# Alloy Family Cross Reference

<table>
<thead>
<tr>
<th>ALLOY FAMILY</th>
<th>PERTINENT ALLOYS</th>
<th>MSDS I.D. #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum Alloys Containing Chromium (minimum 0.1%)</td>
<td>5052, 5056, 5083, 5086, 5154, 5454, 5456, 6019, 6053, 6061, 7039, 7049, 7075, 7079, 7149, 7175, 7178, 7179, 7475</td>
<td>KDS-4</td>
</tr>
<tr>
<td>Aluminum Alloys Containing Lead (minimum 0.1%)</td>
<td>2011, 2030, 6012, 6262</td>
<td>KDS-7</td>
</tr>
<tr>
<td>Aluminum and Aluminum alloys</td>
<td>All Other Alloys</td>
<td>KDS-2</td>
</tr>
</tbody>
</table>
Material Safety Data Sheet

Material Name: Aluminum Alloys Containing Lead

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

Identification Number: KDS-7
Chemical Name: Aluminum (Minimum 0.1% Lead)
Product Use: Fabricated Parts
Synonyms: None
Manufacturer Information
Kaiser Aluminum
27422 Portola Pkwy
Ste 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 lead, a suspect human carcinogen and reproductive hazard. It may cause damage to the central nervous system and brain. Excessive lead exposure may also adversely affect male and female reproductive capability and cause harm to the unborn fetus. 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 and nickel component 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>Percent$^1$</th>
</tr>
</thead>
<tbody>
<tr>
<td>7428-90-3</td>
<td>Aluminum</td>
<td>80-90</td>
</tr>
<tr>
<td>7440-21-3</td>
<td>Silicon P., W*</td>
<td>0.1-1, 1-5, 5-10, 10-15</td>
</tr>
<tr>
<td>7439-85-5</td>
<td>Iron P., W</td>
<td>0.1-1, 1-5</td>
</tr>
<tr>
<td>7440-66-6</td>
<td>Zirc P., W</td>
<td>0.1-1, 1-5, 5-10</td>
</tr>
</tbody>
</table>

$^1$ 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.

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Material Name: Aluminum Alloys Containing Lead

<table>
<thead>
<tr>
<th>Material Code</th>
<th>Material Name</th>
<th>MSDS ID: KDS-7</th>
</tr>
</thead>
<tbody>
<tr>
<td>7440-50-8</td>
<td>Copper P. W</td>
<td>0.1-1, 1-5, 5-10</td>
</tr>
<tr>
<td>7445-96-5</td>
<td>Manganese P. W</td>
<td>0.1-1, 1-5, 5-10</td>
</tr>
<tr>
<td>7455-95-4</td>
<td>Magnesium P. W</td>
<td>0.1-1, 1-3</td>
</tr>
<tr>
<td>7440-69-9</td>
<td>Bismuth P. W</td>
<td>0.1-1, 1-2</td>
</tr>
<tr>
<td>7440-31-5</td>
<td>Tin P. W</td>
<td>0.1-1</td>
</tr>
<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, 1-2</td>
</tr>
<tr>
<td>7439-92-1</td>
<td>Lead P. W</td>
<td>0.1-1, 1-2</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 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.

**[P]: Prime ingot hardener aluminum.
(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, ABC or D, 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.

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Unsuitable Extinguishing Media
Do NOT use water or halogenated agents.

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 dusts 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 dusty or powdery product near an open flame, heat or other sources of ignition.
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**Section 8: Exposure Controls / Personal Protection**

### A: Component Exposure Limits

Consult local authorities for acceptable exposure limits.

