂O₃ Fume)</td>
</tr>
<tr>
<td>Chromium (Cr)</td>
<td>7440-47-3</td>
<td>0.1% - 1.2%</td>
<td>5.0 (Fe₂O₃ Fume)</td>
</tr>
<tr>
<td>Copper (Cu)</td>
<td>7440-56-7</td>
<td>0.04% - 0.7%</td>
<td>None Listed</td>
</tr>
<tr>
<td>Lead (Pb)</td>
<td>7439-92-1</td>
<td>0.15% - 0.35%</td>
<td>1.0 as chrome</td>
</tr>
<tr>
<td>Manganese (Mn)</td>
<td>7439-86-5</td>
<td>0.05% - 0.20%</td>
<td>0.2 as copper; 1.0 as dust</td>
</tr>
<tr>
<td>Molybdenum (Mo)</td>
<td>7439-88-7</td>
<td>0.01% - 0.10%</td>
<td>0.05 as fume &amp; dust</td>
</tr>
<tr>
<td>Nickel (Ni)</td>
<td>7440-02-0</td>
<td>0.01% - 0.10%</td>
<td>5 as manganese</td>
</tr>
<tr>
<td>Phosphorus (P)</td>
<td>7723-14-0</td>
<td>0.15% Max</td>
<td>15 as insoluble compds</td>
</tr>
<tr>
<td>Silicon (Si)</td>
<td>7440-21-3</td>
<td>0.15% - 2.20%</td>
<td>0.1 as Nickel</td>
</tr>
<tr>
<td>Sulfur (S)</td>
<td>7704-34-9</td>
<td>0.00% - 0.05%</td>
<td>None Listed</td>
</tr>
<tr>
<td>Tungsten (W)</td>
<td>7440-33-7</td>
<td>0.1% - 0.18%</td>
<td>13 sulfur dioxide</td>
</tr>
<tr>
<td>Vanadium (V)</td>
<td>7440-62-2</td>
<td>0.01% - 0.10%</td>
<td>None Listed</td>
</tr>
<tr>
<td>Zinc (Zn) coating</td>
<td>1314-13-2</td>
<td>0.1% - 1.0%</td>
<td>0.5 dust; 0.1 fume</td>
</tr>
</tbody>
</table>

II. PHYSICAL DATA

- Material state (Normal Conditions): Liquid, Solid
- Melting Point: Approx 2750°F
- Boiling Point: NA °F
- Specific Gravity (H₂O = 1) - 7
- Solubility in water (% by weight) - NA
- Upper Pressure (Limiting at 30°C) - N/A

III. PERSONAL PROTECTIVE EQUIPMENT

- Respiratory Protection: NIOSH approved dust/mist/fume respirator should be used during welding or burning if OSHA PEL or TLV is exceeded.
- Gloves, Arms, and Body: Use appropriate protective clothing such as weathers aprons & gloves when welding or burning. Check local codes.
- Eyes and Face: Safety glasses should always be worn when grinding or cutting; face shields should be worn when welding or burning.
- Other Clothing and Equipment: As required.

IV. EMERGENCY MEDICAL PROCEDURES

- Inhalation: Remove to fresh air; if condition continues, consult physician.
- Eye Contact: Immediately flush eyes with running water and remove any contact lenses. Get medical attention.
- Skin Contact: If irritation develops, remove clothing and wash well with soap and water. Seek medical attention.
- Ingestion: If significant amounts of metal are ingested, seek medical attention.
V. HEALTH/SAFETY INFORMATION

HEALTH

Steel products in the natural state do not present an inhalation, ingestion, or contact health hazard. However, operations such as welding, burning, sawing, brazing, grinding, and possibly machining, which result in elevating the temperature of the product to or above its melting point or results in the generation or airborne particulates may present hazards. The above operations should be performed in well ventilated areas. The major exposure hazard is inhalation.

Effects of overexposure are as follows:

Acute: Excessive inhalation of metallic fumes and dusts may result in irritation of eyes, nose, and throat. Also, high concentrations of fumes and dusts of iron-oxide, manganese, copper, zinc, & lead may result in metal fume fever. Typical symptoms consist of a metallic taste in the mouth, dryness and irritation of the throat, chills and fever, and usually last from 12 to 48 hours.

Chronic: Chronic and prolonged inhalation of high concentrations of fumes or dust of the following elements may lead to the conditions listed opposite the element:
- Iron (iron-oxide) - Pulmonary effects, siderosis.
- Manganese - Bronchiils, pneumonitis, lack of coordination.
- Chromium - Various forms of dermatitis, inflammation and/or ulceration of upper respiratory tract, and possibly cancer of nasal passages and lungs. Based on available information, there does not appear to be any evidence that exposure to welding fume induces human cancer.
- Nickel - SAME AS CHROMIUM
- Copper - Pulmonary effects.
- Vanadium - No reported cases of exposure to vanadium.
- Molybdenum - Pain in joints, hands, knees and feet.
- Tungsten - Some evidence of pulmonary involvement such as cough.
- Lead - Prolonged exposures can cause behavioral changes, kidney damage, pernioney neuropathy characterized by decreased hand-grip strength and adverse reproductive effects.
- Zinc - None reported.

See Section I.

FIRE AND EXPLOSION

<table>
<thead>
<tr>
<th>Flash Point</th>
<th>Auto-Ignition Temperature</th>
<th>Flammable Limits in Air</th>
<th>Extinguishing Media</th>
</tr>
</thead>
<tbody>
<tr>
<td>NA</td>
<td>°F</td>
<td>NA</td>
<td>°F</td>
</tr>
<tr>
<td>NA</td>
<td>NA</td>
<td>Lower NA</td>
<td>%</td>
</tr>
<tr>
<td>NA</td>
<td>NA</td>
<td>Upper NA</td>
<td>%</td>
</tr>
</tbody>
</table>

Fire and Explosion Hazards: None
Extinguishing Media Not to be Used: NA

REACTIVITY

- Stability: Stable
- Incompatibility (Materials to Avoid): Reacts with strong acids to form hydrogen gas.

Non-ventilated areas when cutting, welding, burning, or brazing; avoid generation of airborne dusts and fumes.

Keep Area Well Ventilated

Hazardous Decomposition Products: Metallic oxides.

VI. ENVIRONMENTAL

Disposal Procedures: Special Precautions: Use good housekeeping practices to prevent accumulation of dust and to keep airborne dust to a minimum.

Waste Disposal Method: Dust, etc. — follow federal, state, and local regulations regarding disposal.

VII. ADDITIONAL INFORMATION

Disclaimer:
The information in this MSDS was obtained from sources which we believe are reliable. However, the information is provided without any representation or warranty, expressed or implied regarding the accuracy or correctness.

The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and their reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of the product.
SECTION I. MATERIAL IDENTIFICATION

SECTION II. HAZARDOUS INGREDIENTS

SECTION III. PHYSICAL DATA

SECTION IV. FIRE AND EXPLOSIVE

SECTION V. REACTIVITY DATA

SECTION VI. Environmental
Material Safety Data Sheet

MIDWEST PASTENERS, INC
450 RICHARD STREET
MIAMISBURG, OHIO 45342

COPPER COATED
WELD PINS
STEP HEAD NAILS

Date Prepared: April 18, 2003

Section 1 - Product Identification

Product Name: Copper Coated Steel Wire

Section 2 - Hazardous Ingredients

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>CAS#</th>
<th>%</th>
<th>TWA (ACGIH) (mg/m³)</th>
<th>PEL (OSHA) (mg/m³)</th>
<th>Carcinogen LC50 (cml. rat)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron</td>
<td>7439-88-6</td>
<td>&lt;99</td>
<td>5.0 (as Fe₂O₃ fume)</td>
<td>10.0 (as Fe₂O₃ fume)</td>
<td>---</td>
</tr>
<tr>
<td>Copper</td>
<td>7440-53-8</td>
<td>&lt;1</td>
<td>1.0</td>
<td>1.0</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.1 (as fume)</td>
<td>0.1 (as fume)</td>
<td>---</td>
</tr>
<tr>
<td>Manganese</td>
<td>7439-86-5</td>
<td>1</td>
<td>1.0 (as fume)</td>
<td>5.0</td>
<td>---</td>
</tr>
</tbody>
</table>

Percentages are representative of product and may vary depending on batch composition. Due to the variance in batch composition, trace quantities of antimony, arsenic, barium, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, and thallium may be present in amounts <1%

Section 3 - Physical/Chemical Characteristics

Noncombustible Solid
Boiling Point: N/A
Vapor Pressure: 0 mmHg (approx)
Vapor Density: N/A
Solubility in Water: Insoluble
Appearance and Odor: Odorless solid with metallic lustre
Evaporation Rate: N/A
Specific Gravity: 5.24
Melting Point: 2800°F
% Volatile by Volume: N/A

Section 4 - Fire Fighting Measures
Flash Point: N/A
Flammable Limit: N/A
Explosive Limit: N/A

Extinguishing Media: Dry Compound or Dry Powder

Page 1 of 4
Fire Fighting Instructions

Firefighters should wear full protective clothing including self contained breathing apparatus.

IDLH Concentrations

Iron Oxide Dust and Fume 2,500 mg/m³
Copper Oxide Dust, Fume or Mist 100 mg/m³

Unusual Fire and Explosion Hazards

Spraying water on molten metal may cause an explosion. Use a dry type extinguisher. Product is non-combustible.

NFPA Rating

Health - 1, Flammability - 0, Reactivity - 0

Section 5 - Reactivity Data

Stability

Stable.

Incompatibility

Avoid contact with strong acids and strong alkalies. Avoid contact with calcium hypochlorite.

Hazardous Polymerization

Product will not undergo hazardous polymerization.

Hazardous Decomposition

Metal fumes and certain noxious gases such as CO may be produced during welding or burning operations.

Section 6 - Health Hazard Data

Health Hazards

Acute and Chronic. Toxic effects are expected from its inhaled form. Prolonged, repeated exposure to fumes or dusts generated during heating, cutting, welding, or brazing may cause the following health effects: Benign pneumoconiosis with X-ray shadows indistinguishable from fibrotic pneumoconiosis (siderosis); irritation of the eyes, upper respiratory system, nose, pharynx, nasal perforation; metal fume fever, chills, muscle ache, nausea, fever, dry throat, cough, weakness, exhaustion, metallic or sweet taste, skin or hair discoloration, metallic taste, dermatitis, lung, liver, kidney damage, anemia.
Primary Routes of Overexposure:
- Inhalation
- Ingestion
- Skin Contact

Target Organs:
- Respiratory System, Eyes, Skin, liver, kidneys. (Increased risk with Wilson’s disease.)

Medical Conditions Aggravated by Exposure:
- None found.

Cancer Information:
- Not found to be a carcinogen. None of the product’s components are listed by ACGIH, IARC, OSHA, NIOSH or NTP.

Section 7 - First Aid Procedures

Inhalation:
If a person breathes large amounts of this chemical, move the exposed person to fresh air at once. If breathing has stopped, perform mouth-to-mouth resuscitation. Keep the affected person warm and at rest. Get medical attention as soon as possible.

If a person has eye or skin contact with copper dusts or mists flush the area immediately with water for a full 15 minutes. The skin should be washed with soap and water. If copper dust is swallowed seek immediate medical attention.

Section 8 - Accidental Release Measures

Spill:
Sweep up spill and place in a container.

Waste Disposal:
Dispose of in accordance with applicable local, state and federal laws. May be used for scrap metal.

Section 9 - Handling and Storage

Storage:
Store away from strong acids and strong alkalies. If reduced to dust form keep away from oxidizers, alkalies, sodium azide, and acetylene.

Other Precautions:
Avoid breathing fumes or dust.
Section 10 - Exposure Controls / Personal Protection

Eye Protection
As necessary to protect against particles from cutting, brazing, or welding operations or radiation from welding type operations.

Skin Protection
Protective Gloves. As necessary to protect against heat or skin abrasions.

Respiratory Protection
Avoid breathing fumes or dust. A NIOSH approved dust or fume cartridge respirator is advised if airborne dust or fume levels are present and exceed PEL.

Up to 50 mg/m³: (APF = 10) Any dust, mist, and fume respirator (APF = 10) Any supplied-air respirator Up to 125 mg/m³: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode (APF = 25) Any powered, air-purifying respirator with a dust, mist, and fume filter Up to 250 mg/m³: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter (APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode (APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter (APF = 50) Any self-contained breathing apparatus with a full facepiece (APF = 50) Any supplied-air respirator with a full facepiece Up to 2500 mg/m³: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode. Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode (APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus. Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter Any appropriate escape-type, self-contained breathing apparatus.

Ventilation
Provide adequate ventilation if material is exposed to heating, cutting, welding, or brazing.

Exposure Guidelines

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>[Code]</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron oxide fume</td>
<td>(1309-37-1)</td>
<td>5.0 mg/m³</td>
</tr>
<tr>
<td>Copper fume</td>
<td>(1317-38-0)</td>
<td>0.1 mg/m³</td>
</tr>
<tr>
<td>Copper dust</td>
<td>(7440-50-8)</td>
<td>1.0 mg/m³</td>
</tr>
<tr>
<td>Manganese as fume</td>
<td>(7439-96-5)</td>
<td>1.0 mg/m³</td>
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</table>
## ThyssenKrupp Materials Inc.
### MATERIAL SAFETY DATA SHEET

### SECTION I. MATERIAL IDENTIFICATION

<table>
<thead>
<tr>
<th>COMPANY</th>
<th>RE-ISSUE DATE</th>
<th>IDENTIFICATION NUMBER</th>
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<tr>
<td>ThyssenKrupp Materials Inc.</td>
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<table>
<thead>
<tr>
<th>TRADE NAME</th>
<th>EMERGENCY PHONE NUMBER</th>
<th>PREPARED BY</th>
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<th>PBT IDENTIFICATION No.</th>
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### SECTION II. HAZARDOUS INGREDIENTS

**Table:**

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<thead>
<tr>
<th>MATERIAL</th>
<th>COMPOSITION</th>
<th>PHYSICAL</th>
<th>HAZARDS</th>
<th>STEMS</th>
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### SECTION III. PHYSICAL DATA

<table>
<thead>
<tr>
<th>MATERIAL (At Normal Conditions)</th>
<th>APPEARANCE AND ODOR</th>
<th>MEASURING POINT</th>
<th>SPECIFIC GRAVITY</th>
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### SECTION IV. FIRE AND EXPLOSIVE

<table>
<thead>
<tr>
<th>SPECIAL FIRE FIGHTING PROCEDURES</th>
<th>FUEL</th>
<th>NO FUEL</th>
<th>STABILIZED</th>
<th>HAZARDOUS DECOMPOSITION PRODUCTS</th>
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</thead>
<tbody>
<tr>
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### SECTION V. REACTIVITY DATA

<table>
<thead>
<tr>
<th>STABILITY</th>
<th>CONDITIONS TO AVOID</th>
<th>HAZARDOUS DECOMPOSITION PRODUCTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Blank]</td>
<td></td>
<td></td>
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</tbody>
</table>

| [Blank]   |                     |                                  |

| [Blank]   |                     |                                  |

### SECTION VI. Environmental

<table>
<thead>
<tr>
<th>SKILL OR LEAK PROCEDURES</th>
<th>WASTE DISPOSAL METHODS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Disposal must comply with applicable Federal, State, and Local, Hazardous and Landfill laws.</td>
</tr>
</tbody>
</table>
SECTION VII. HEALTH HAZARD DATA

... (content is not fully visible but includes sections for Health Hazard Data, Incompatibility, Airborne Exposure Limit, and Initial Isolation Distances.)

SECTION VIII. EMERGENCY AND FIRST AID PROCEDURES

... (content is not fully visible but includes sections for Symptoms of Exposure, Emergency Procedures, and First Aid Procedures.)

SECTION IX. SPECIAL PROTECTION INFORMATION & CONTROL MEASURES

... (content is not fully visible but includes sections for Personal Protective Equipment, Special Handling Procedures, and Storage Information.)