**Aluminum (7429-99-5)**

- **ACGIH:** 10 mg/m³ TWA (metal dust)\(^1\)
- **OSHA:** 15 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 (dust)
- **British Columbia:** 10 mg/m³ TWA (total dust); 3 mg/m³ TWA (respirable fraction)
- **Manitoba:** 10 mg/m³ TWA
- **New Brunswick:** 10 mg/m³ TWA (metal dust)
- **NW Territories:** 10 mg/m³ TWA
- **Nova Scotia:** 10 mg/m³ TWA (metal dust)
- **Nunavut:** 10 mg/m³ TWA
- **Ontario:** 5 mg/m³ TWA (powder); 10 mg/m³ TWA (metal and oxide dust)
- **Quebec:** 10 mg/m³ TWA
- **Saskatchewan:** 10 mg/m³ TWA
- **STEL:**
  - 20 mg/m³ STEL

**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 (total dust containing no asbestos and less than 1% crystalline silica)
- **Saskatchewan:** 10 mg/m³ TWA
- **STEL:**
  - 20 mg/m³ STEL

**Yukon:** 30 mg/m³ TWA; 10 mg/m³ TWA
- **STEL:**
  - 20 mg/m³ STEL

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\(^1\) The ACGIH has proposed changing the TLV for aluminum from 10 mg/m³ as total dust to 1 mg/m³ as respirable particulate matter.
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**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:** 10 mg/m³ STEL (fume, as Fe) (related to iron oxide)
- **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 iron oxide (Fe₂O₃))
- **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 iron oxide)
- **Ontario:** 5 mg/m³ TWA (dust and fume, as Fe) (related to iron oxide)
- **Quebec:** 5 mg/m³ TWA (dust and fume, as Fe) (related to iron oxide)
- **Saskatchewan:** 5 mg/m³ TWA (fume, as Fe) (related to iron oxide)
- **Yukon:** 5 mg/m³ TWA (fume as Fe₂O₃) (related to iron oxide)
- **Yukon:** 10 mg/m³ STEL (fume, as Fe) (related to iron oxide)

**Zinc (7440-66-6)**

- **ACGIH:** 2 mg/m³ TWA (respirable fraction) (related to zinc oxide)
- **OSHA:** 5 mg/m³ TWA (fume), 15 mg/m³ TWA (total dust), 5 mg/m³ TWA (respirable fraction) (related to zinc oxide)
- **NIOSH:** 5 mg/m³ TWA (dust and fume) (related to zinc oxide)
- **Alberta:** 10 mg/m³ TWA (dust), 5 mg/m³ TWA (fume) (related to zinc oxide)
- **British Columbia:** 2 mg/m³ TWA (respirable) (related to zinc oxide)
- **Manitoba:** 10 mg/m³ TWA (respirable) (related to zinc oxide)
- **New Brunswick:** 5 mg/m³ TWA (fume), 10 mg/m³ TWA (particulate matter containing no asbestos and <1% crystalline silica, dust) (related to zinc oxide)
- **NW Territories:** 5 mg/m³ TWA (fume), 5 mg/m³ TWA (dust, respirable mass), 10 mg/m³ TWA (dust, total mass) (related to zinc oxide)
- **Nova Scotia:** 2 mg/m³ TWA (respirable fraction) (related to zinc oxide)
- **Nunavut:** 5 mg/m³ TWA (fume), 5 mg/m³ TWA (dust, respirable mass), 10 mg/m³ TWA (dust, total mass) (related to zinc oxide)
- **Ontario:** 2 mg/m³ TWA (respirable fraction) (related to zinc oxide)
- **Quebec:** 5 mg/m³ TWA (fume), 10 mg/m³ TWA (dust) (related to zinc oxide)
- **Saskatchewan:** 5 mg/m³ TWA (fume), 10 mg/m³ TWA (dust) (related to zinc oxide)
- **Yukon:** 5 mg/m³ TWA (fume), 10 mg/m³ TWA (dust) (related to zinc oxide)

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## Copper (7440-50-8)

- **ACGIH:** 0.2 mg/m³ TWA (fume); 1 mg/m³ TWA (dust and mist, as Cu)
- **OSHA:** 0.1 mg/m³ TWA (fume, dusts, mists as Cu)
- **NIOSH:** 1 mg/m³ TWA (dust and mist); 0.1 mg/m³ (respirable fume)
- **Alberta:** 0.2 mg/m³ TWA (fume); 1 mg/m³ TWA (dust and mist, as Cu)
- **British Columbia:** 1 mg/m³ TWA (dust and mist, as Cu); 0.2 mg/m³ TWA (fume, as Cu)
- **Manitoba:** 0.2 mg/m³ TWA (fume); 1 mg/m³ TWA (dust and mist, as Cu)
- **New Brunswick:** 0.2 mg/m³ TWA (fume); 1 mg/m³ TWA (dust and mist, as Cu)
- **NW Territories:** 0.2 mg/m³ TWA (fume); 1 mg/m³ TWA (dust and mist)
- **Nova Scotia:** 0.6 mg/m³ STEL (fume); 2 mg/m³ STEL (dust and mist)
- **Nunavut:** 0.2 mg/m³ TWA (fume); 1 mg/m³ TWA (dust and mist, as Cu)
- **Ontario:** 0.2 mg/m³ TWAEV (fume, as Cu); 1 mg/m³ TWAEV (dust and mist, as Cu)
- **Quebec:** 0.2 mg/m³ TWAEV (fume, as Cu); 1 mg/m³ TWAEV (dust and mist, as Cu)
- **Saskatchewan:** 0.2 mg/m³ TWA (fume, as Cu); 1 mg/m³ TWA (dust and mist, as Cu)
- **Yukon:** 0.2 mg/m³ TWA (fume); 1 mg/m³ TWA (dust and mist, as Cu)

## Manganese (7439-96-5)

- **ACGIH:** 0.2 mg/m³ TWA
- **OSHA:** 5 mg/m³ Ceiling (Mn fume and Mn compounds)
- **NIOSH:** 1 mg/m³ TWA (Mn fume and Mn compounds)
- **Alberta:** 1 mg/m³ TWA (fume, as Mn)
- **British Columbia:** 0.2 mg/m³ TWA
- **Manitoba:** 1 mg/m³ TWA (fume)
- **NW Territories:** 3 mg/m³ STEL (fume)
- **New Brunswick:** 0.2 mg/m³ TWA
- **Ontario:** 0.2 mg/m³ TWAEV
- **Quebec:** 5 mg/m³ TWAEV (dust); 1 mg/m³ TWAEV (fume)
- **Saskatchewan:** 5 mg/m³ TWA; 1 mg/m³ TWA (fume)
- **Yukon:** 5 mg/m³ Ceiling

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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)
Manitoba: 10 mg/m³ STEL [respirable dust and fume, as Mg] (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)
 Nova Scotia: 10 mg/m³ TWA [inhalable fraction] (related to Magnesium oxide)
 Nunavut: 10 mg/m³ TWA [fume, as Mg] (related to Magnesium oxide)
 Ontario: 10 mg/m³ STEL [fume, as Mg] (related to Magnesium oxide)
 Quebec: 10 mg/m³ STEL [fume, as Mg] (related to Magnesium oxide)
 Saskatchewan: 10 mg/m³ TWA [fume] (related to Magnesium oxide)
 Yukon: 10 mg/m³ TWA [fume as Mg] (related to Magnesium oxide)

Bismuth (7440-59-9)

Note: There are currently no applicable limits for the bismuth component of the products in the U.S.