SECTION X. OTHER INFORMATION

... (content is not fully visible but includes sections for Physical and Chemical Properties, Hazardous Combustion Products, and Other Information.)
MATERIAL SAFETY DATA SHEET

SECTION I - GENERAL INFORMATION

PRODUCT NAME: MILD STEEL - WELD PINS/COPPER COATED CD STUDS
TRADE NAME: LOW CARBON STEEL

SECTION II - CHEMICAL COMPOSITION

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>CAS NUMBER</th>
<th>OSHA PEL²</th>
<th>ACGIH TLV³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Metal</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Iron</td>
<td>7439-89-6</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Manganese</td>
<td>7439-96-5</td>
<td>.25-.40</td>
<td>5</td>
</tr>
<tr>
<td>Nickel</td>
<td>7740-02-0</td>
<td>.01-.10</td>
<td>1</td>
</tr>
<tr>
<td>Chromium</td>
<td>7740-47-3</td>
<td>.01-.10</td>
<td>1</td>
</tr>
<tr>
<td>Copper</td>
<td>7740-58-0</td>
<td>.10-.20</td>
<td>0.1</td>
</tr>
<tr>
<td>Trace Elements</td>
<td>&lt;2.0</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

| Metallic Coating        |            |           |            |
| Copper                  | 7740-58-0  | 99.0 (min)| 5.0        |
| Trace Elements          | <1.0       | n/a       | n/a        |

SECTION III - PHYSICAL DATA

- Physical State: Solid
- Boiling Point (° F): Unknown
- Specific Gravity: Unknown
- Vapor Pressure: n/a
- Percent Volatile by Wt.: n/a
- Vapor Density (air=1): n/a
- Evaporation Rate: n/a
- Solubility by Water: Insoluble
- Ph (Paint Coating): n/a
- Appearance and Odor: Iron Nails with Copper coating; Odorless

¹ As defined by OSHA (29CFR1910.1200) or certain state regulations.
² Permissible Exposure Limit – (mg/m³) – OSHA (29CFR1910)
³ Threshold Limit Value – (mg/m³) – American Conference of Governmental Industrial Hygienists

2/4/03
MATERIAL SAFETY DATA SHEET

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point: 2500°F

Extinguishing Media: Extinguish fires with CO₂, water (fog), steam, foam, or dry chemical

Special Fire Fighting Procedures: n/a

Unusual Fire and Explosive Hazards: When this material is involved in a fire, toxic degradation products can be produced, including CO₂, CO, and oxides of nitrogen. Fire fighter should use self-contained breathing apparatus. Dense toxic smoke can be produced when this material burns.

SECTION V - REACTIVITY DATA

Stability: Stable

Conditions to Avoid: Open Flame

Incompatibility: n/a

Hazardous Polymerization: Will Not Occur

SECTION VI - HEALTH HAZARD DATA

Principle Routes of Entry: Inhalation

Medical Conditions Possibly Aggravated: Chronic diseases or disorders of the respiratory system.

Carcinogen Information: NTP⁴ and IARC⁵ consider chromium and certain chromium compounds to be known human carcinogens, and nickel and certain nickel compounds to be probably human carcinogens.

⁴ National Toxicology Program
⁵ International Agency for Research on Cancer

2/4/03
EFFECTS OF OVEREXPOSURE

NOTE: Steel products in their usual physical state do not pose any health hazards. However, when subjected to welding, burning, grinding, cutting, abrasive blasting, heat treatment, pickling, or similar operations, potentially hazardous fumes or dusts may be emitted. Despite the fact that welding, burning, etc. of steel products in this particular category may produce fumes containing manganese, chromium, nickel, and copper, the air concentrations generated of these components are expected to be extremely low. Special attention should be given to the metallic coating, which could be a significant source of the fumes and dusts created during welding or similar activities. The following is a list of fumes or dusts, which may be generated from this steel product category and health effects associated with overexposure to them.

Iron (Fe)

Subjecting iron and alloys containing iron to high temperatures (such as welding) will cause the formation of iron oxide. Long-term exposure to iron oxide fumes or dusts has been associated with a benign lung condition known as siderosis, which is observable as an x-ray change. No physical impairment of lung function has been linked to siderosis.

Manganese (Mn)

Mn intoxication is usually due to the oxide or salts of Mn; elemental Mn exhibits very low toxicity. The dusts and fumes can act as minor irritants to the eyes and respiratory tract. Both acute and chronic exposures may adversely affect the central nervous system (CNS), but symptoms are more likely to occur after at least 1 or 2 years of prolonged or repeated exposures. Early symptoms may include weakness in lower extremities, sleepiness, salivation, nervousness, and apathy. In more advanced stages, severe muscular uncoordination, impaired speech, spastic walking, mask-like facial expressions and uncontrollable laughing may occur. Manganese fumes have also been reported to result in metal fume fever, a flu-like syndrome with symptoms such as dizziness, chills, fever, headache, and nausea. An increased incidence of pneumonia, bronchitis, and pneumonitis has been reported in some worker populations exposed to manganese. Animal studies indicate that manganese exposure may increase susceptibility to bacterial and viral infections.

Chromium (Cr)

The toxicity of and health hazards of chromium are heavily dependent upon its oxidation state. The elemental (as in the metals), divalent and trivalent forms are of very low toxicity. The hexavalent form (such as occurs in chromates and chronic acids) is very toxic and can produce both acute and chronic effects. Adverse effects on the skin may include ulcerations, irritative dermatitis, and allergic skin reactions. Adverse effects on the respiratory system may include bronchospasms, edema, hypersecretion, bronchitis, irritation allergic asthmatic reactions and ulceration and perforation of the nasal septum. Respiratory
symptoms may include coughing and wheezing, shortness of breath and nasal itch. Eye irritation or inflammation can also be produced. Exposure to some hexavalent chromium compounds has been shown to be associated with an increased risk of lung cancer.

Nickel (Ni)

Ni fumes and dusts are respiratory irritants and may cause severe pneumonitis. Skin contact with nickel and its compounds may cause an allergic dermatitis. The resulting skin rash is often referred to as "nickel itch". Ni and its compounds may also produce eye irritation. Particularly on the inner surfaces of the eyelids (i.e. the conjunctiva). Animal and/or epidemiology studies have linked nickel and certain nickel compounds to an increased incidence of cancer of the lungs and nasal passages.

Copper (Cu)

Inhalation of Cu fume may cause irritation of the eyes and throat and a flu-like illness called metal fume fever. Signs and symptoms of metal fume fever include fever, muscle aches, nausea, chills, dry throat, cough, and weakness. Cu fume may also produce a metallic or sweet taste. Repeated or prolonged exposure to Cu fume may cause discoloration of the skin or hair.

SECTION VII – EMERGENCY AND FIRST AID PROCEDURES

Eye Contact: Not anticipated to cause any significant eye hazard.

Skin Contact: Not anticipated to cause any significant skin hazard.

EFFECTS OF OVEREXPOSURE:

Inhalation: High concentrations of fumes may cause respiratory irritation.

SECTION VIII – TOXICITY DATA

n/a

SECTION IX – SPECIAL PROTECTION INFORMATION

Protective Gloves: As required for welding
Eye Protection: Safety glasses
Other Protective Equipment: As deemed necessary for welding
Respiratory Protection: NIOSH/MSHA approved dust and fume respirator
Ventilation: Local exhaust recommended when welding

2/4/03
SECTION X – SPECIAL PRECAUTIONS AND SPILL-LEAK PROCEDURES

Handling and Storage Precautions: Nail points may be sharp

Other: None

Steps to be Taken in Case of Spill/Leak: n/a

Waste Disposal Methods: Dispose of by means as to comply with all local, state and federal regulations.

Reportable Quantity: n/a

This document has been prepared solely for the intent of compliance with the provisions of Subpart 2 of Part 1910 of Title 29 of the Code of Federal Regulations, Paragraph 1910.1200. WHILE THE INFORMATION AND RECOMMENDATIONS SET FORTH ON THIS DATA SHEET ARE BELIEVED TO BE ACCURATE AS OF THE PRESENT DATE, MIDWEST FASTENERS INC. MAKES NO WARRANTY WITH RESPECT THERETO AND DISCLAIMS ALL LIABILITY FROM RELIANCE THEREON.