Tin (7440-31-5)

ACGIH: 2 mg/m³ TWA
OSHA: 2 mg/m³ TWA
NIOSH: 2 mg/m³ TWA
Alberta: 2 mg/m³ TWA
British Columbia: 2 mg/m³ TWA
Manitoba: 2 mg/m³ TWA
New Brunswick: 2 mg/m³ TWA
Nova Scotia: 2 mg/m³ TWA
Ontario: 2 mg/m³ TWAEV
Quebec: 2 mg/m³ TWAEV
Saskatchewan: 2 mg/m³ TWA

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Chromium (7440-47-3)

ACGIH: 0.5 mg/m³ TWA
OSHA: 1 mg/m³ TWA
NIOSH: 0.5 mg/m³ TWA
Alberta: 0.5 mg/m³ TWA
British Columbia: 0.5 mg/m³ TWA
Manitoba: 0.5 mg/m³ TWA
New Brunswick: 0.5 mg/m³ TWA
NW Territories: 0.5 mg/m³ TWA
1.5 mg/m³ STEL
Nova Scotia: 0.5 mg/m³ TWA
Nunavut: 0.5 mg/m³ TWA
1.5 mg/m³ STEL
Ontario: 0.5 mg/m³ TWAEV
Quebec: 0.5 mg/m³ TWAEV
Saskatchewan: 0.5 mg/m³ TWA
1.5 mg/m³ STEL
Yukon: 0.1 mg/m³ TWA
3.0 mg/m³ STEL

Lead (7439-92-1)

ACGIH: 0.05 mg/m³ TWA
OSHA: 50 µg/m³ TWA (as Pb); 30 µg/m³ Action Level (as Pb. Poison - see 29 CFR 1910.1025)
NIOSH: 0.05 mg/m³ TWA; Blood lead level <0.06 mg/ml of whole blood
Alberta: 0.05 mg/m³ TWA
British Columbia: 0.05 mg/m³ TWA
Manitoba: 0.15 mg/m³ TWA (dust and fume)
New Brunswick: 0.05 mg/m³ TWA
NW Territories: 0.15 mg/m³ TWA
0.45 mg/m³ STEL
Nova Scotia: 0.05 mg/m³ TWA
Nunavut: 0.15 mg/m³ TWA
0.45 mg/m³ STEL
Ontario: 0.05 mg/m³ TWA (designated substance regulation)
Quebec: 0.15 mg/m³ TWAEV (dust and fume)
Saskatchewan: 0.15 mg/m³ TWA
0.45 mg/m³ STEL

Engineering Controls

Use local exhaust ventilation.

PERSONAL PROTECTIVE EQUIPMENT

Personal Protective Equipment: Eyes/ Face
Wear safety glasses with side shields.

Personal Protective Equipment: Skin
Wear leather or other appropriate work gloves, if necessary for type of operation.

Personal Protective Equipment: Respiratory
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.

Personal Protective Equipment: General
Eye wash fountain is recommended.

*** Section 9 - Physical & Chemical Properties ***
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** Section 10 - Chemical Stability & Reactivity Information **

Chemical Stability
Stable under normal conditions.

Chemical Stability: Conditions to Avoid
Avoid 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 produce 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 pneumonitis which increases the risk of pneumonia.

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T.N.: 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 sensitisation, skin and nasal ulcers, and perforation of the nasal septum.

Lead: Inorganic lead has been found to have toxic effects on both the central and peripheral nervous systems. Symptoms of lead toxicity include behavioral disturbances such as irritability, restlessness, insomnia, and other sleep disturbances, fatigue, vertigo, headache, poor memory, tremor, depression, and apathy. With more severe exposure, symptoms can progress to drowsiness, stupor, hallucinations, delirium, convulsions, and coma. Lead compounds can have a variety of effects. Lead poisoning is characterized by muscle weakness, weight loss, listlessness, insomnia, gastrointestinal disturbances, and low blood pressure. In severe cases, neuromuscular damage can occur as well as permanent brain damage. In addition to generalized poisoning, lead can have potentially serious reproductive effects for both males and females. Lead exposure can cause decreased fertility in both males and females. Male sperm counts can be decreased and sperm morphology altered while the female ovulatory cycle can be disrupted. Lead can also cross the placental barrier and affect the developing fetus. Studies have shown that in utero lead exposure can lead to potentially severe developmental disabilities.