FOR ADDITIONAL INFORMATION REFER TO THE FOLLOWING:

ANSI Z49.1 OSHA (29CFR1910)
The American Welding Society U.S. Department of Labor
P. O. Box 351040 Washington, D.C. 20210
Miami, FL 33135

Prepared by: Stephen B. Turner April, 1989

2/4/03
Material Safety Data Sheet

Material Name: Aluminum Alloys Containing Chromium

*** Section 1 - Chemical Product and Company Identification ***

Identification Number: KDS-4
Chemical Name: Aluminum (Minimum 0.1% Chromium)
Product Use: Fabricated Parts
Synonyms: None
Manufacturer Information
Kaiser Aluminum
27422 Portola Parkway
Suite 350
Foothill Ranch, CA 92610
Emergency # CHEMTREC 1-800-424-9300

*** Section 2 - Hazards Identification ***

Emergency Overview
Product is solid metallic pieces. Product may form explosive dust/air mixtures if high concentration of product dust is suspended in air. Firefighters should wear full protective clothing and self contained breathing apparatus. Exposure to dust may be irritating to eyes, nose, and throat. Contact with hot metal may cause severe thermal burns. Do not touch or handle cast aluminum or heated materials before determining the temperature. Product contains chromium which is an identified carcinogen. Hot work operation such as welding, torch cutting, etc. may potentially generate hexavalent chromium which has been identified as a carcinogen. See Section 15.

Potential Health Effects: Eyes
Dust, fumes or powder may irritate eye tissue.

Potential Health Effects: Skin
Dust or powder may irritate the skin. Some products may contain residual coating. Prolonged skin contact with the coating oils may result in skin sensitization (allergy) in some individuals. Do not touch or handle cast aluminum or heated materials before determining the temperature. Aluminum does not change color on heating. Contact with hot metal may cause severe thermal burns.

Potential Health Effects: Ingestion
Not a likely route of entry. Ingestion of large amounts of dusts or particulates may produce gastrointestinal disturbances including irritation, nausea, and diarrhea.

Potential Health Effects: Inhalation
Dusts of this product may cause irritation of the nose, throat, and respiratory tract.

HMIS Ratings: Health: 1 Fire: 1 Reactivity: 0 Pers. Prot.: Goggles, Gloves
Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe  * = Chronic hazard

*** Section 3 - Composition / Information on Ingredients ***

<table>
<thead>
<tr>
<th>CAS #</th>
<th>Component</th>
<th>Percent1</th>
</tr>
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<tbody>
<tr>
<td>7429-90-5</td>
<td>Aluminum</td>
<td>80-100</td>
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<table>
<thead>
<tr>
<th>CAS #</th>
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<th>Percent1</th>
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<tbody>
<tr>
<td>7440-21-3</td>
<td>Silicon, W</td>
<td>0.1-1, 1-5, 5-10, 10-15</td>
</tr>
<tr>
<td>7439-89-6</td>
<td>Iron, W</td>
<td>0.1-1, 1-5</td>
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<td>7440-66-6</td>
<td>Zinc, W</td>
<td>0.1-1, 1-5, 5-10</td>
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<td>7440-50-8</td>
<td>Copper, W</td>
<td>0.1-1, 1-5, 5-10</td>
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<td>7439-96-5</td>
<td>Manganese, W</td>
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<td>7439-95-4</td>
<td>Magnesium, W</td>
<td>0.1-1, 1-5, 5-10</td>
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</table>

Alloying Elements:

---

1 Where more than one range for a component is given in the "Percent" column, the range for the component includes all the individual ranges. Thus, if the column lists 0.1-1, 1-5, 5-10, the material is present in the product at a concentration between 0.1 and 10 percent.

Issue Date: 12/01/2008 Revision: 8.0000
Material Safety Data Sheet

Material Name: Aluminum Alloys Containing Chromium

<table>
<thead>
<tr>
<th>Component</th>
<th>Material Code</th>
<th>Hazard Code</th>
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<tr>
<td>7440-69-9</td>
<td>Bismuth P, W</td>
<td>0.1-1, 1-3</td>
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<tr>
<td>7440-33-5</td>
<td>Tin P, W</td>
<td>0.1-1.5</td>
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<tr>
<td>64771-72-8</td>
<td>Coating Oil</td>
<td>0.1-1</td>
</tr>
<tr>
<td>7440-47-3</td>
<td>Chromium P, W</td>
<td>0.1-1</td>
</tr>
</tbody>
</table>

Component Related Regulatory Information
This product may be regulated, have exposure limits or other information identified as the following: Iron oxide (1309-37-1), Magnesium oxide fume (1309-48-4), Zinc oxide (1314-13-2).

Component Information/Information on Non-Hazardous Components
This material is considered hazardous under 29 CFR 1910.1200 (Hazard Communication) and the Canadian Workplace Hazardous Materials Information System (WHMIS). The information in this MSDS is provided for situations where this material may be deformed creating dusts or fumes which may be potentially hazardous.

Coating Oils: Certain products may be coated with residual processing materials which comprise less than 1% of the total product. These can include 111-82-0, 112-39-0, 112-72-1, 124-10-7, 30399-84-9, 64771-72-8, and proprietary corrosion inhibitors. See Section 16 for chemical names. With the exception of 64771-72-8 there are no established or recommended exposure limits.

(W): Wrought Aluminum (fabricated products).

*** Section 4 - First Aid Measures ***

First Aid: Eyes
Flush immediately with water for at least 15 minutes. Do not rub eyes. If irritation persists get medical attention.

First Aid: Skin
For skin contact, flush with large amounts of water. If irritation persists, get medical attention.

First Aid: Ingestion
Due to the physical nature of this material, ingestion is unlikely to occur. If ingestion of a large amount does occur, seek medical attention.

First Aid: Inhalation
If symptoms are experienced, remove source of contamination or move victim to fresh air. Call a physician if symptoms develop or persist.

*** Section 5 - Fire Fighting Measures ***

General Fire Hazards
High concentration of airborne dust may form explosive mixture with air. Use adequate ventilation.
Coating oils that may be present on some products can be ignited by open flames and other sources of ignition while the aluminum base product will ignite only under extreme conditions.

Hazardous Combustion Products
Decomposition of base metal product may yield metallic oxides.
Decomposition of coating oils present on some products will release carbon monoxide, carbon dioxide, and other hydrocarbon species.

Extinguishing Media
Use dry chemical, foam, carbon dioxide, water spray or water fog for oil fires.
Use dry powder, talc, or sand to extinguish metal fires.
Material in or near fires should be cooled with a water spray or fog if compatible with fire fighting techniques for the other materials involved in the fire.

Unsuitable Extinguishing Media
Do NOT use water or halogenated agents.

Issue Date: 12/01/2008   Revision: 8.0000
Material Safety Data Sheet

Material Name: Aluminum Alloys Containing Chromium

Fire Fighting Equipment/Instructions
Fire fighters should wear full-face, self contained breathing apparatus and impervious protective clothing. Fire fighters should avoid inhaling any combustion products. Avoid creation of dusts.

NFPA Ratings: Health: 1 Fire: 1 Reactivity: 0
Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

** * * Section 6 - Accidental Release Measures * * **

Containment Procedures
Contain the discharged material. Remove sources of ignition.

Clean-Up Procedures
Shovel the material into waste container. Avoid the generation of dusts during clean-up.

Evacuation Procedures
Isolate area. Keep unnecessary personnel away.

Special Procedures
Wear appropriate personal protective equipment. See Section 8. Follow all Local, State, Federal and Provincial regulations for disposal.

** * * Section 7 - Handling and Storage * * **

Handling Procedures
Do not breathe fumes or dust from this material. Use with adequate ventilation. Keep dusts and powders of this product from heat, sparks, or open flame. Use non-sparking tools when opening or closing containers. Do not touch or handle cast aluminum or heated materials before determining the temperature. Aluminum does not change color on heating. Series 2000 and 7000 alloy ingots must be stress relieved prior to being sawed to prevent an explosion or violent cracking.

Products may have sharp edges. Handle with caution and wear appropriate personal protective equipment. Dry metal properly before loading in a melting furnace. Moisture trapped in crevices and occlusions can cause a violent explosion.

Storage Procedures
Keep the container tightly closed and in a cool, well-ventilated place. Store away from incompatible materials. If dusts and powders are formed, use adequate ventilation in storage and do not handle or store dusts or powders of this product near an open flame, heat or other sources of ignition.

** * * Section 8 - Exposure Controls / Personal Protection * * **

A: Component Exposure Limits
Consult local authorities for acceptable exposure limits.
Aluminum (7429-90-5)

<table>
<thead>
<tr>
<th>Source</th>
<th>Exposure Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACGIH</td>
<td>10 mg/m3 TWA (metal dust)</td>
</tr>
<tr>
<td>OSHA</td>
<td>15 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable fraction)</td>
</tr>
<tr>
<td>NIOSH</td>
<td>10 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable fraction)</td>
</tr>
<tr>
<td>Alberta</td>
<td>10 mg/m3 TWA (dust)</td>
</tr>
<tr>
<td>British Columbia</td>
<td>10 mg/m3 TWA (total dust); 3 mg/m3 TWA (respirable fraction)</td>
</tr>
<tr>
<td>Manitoba</td>
<td>10 mg/m3 TWA</td>
</tr>
<tr>
<td>New Brunswick</td>
<td>10 mg/m3 TWA (metal dust)</td>
</tr>
<tr>
<td>NW Territories</td>
<td>10 mg/m3 TWA</td>
</tr>
<tr>
<td>Nova Scotia</td>
<td>10 mg/m3 TWA (metal dust)</td>
</tr>
<tr>
<td>Nunavut</td>
<td>10 mg/m3 TWA</td>
</tr>
<tr>
<td></td>
<td>20 mg/m3 STEL</td>
</tr>
<tr>
<td>Ontario</td>
<td>5 mg/m3 TWA (powder); 10 mg/m3 TWA (metal and oxide dust)</td>
</tr>
<tr>
<td>Quebec</td>
<td>10 mg/m3 TWA</td>
</tr>
<tr>
<td>Saskatchewan</td>
<td>10 mg/m3 TWA</td>
</tr>
<tr>
<td></td>
<td>20 mg/m3 STEL</td>
</tr>
</tbody>
</table>

\footnote{The ACGIH has proposed changing the TLV for aluminum from 10 mg/m3 as total dust to 1 mg/m3 as respirable particulate matter.}
Material Safety Data Sheet
Material Name: Aluminum Alloys Containing Chromium

Silicon (7440-21-3)
OSHA: 10 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable fraction)
NIOSH: 10 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable fraction)
Alberta: 10 mg/m3 TWA
British Columbia: 10 mg/m3 TWA (total dust); 3 mg/m3 TWA (respirable fraction)
Manitoba: 10 mg/m3 TWA (total dust containing no asbestos and <1% free silica)
New Brunswick: 10 mg/m3 TWA
NW Territories: 5 mg/m3 TWA (respirable mass); 10 mg/m3 TWA (total mass)
Nova Scotia: 10 mg/m3 TWA
Nunavut: 5 mg/m3 TWA (respirable mass); 10 mg/m3 TWA (total mass)
Ontario: 10 mg/m3 TWA (total dust)
Quebec: 10 mg/m3 TWA EV (total dust, containing no asbestos and less than 1% crystalline silica)
Saskatchewan: 10 mg/m3 TWA
20 mg/m3 STEL
Yukon: 30 mppcf TWA; 10 mg/m3 TWA
20 mg/m3 STEL

Iron (7439-89-6)
ACGIH: 5 mg/m3 TWA (respirable fraction) (related to iron oxide (Fe2O3))
OSHA: 10 mg/m3 TWA (fume) (related to iron oxide)
NIOSH: 5 mg/m3 TWA (dust and fume, as Fe) (related to iron oxide)
Alberta: 5 mg/m3 TWA (dust and fume, as Fe) (related to iron oxide)
British Columbia: 5 mg/m3 TWA (dust and fume, as Fe) (related to iron oxide)
Manitoba: 5 mg/m3 TWA (as Fe, welding fumes, dust, total particulate) (related to iron oxide (Fe2O3))
New Brunswick: 5 mg/m3 TWA (particulate matter containing no asbestos and < 1% crystalline silica, dust and fume, as Fe) (related to iron oxide (Fe2O3))
NW Territories: 5 mg/m3 TWA (respirable mass); 10 mg/m3 TWA (total mass) (related to Rouge)
Nova Scotia: 5 mg/m3 TWA (respirable fraction) (related to iron oxide (Fe2O3))
Nunavut: 5 mg/m3 TWA (respirable mass); 10 mg/m3 TWA (total mass) (related to Rouge)
Ontario: 5 mg/m3 TWA EV (dust and fume, as Fe) (related to iron oxide)
Quebec: 5 mg/m3 TWA EV (dust and fume, as Fe) (related to iron trioxide)
Saskatchewan: 5 mg/m3 TWA (fume, as Fe) (related to iron oxide)
10 mg/m3 STEL (fume, as Fe) (related to iron oxide)
Yukon: 5 mg/m3 TWA (fume as Fe2O3) (related to iron oxide)
10 mg/m3 STEL (fume, as Fe2O3) (related to iron oxide)
### Material Safety Data Sheet

**Material Name:** Aluminum Alloys Containing Chromium  
**MSDS ID:** KDS-4

#### Zinc (7440-66-6)

<table>
<thead>
<tr>
<th>Province</th>
<th>Limitation Details</th>
<th>Concentration Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACGIH</td>
<td>2 mg/m³ TWA (respirable) (related to Zinc oxide)</td>
<td>10 mg/m³ STEL (respirable) (related to Zinc oxide)</td>
</tr>
<tr>
<td>OSHA</td>
<td>5 mg/m³ TWA (fume); 15 mg/m³ TWA (total dust); 5 mg/m³ TWA (respirable fraction) (related to Zinc oxide)</td>
<td>10 mg/m³ STEL (fume) (related to Zinc oxide)</td>
</tr>
<tr>
<td>NIOSH</td>
<td>5 mg/m³ TWA (dust and fume) (related to Zinc oxide)</td>
<td>10 mg/m³ STEL (fume) (related to Zinc oxide)</td>
</tr>
<tr>
<td>Alberta</td>
<td>10 mg/m³ TWA (dust); 5 mg/m³ TWA (fume) (related to Zinc oxide)</td>
<td>10 mg/m³ STEL (fume) (related to Zinc oxide)</td>
</tr>
<tr>
<td>British Columbia</td>
<td>2 mg/m³ TWA (respirable) (related to Zinc oxide)</td>
<td>10 mg/m³ STEL (respirable) (related to Zinc oxide)</td>
</tr>
<tr>
<td>Manitoba</td>
<td>5 mg/m³ TWA (fume); 10 mg/m³ TWA (total dust containing no asbestos and &lt;1% crystalline silica) (related to Zinc oxide)</td>
<td>10 mg/m³ STEL (fume) (related to Zinc oxide)</td>
</tr>
<tr>
<td>New Brunswick</td>
<td>5 mg/m³ TWA (fume); 10 mg/m³ TWA (particulate matter containing no asbestos and &lt;1% crystalline silica, dust) (related to Zinc oxide)</td>
<td>10 mg/m³ STEL (fume) (related to Zinc oxide)</td>
</tr>
<tr>
<td>NW Territories</td>
<td>5 mg/m³ TWA (fume); 5 mg/m³ TWA (dust, respirable mass); 10 mg/m³ TWA (dust, total mass) (related to Zinc oxide)</td>
<td>10 mg/m³ STEL (fume) (related to Zinc oxide)</td>
</tr>
<tr>
<td>Nova Scotia</td>
<td>2 mg/m³ TWA (respirable fraction) (related to Zinc oxide)</td>
<td>10 mg/m³ STEL (respirable fraction) (related to Zinc oxide)</td>
</tr>
<tr>
<td>Nunavut</td>
<td>5 mg/m³ TWA (fume); 5 mg/m³ TWA (dust, respirable mass); 10 mg/m³ TWA (dust, total mass) (related to Zinc oxide)</td>
<td>10 mg/m³ STEL (fume) (related to Zinc oxide)</td>
</tr>
<tr>
<td>Ontario</td>
<td>2 mg/m³ TWA (respirable) (related to Zinc oxide)</td>
<td>10 mg/m³ STEL (respirable) (related to Zinc oxide)</td>
</tr>
<tr>
<td>Quebec</td>
<td>5 mg/m³ TWA (fume); 10 mg/m³ TWA (dust) (related to Zinc oxide)</td>
<td>10 mg/m³ STEL (fume) (related to Zinc oxide)</td>
</tr>
<tr>
<td>Saskatchewan</td>
<td>5 mg/m³ TWA (fume); 10 mg/m³ TWA (dust) (related to Zinc oxide)</td>
<td>10 mg/m³ STEL (fume); 20 mg/m³ STEL (dust) (related to Zinc oxide)</td>
</tr>
<tr>
<td>Yukon</td>
<td>5 mg/m³ TWA (fume); 30 mpccf TWA (dust); 10 mg/m³ TWA (dust) (related to Zinc oxide)</td>
<td>10 mg/m³ STEL (fume); 20 mg/m³ STEL (dust) (related to Zinc oxide)</td>
</tr>
</tbody>
</table>