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.
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B: Component Carcinogenicity

Iron (7439-85-6)
- ACGIH: A4 - Not Classifiable as a Human Carcinogen (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 (7790-58-5)
- ACGIH: A4 - Not Classifiable as a Human Carcinogen
- Monograph 49 [1990] (listed under Chromium and Chromium compounds) Supplement 7 [1987] (Group 3 (not classifiable))

Lead (7439-92-1)
- ACGIH: A3 - Confirmed animal carcinogen with unknown relevance to humans
- OSHA: 50 µg/m3 TWA (as Pb); 30 µg/m3 Action Level (as Pb; Poison - see 29 CFR 1910.1025)
- NTP: Reasonably Anticipated To Be A Carcinogen (Possible Select Carcinogen)
- IARC: Supplement 7 [1987]; Monograph 23 [1980] (evaluated as a group) (Group 2B (possibly carcinogenic to humans))

Reproductive Toxicology

Lead has a wide variety of reproductive effects in humans. It can affect both the male and female reproductive organs as well as egg and sperm production and development. Lead can also cause neurodevelopmental disorders in children from both prenatal and postnatal exposures.

** 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 (7439-85-6)
- Test & Species: 96 Hr LC50 Morone saxatilis
- Conditions: static 13.6 mg/L

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

Copper (7440-53-8)
- Test & Species: 96 Hr LC50 Pimephales promelas
- Conditions: 23 µg/L
- 96 Hr LC50 Oncorhynchus mykiss
- 13.8 µg/L
- 96 Hr LC50 Lepomis macrochirus
- 236 µg/L
- 72 Hr EC50 Scenedesmus subspicatus
- 200 µg/L
- 96 Hr EC50 water flea
- 10 µg/L

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

Lead (7439-92-1)
Test & Species
96 hr LC50 Pimephales promelas
Conditions
6.5 mg/L
48 hr EC50 water flea
600 μg/L

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

Lead (7439-92-1)
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.

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 63) and/or CERCLA (40 CFR 302.4).
Aluminum (7429-90-5)
SARA 313: 1.0 % de minimis concentration (dust or fume only)

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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 substance is required if the diameter of the pieces of the solid metal released is equal to or exceeds 0.004 inches)

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></td>
</tr>
</tbody>
</table>

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.
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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>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>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Silicon</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)</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>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Copper</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Manganese</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Magnesium (related to Magnesium oxide fume)</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>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Chromium</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Lead</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

The following statement(s) are provided under the California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65):

WARNING! This product contains a chemical known to the state of California to cause cancer.
WARNING! This product contains a chemical known to the state of California to cause reproductive/developmental effects.

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>Manganese</td>
<td>7439-96-5</td>
<td>1 %</td>
</tr>
<tr>
<td>Magnesium</td>
<td>7439-95-4</td>
<td>1 % (related to Magnesium oxide)</td>
</tr>
<tr>
<td>Chromium</td>
<td>7440-47-3</td>
<td>0.1 %</td>
</tr>
<tr>
<td>Lead</td>
<td>7439-92-1</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.
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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>7440-69-9</td>
<td>Yes</td>
<td>DSL</td>
<td>EINECS</td>
</tr>
<tr>
<td>Bismuth</td>
<td>7440-31-5</td>
<td>Yes</td>
<td>DSL</td>
<td>EINECS</td>
</tr>
<tr>
<td>Tin</td>
<td>64771-72-8</td>
<td>Yes</td>
<td>DSL</td>
<td>EINECS</td>
</tr>
<tr>
<td>Coating Oil</td>
<td>7440-47-3</td>
<td>Yes</td>
<td>DSL</td>
<td>EINECS</td>
</tr>
<tr>
<td>Chromium</td>
<td>7439-92-1</td>
<td>Yes</td>
<td>DSL</td>
<td>EINECS</td>
</tr>
</tbody>
</table>

---

**Section 16 - Other Information**

Coating Component Information:
- 111-82-0: Dodecanic 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 CS-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-7

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