#### Copper (7440-50-8)

<table>
<thead>
<tr>
<th>Province</th>
<th>Limitation Details</th>
<th>Concentration Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACGIH</td>
<td>0.2 mg/m³ TWA (fume); 1 mg/m³ TWA (dust and mist, as Cu)</td>
<td>0.1 mg/m³ TWA (fume, dusts, mists as Cu)</td>
</tr>
<tr>
<td>OSHA</td>
<td>1 mg/m³ TWA (dust and mist); 0.1 mg/m³ TWA (respirable fume)</td>
<td>1 mg/m³ TWA (fume, as Cu)</td>
</tr>
<tr>
<td>Alberta</td>
<td>0.2 mg/m³ TWA (fume); 1 mg/m³ TWA (dust and mist, as Cu)</td>
<td>0.2 mg/m³ TWA (fume, as Cu)</td>
</tr>
<tr>
<td>British Columbia</td>
<td>1 mg/m³ TWA (dust and mist, as Cu); 0.2 mg/m³ TWA (fume, as Cu)</td>
<td>0.2 mg/m³ TWA (fume, as Cu)</td>
</tr>
<tr>
<td>Manitoba</td>
<td>0.2 mg/m³ TWA (fume); 1 mg/m³ TWA (dust and mist, as Cu)</td>
<td>0.2 mg/m³ TWA (fume, as Cu)</td>
</tr>
<tr>
<td>New Brunswick</td>
<td>0.2 mg/m³ TWA (fume); 1 mg/m³ TWA (dust and mist, as Cu)</td>
<td>0.2 mg/m³ TWA (fume, as Cu)</td>
</tr>
<tr>
<td>NW Territories</td>
<td>0.2 mg/m³ TWA (fume); 1 mg/m³ TWA (dust and mist)</td>
<td>0.6 mg/m³ STEL (fume); 2 mg/m³ STEL (dust and mist)</td>
</tr>
<tr>
<td>Nova Scotia</td>
<td>0.2 mg/m³ TWA (fume); 1 mg/m³ TWA (dust and mist, as Cu)</td>
<td>0.2 mg/m³ TWA (fume, as Cu)</td>
</tr>
<tr>
<td>Nunavut</td>
<td>0.2 mg/m³ TWA (fume); 1 mg/m³ TWA (dust and mist, as Cu)</td>
<td>0.2 mg/m³ TWA (fume, as Cu)</td>
</tr>
<tr>
<td>Ontario</td>
<td>0.2 mg/m³ TWA (fume, as Cu); 1 mg/m³ TWA (dust and mist, as Cu)</td>
<td>0.2 mg/m³ TWA (fume, as Cu); 1 mg/m³ TWA (dust and mist, as Cu)</td>
</tr>
<tr>
<td>Quebec</td>
<td>0.2 mg/m³ TWA (fume, as Cu); 1 mg/m³ TWA (dust and mist, as Cu)</td>
<td>0.2 mg/m³ TWA (fume, as Cu); 1 mg/m³ TWA (dust and mist, as Cu)</td>
</tr>
<tr>
<td>Saskatchewan</td>
<td>0.2 mg/m³ TWA (fume, as Cu); 1 mg/m³ TWA (dust and mist, as Cu)</td>
<td>0.2 mg/m³ TWA (fume, as Cu); 1 mg/m³ TWA (dust and mist, as Cu)</td>
</tr>
<tr>
<td>Yukon</td>
<td>0.2 mg/m³ TWA (fume); 1 mg/m³ TWA (dust and mist, as Cu)</td>
<td>0.2 mg/m³ STEL (fume, as Cu); 1 mg/m³ STEL (dust and mist, as Cu)</td>
</tr>
</tbody>
</table>
Manganese (7439-96-5)
ACGIH: 0.2 mg/m³ TWA
OSHA: 5 mg/m³ Ceiling (Mn and Mn compounds)
NIOSH: 1 mg/m³ TWA (Mn and Mn compounds)
3 mg/m³ STEL (Mn and Mn compounds)
Alberta: 1 mg/m³ TWA (fume, as Mn)
British Columbia: 0.2 mg/m³ TWA
Manitoba: 1 mg/m³ TWA (fume)
3 mg/m³ STEL (fume)
5 mg/m³ Ceiling (dust)
New Brunswick: 0.2 mg/m³ TWA
NW Territories: 1 mg/m³ TWA (fume)
3 mg/m³ STEL (fume)
5 mg/m³ Ceiling
Nova Scotia: 0.2 mg/m³ TWA
Nunavut: 1 mg/m³ TWA (fume)
3 mg/m³ STEL (fume)
5 mg/m³ Ceiling
Ontario: 0.2 mg/m³ TWA
Quebec: 5 mg/m³ TWAEV (dust); 1 mg/m³ TWA (fume)
Saskatchewan: 5 mg/m³ TWA; 1 mg/m³ TWA (fume)
5 mg/m³ STEL; 3 mg/m³ STEL (fume)
Yukon: 5 mg/m³ Ceiling

Magnesium (7439-95-4)
ACGIH: 10 mg/m³ TWA (inhalable fraction) (related to Magnesium oxide)
OSHA: 10 mg/m³ TWA (total particulate) (related to Magnesium oxide fume)
Alberta: 10 mg/m³ TWA (fume) (related to Magnesium oxide)
British Columbia: 10 mg/m³ TWA (fume, inhalable, as Mg), 3 mg/m³ TWA (respirable dust and fume, as Mg) (related to Magnesium oxide)
10 mg/m³ STEL (respirable dust and fume, as Mg) (related to Magnesium oxide)
Manitoba: 10 mg/m³ TWA (fume) (related to Magnesium oxide)
New Brunswick: 10 mg/m³ TWA (fume) (related to Magnesium oxide)
NW Territories: 10 mg/m³ TWA (fume, as Mg) (related to Magnesium oxide)
20 mg/m³ STEL (fume, as Mg) (related to Magnesium oxide)
Nova Scotia: 10 mg/m³ TWA (inhalable fraction) (related to Magnesium oxide)
20 mg/m³ STEL (fume, as Mg) (related to Magnesium oxide)
Nunavut: 10 mg/m³ TWA (fume, as Mg) (related to Magnesium oxide)
20 mg/m³ STEL (fume, as Mg) (related to Magnesium oxide)
Ontario: 10 mg/m³ TWAEV (inhalable) (related to Magnesium oxide)
Quebec: 10 mg/m³ TWAEV (fume, as Mg) (related to Magnesium oxide)
Saskatchewan: 10 mg/m³ TWA (fume) (related to Magnesium oxide)
20 mg/m³ STEL (fume) (related to Magnesium oxide)
Yukon: 10 mg/m³ TWA (fume as Mg) (related to Magnesium oxide)
10 mg/m³ STEL (fume, as Mg) (related to Magnesium oxide)

Bismuth (7440-69-9)
Note: There are currently no applicable limits for the bismuth component of the products in the US.
Material Safety Data Sheet

Material Name: Aluminum Alloys Containing Chromium

MSDS ID: KDS-4

<table>
<thead>
<tr>
<th>Substance</th>
<th>ACGIH</th>
<th>OSHA</th>
<th>NIOSH</th>
<th>Alberta</th>
<th>British Columbia</th>
<th>Manitoba</th>
<th>New Brunswick</th>
<th>Nova Scotia</th>
<th>Ontario</th>
<th>Quebec</th>
<th>Saskatchewan</th>
<th>Physical Processes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tin (7440-31-5)</td>
<td>2 mg/m³ TWA</td>
<td>2 mg/m³ TWA</td>
<td>2 mg/m³ TWA</td>
<td>2 mg/m³ TWA</td>
<td>2 mg/m³ TWA</td>
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<td>2 mg/m³ TWA</td>
<td>2 mg/m³ TWA</td>
<td>2 mg/m³ TWA</td>
<td>2 mg/m³ TWA</td>
<td>4 mg/m³ STEL</td>
</tr>
<tr>
<td>Chromium (7440-47-3)</td>
<td>0.5 mg/m³ TWA</td>
<td>1 mg/m³ TWA</td>
<td>0.5 mg/m³ TWA</td>
<td>0.5 mg/m³ TWA</td>
<td>0.5 mg/m³ TWA</td>
<td>0.5 mg/m³ TWA</td>
<td>0.5 mg/m³ TWA</td>
<td>0.5 mg/m³ TWA</td>
<td>0.5 mg/m³ TWA</td>
<td>0.5 mg/m³ TWA</td>
<td>0.5 mg/m³ TWA</td>
<td>1.5 mg/m³ STEL</td>
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</tr>
<tr>
<td>Engineering Controls</td>
<td>Use local exhaust ventilation.</td>
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</tr>
<tr>
<td>Personal Protective Equipment: Eyes/ Face</td>
<td>Wear safety glasses with side shields.</td>
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<td></td>
</tr>
<tr>
<td>Personal Protective Equipment: Skin</td>
<td>Wear leather or other appropriate work gloves, if necessary for type of operation.</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Personal Protective Equipment: Respiratory</td>
<td>If ventilation is not sufficient to effectively control exposures, appropriate NIOSH approved respirators should be used. Respirators should be selected and used under the direction of trained health and safety professionals in accordance with all applicable health, safety, and environmental regulations.</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Personal Protective Equipment: General</td>
<td>Eye wash fountain is recommended.</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

*** Section 9 - Physical & Chemical Properties ***
Material Safety Data Sheet

Material Name: Aluminum Alloys Containing Chromium

MSDS ID: KDS-4

<table>
<thead>
<tr>
<th>Appearance: Solid metallic pieces</th>
<th>Odor: None</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical State: Solid</td>
<td>pH: Not Available</td>
</tr>
<tr>
<td>Vapor Pressure: Not Available</td>
<td>Vapor Density: Not Available</td>
</tr>
<tr>
<td>Boiling Point: Not Available</td>
<td>Melting Point: 950-1215°F (510-660°C)</td>
</tr>
<tr>
<td>Solubility (H2O): &lt;1 %</td>
<td>Specific Gravity: 2.5-2.9 g/cc</td>
</tr>
</tbody>
</table>

*** Section 10 - Chemical Stability & Reactivity Information ***

Chemical Stability
Stable under normal conditions.

Chemical Stability: Conditions to Avoid
Avoid ignition sources where dust is produced. Avoid incompatible materials.

Special Sensitivity: Series 2000 and 7000 alloy ingots must be stress relieved prior to being sawed to prevent an explosion or violent cracking. When melting aluminum, aluminum alloys, or aluminum scrap, care must be taken to exclude water or moisture. Water or moisture trapped under hot or molten metal can result in a violent explosion. Strong oxidizing agents must be excluded during heating and melting operations to prevent the possibility of an explosion. Finely divided aluminum dusts may form explosive mixtures in air. Care should be taken to employ effective dust control measures.

Incompatibility
This product may react with strong acids, bases and oxidizing agents to product hydrogen gas, which is highly flammable. Contact with chlorinated solvents may release toxic and corrosive hydrogen chloride gas. Hot aluminum may react with chlorinated solvents to produce phosgene, a highly irritating and toxic gas.

Hazardous Decomposition
Decomposition of this product may yield metallic oxides.
Decomposition of coating oils present on some products will release carbon monoxide, carbon dioxide, and other hydrocarbon species.

Possibility of Hazardous Reactions
Will not occur.

*** Section 11 - Toxicological Information ***

Acute Dose Effects

A: General Product Information
Inhalation of metal fumes may cause metal fume fever, a flu-like illness generally lasting 24 hours or less.

Aluminum: Chronic overexposure to aluminum can result in lung damage and has been associated with asthma-like syndrome. Accumulation of aluminum in the body may result in neurological damage, anemia and bone softening. Repeated overexposure to high levels of aluminum oxide may lead to pulmonary fibrosis, a progressive lung disorder.

Silicon: Silicon dust seems to have little adverse effect on lungs and does not appear to produce significant organic disease or toxic effects when exposures are kept under reasonable control.

Iron: Chronic inhalation of iron has resulted in mottling of the lungs, a condition referred to as siderosis. This is considered benign pneumoconiosis and does not ordinarily cause significant physiologic impairment.

Zinc: Zinc poisoning can cause anemia, lethargy and dizziness. Inhalation of zinc fumes may cause metal fume fever, a flu-like illness generally lasting 24 hours or less.

Manganese: Overexposure to manganese may result in CNS effects, anemia and pneumoconiosis which increased the risk of pneumonia.
Material Safety Data Sheet

Material Name: Aluminum Alloys Containing Chromium
MSDS ID: KDS-4

Tin: Prolonged exposure to high concentration of tin-containing dusts and/or fumes may result in the development of Stannosis which is a rare benign pneumoconiosis. The maximum concentration of tin in the product is such that Stannosis should not present a potential hazard.

Chromium: Industrial exposure to chromium may cause dermatitis, skin ulcers, perforation of the nasal septum, as well as cancers of the lungs, nasal cavity and paranasal sinuses. The cancer sites are mainly associated with hexavalent chrome which can also cause skin sensitization, skin and nasal ulcers, and perforation of the nasal septum.

B: Component Analysis - LD50/LC50
Silicon (7440-21-3)
Oral LD50 Rat: 3160 mg/kg

Iron (7439-89-6)
Oral LD50 Rat: 984 mg/kg

Zinc (7440-66-6)
Oral LD50 Rat: >5000 mg/kg (related to Zinc oxide)

Manganese (7439-96-5)
Oral LD50 Rat: 9 g/kg

Magnesium (7439-95-4)
Oral LD50 Rat: 230 mg/kg

Bismuth (7440-69-9)
Oral LD50 Rat: 5 g/kg

Repeated Dose Effects
Exposure to metal dusts and oxides may cause fume fever. Fume fever is a temporary flu-like condition characterized by chills, fever, muscle aches and pains, nausea and vomiting. Typically the symptoms appear within a few hours after exposure and subside within 2-3 days with no permanent effects.

Carcinogenicity
A: General Product Information
No carcinogenicity data available for this product.

B: Component Carcinogenicity
Iron (7439-89-6)
ACGIH: A4 - Not Classifiable as a Human Carcinogen (dust and fume) (related to Iron oxide)
IARC: Supplement 7 [1987], Monograph 1 [1972] (related to Ferric oxide) (Group 3 (not classifiable))

Magnesium (7439-95-4)
ACGIH: A4 - Not Classifiable as a Human Carcinogen (related to Magnesium oxide)

Chromium (7440-47-3)
ACGIH: A4 - Not Classifiable as a Human Carcinogen
IARC: Monograph 45 [1990] [listed under Chromium and Chromium compounds] Supplement 7 [1987] [Group 3 (not classifiable)]
Material Safety Data Sheet

Material Name: Aluminum Alloys Containing Chromium

*** Section 12 - Ecological Information ***

Ecotoxicity
A: General Product Information
No data available for this product. Coating oils may present an environmental hazard to aquatic and terrestrial flora and fauna.

B: Component Analysis - Ecotoxicity - Aquatic Toxicity

Iron (7439-89-6)
Test & Species
96 Hr LC50 Morone saxatilis 13.6 mg/L Conditions

Zinc (7440-66-6)
Test & Species
96 Hr LC50 Pimephales promelas 6.4 mg/L Conditions
96 Hr EC50 Selenastrum capricornutum 30 µg/L
72 Hr EC50 water flea 5 µg/L

Copper (7440-50-8)
Test & Species
95 Hr LC50 Pimephales promelas 23 µg/L Conditions
96 Hr LC50 Oncorhynchus mykiss 13.8 µg/L
96 Hr LC50 Lepomis macrochirus 236 µg/L
72 Hr EC50 Scenedesmus subsipicatus 120 µg/L
96 Hr EC50 water flea 10 µg/L
96 Hr EC50 water flea 200 µg/L

Coating Oil (64771-72-8)
Test & Species
96 Hr LC50 Pimephales promelas >5000 mg/L Conditions

Environmental Fate
No data available for this product.

*** Section 13 - Disposal Considerations ***

US EPA Waste Number & Descriptions
A: General Product Information
Material, if discarded, is not expected to be a characteristic hazardous waste under RCRA.

B: Component Waste Numbers
Chromium (7440-47-3)
RCRA: 5.0 mg/L regulatory level

Disposal Instructions
Dispose of waste material according to Local, State, Federal, and Provincial Environmental Regulations.
See Section 7 for Handling Procedures. See Section 8 for Personal Protective Equipment recommendations.

*** Section 14 - Transportation Information ***

US DOT Information
Shipping Name: Not regulated.
Additional Info.: Aluminum and aluminum alloys are not regulated for transportation. Aluminum powder is regulated: Aluminum Powder, Class 4.3, UN 1396, PG II.
Material Safety Data Sheet

Material Name: Aluminum Alloys Containing Chromium

TDG Information

Shipping Name: Not regulated.

Additional Info.: Aluminum and aluminum alloys are not regulated for transportation. Aluminum powder is regulated.

Aluminum Powder, Class 4.3, UN 1396, PG II.

*** Section 15 - Regulatory Information ***

US Federal Regulations

A: General Product Information

Components of this product have been checked against the non-confidential TSCA inventory by CAS Registry Number. Components not identified on this non-confidential inventory are either exempt from listing (i.e. polymers, hydrates) or are listed on the confidential inventory as declared by the supplier.

B: Component Analysis

This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65) and/or CERCLA (40 CFR 302.4).

Aluminum (7429-90-5)

SARA 313: 1.0 % de minimis concentration (dust or fume only)

Zinc (7440-66-6)

SARA 313: 1.0 % de minimis concentration (dust or fume only)

CERCLA: 1000 lb final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is equal to or exceeds 0.004 inches); 454 kg final RQ (no reporting of releases of this hazardous substance is required if the diameter of the solid metal released is equal to or exceeds 0.004 inches)

Copper (7440-50-8)

SARA 313: 1.0 % de minimis concentration

CERCLA: 5000 lb final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is equal to or exceeds 0.004 inches); 2270 kg final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is equal to or exceeds 0.004 inches)

Manganese (7439-96-5)

SARA 313: 1.0 % de minimis concentration

Chromium (7440-47-3)

CERCLA: 5000 lb final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is equal to or exceeds 0.004 inches); 2270 kg final RQ (no reporting of releases of this hazardous material is required if the diameter of the pieces of the solid metal released is equal to or exceeds 0.004 inches)

Hot work operations such as welding, torch cutting, etc. will generate metal oxides, which can include hexavalent chromium. OSHA has enacted a standard for exposure to hexavalent chromium [29 CFR 1910.1026], which mandates very stringent exposure limits. Users of the product are urged to read this standard and determine how it might affect their operations.

C: Component Marine Pollutants

This material contains one or more of the following chemicals required by US DOT to be identified as marine pollutants.

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS #</th>
<th>DOT regulated severe marine pollutant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper</td>
<td>7440-50-8</td>
<td>DOT regulated severe marine pollutant</td>
</tr>
</tbody>
</table>
Material Safety Data Sheet

Material Name: Aluminum Alloys Containing Chromium

Acute Health: Yes  Chronic Health: Yes  Fire: No  Pressure: No  Reactive: No

State Regulations
A: General Product Information

Other state regulations may apply. Check individual state requirements.

Aluminum and its alloys may contain up to 0.005% beryllium, 0.05% cadmium, <0.1% chromium, 0.05% lead, and 0.05% nickel as impurities if these elements are not listed in Section 3. Beryllium, cadmium, chromium, lead, and nickel have been identified as carcinogens or having developmental or reproductive toxicity by the State of California, as Special Health Hazard Substances by the States of New Jersey and Pennsylvania, and as Extraordinarily Hazardous Substances by the State of Massachusetts.

B: Component Analysis - State

The following components appear on one or more of the following state hazardous substances lists:

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS</th>
<th>CA</th>
<th>MA</th>
<th>MN</th>
<th>NJ</th>
<th>PA</th>
<th>RI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum</td>
<td>7429-90-5</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Silicon</td>
<td>7440-21-3</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Iron (related to iron oxide) (related to iron oxide fume)</td>
<td>7439-89-6</td>
<td>Yes</td>
<td>Yes'</td>
<td>Yes'</td>
<td>Yes'</td>
<td>Yes'</td>
<td>Yes'</td>
</tr>
<tr>
<td>Zinc (related to Zinc oxide)</td>
<td>7440-66-6</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Copper</td>
<td>7440-50-8</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Manganese (related to Magnesium oxide fume)</td>
<td>7439-95-4</td>
<td>Yes</td>
<td>Yes'</td>
<td>Yes'</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Tin</td>
<td>7440-31-5</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Chromium</td>
<td>7440-47-3</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Canadian WHMIS Information

A: General Product Information

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all information required by CPR.

B: Component Analysis - WHMIS IDL

The following components are identified under the Canadian Hazardous Products Act Ingredient Disclosure List:

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS #</th>
<th>Minimum Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum</td>
<td>7429-90-5</td>
<td>1 %</td>
</tr>
<tr>
<td>Iron</td>
<td>7439-89-6</td>
<td>1 % (related to Ferric oxide)</td>
</tr>
<tr>
<td>Zinc</td>
<td>7440-66-6</td>
<td>1 % (related to Zinc oxide)</td>
</tr>
<tr>
<td>Copper</td>
<td>7440-50-8</td>
<td>1 %</td>
</tr>
<tr>
<td>Magnesium</td>
<td>7439-95-4</td>
<td>1 % (related to Magnesium oxide)</td>
</tr>
<tr>
<td>Manganese</td>
<td>7439-96-5</td>
<td>1 %</td>
</tr>
<tr>
<td>Chromium</td>
<td>7440-47-3</td>
<td>0.1 %</td>
</tr>
</tbody>
</table>

WHMIS Classification:

Class D2A: Very Toxic Material
Class D2B: Eye and skin irritation [if dusts are formed]

Additional Regulatory Information
A: General Product Information

No additional information available.
Material Safety Data Sheet

Material Name: Aluminum Alloys Containing Chromium

B: Component Analysis - Inventory

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS #</th>
<th>TSCA</th>
<th>CAN</th>
<th>EEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum</td>
<td>7429-90-5</td>
<td>Yes</td>
<td>DSL</td>
<td>EINECS</td>
</tr>
<tr>
<td>Silicon</td>
<td>7440-21-3</td>
<td>Yes</td>
<td>DSL</td>
<td>EINECS</td>
</tr>
<tr>
<td>Iron</td>
<td>7439-89-6</td>
<td>Yes</td>
<td>DSL</td>
<td>EINECS</td>
</tr>
<tr>
<td>Zinc</td>
<td>7440-66-6</td>
<td>Yes</td>
<td>DSL</td>
<td>EINECS</td>
</tr>
<tr>
<td>Copper</td>
<td>7440-50-8</td>
<td>Yes</td>
<td>DSL</td>
<td>EINECS</td>
</tr>
<tr>
<td>Manganese</td>
<td>7439-96-5</td>
<td>Yes</td>
<td>DSL</td>
<td>EINECS</td>
</tr>
<tr>
<td>Magnesium</td>
<td>7439-95-4</td>
<td>Yes</td>
<td>DSL</td>
<td>EINECS</td>
</tr>
<tr>
<td>Bismuth</td>
<td>7440-59-9</td>
<td>Yes</td>
<td>DSL</td>
<td>EINECS</td>
</tr>
<tr>
<td>Tin</td>
<td>7440-31-5</td>
<td>Yes</td>
<td>DSL</td>
<td>EINECS</td>
</tr>
<tr>
<td>Coating Oil</td>
<td>64771-72-8</td>
<td>Yes</td>
<td>DSL</td>
<td>EINECS</td>
</tr>
<tr>
<td>Chromium</td>
<td>7440-47-3</td>
<td>Yes</td>
<td>DSL</td>
<td>EINECS</td>
</tr>
</tbody>
</table>

*** Section 16 - Other Information ***

Other Information:

Coating Component Information:
111-82-0: Dodecanoic acid, methyl ester
112-39-0: Methyl palmitate
112-72-1: Myristic alcohol
124-10-7: Methyl tetradecanoate
30399-84-9: Isooctadecanoic acid
64771-72-8: Paraffins, petroleum, normal C5-20

Exercise caution when cutting the containment strapping that may secure some products, particularly wrought materials, during transportation. It may rebound and cause serious injury.

Reasonable care has been taken in the preparation of this information, but the manufacturer makes no warranty of merchantability or any other warranty, expressed or implied, with respect to this information. The manufacturer makes no representations and assumes no liability for any direct, incidental or consequential damages resulting from its use.

Key/Legend


End of Sheet KDS-4