



# SAFETY DATA SHEET

## 1. Identification

<b>Product identifier</b>	<b>WROUGHT ALUMINUM PRODUCTS, 4xxx SERIES ALLOYS</b>
<b>Other means of identification</b>	
<b>SDS number</b>	666
<b>Version #</b>	09
<b>Revision date</b>	March 10, 2015.
<b>Synonym(s)</b>	4xxx series alloys * C02S, C06U, C08T, C09D, C09T, C100, C10J, C10S, C11S, C12D, C12S, C13S, C14S, C154, C15S, C16S, C17K, C17S, C18S, C18U, C21U, C26S, C288F, C30H, C329, C332, C35Z, C36U, C37D, C37U, C399, C40N, C4145, C41N, C427F, C4343, C4343Z, C43J, C43N, C44N, C44U, C45N, C464F, C46N, C476F, C47N, C484F, C48H, C48N, C49N, C49U, C50H, C51S, C522F, C52W, C53U, C544F, C55B, C59W, C611F, C613F, C624F, C62W, C632F, C73S, C73W, C73Z, C75P, C76B, C76P, C77P, C78P, C79C, C80N, C80P, C81N, C81P, C82N, C83N, C84N, C84P, C85C, C85P, C86N, C87P, C94E, C97N, C98A, C98H
<b>Recommended use</b>	Fabricated aluminum parts and products
<b>Recommended restrictions</b>	None known.
<b>Manufacturer/Importer/Supplier/Distributor information</b>	
<b>Manufacturer</b>	Alcoa Inc. 201 Isabella Street Pittsburgh, PA 15212-5858 USA Health and Safety Tel: 1-412-553-4649 Health and Safety Fax: 1-412-553-4822 Health and Safety Email: accmsds@alcoa.com
<b>Emergency Information</b>	CHEMTREC: +1-703-527-3887 +1-800-424-9300 (24 Hour Emergency Telephone, multiple languages spoken); ALCOA: +1-412-553-4001 (24 Hour Emergency Telephone, only English spoken)
<b>Website</b>	For a current Safety Data Sheet, refer to Alcoa websites: <a href="http://www.alcoa.com">www.alcoa.com</a> or internally at <a href="http://my.alcoa.com">my.alcoa.com</a> EHS Community

## 2. Hazard(s) identification

<b>Classification</b>	This product is considered hazardous under 29 CFR 1910.1200 (Hazard Communication).	
<b>Physical hazards</b>	Not classified.	
<b>Health hazards</b>	Sensitization, respiratory	Category 1
	Sensitization, skin	Category 1
	Carcinogenicity	Category 2
	Specific target organ toxicity, repeated exposure	Category 1
<b>Environmental hazards</b>	Not classified.	
<b>OSHA defined hazards</b>	Combustible dust	
<b>Label elements</b>		



<b>Signal word</b>	Danger
<b>Hazard statement</b>	May cause allergy or asthma symptoms or breathing difficulties if inhaled. May cause an allergic skin reaction. Suspected of causing cancer by inhalation. Causes damage to organs through prolonged or repeated exposure. May form combustible dust concentrations in air.

## Precautionary statement

### Prevention

Do not breathe dust/fume. Avoid breathing dust/fume. In case of inadequate ventilation wear respiratory protection. Contaminated work clothing must not be allowed out of the workplace. Obtain special instructions before use. Wear protective gloves. Prevent dust accumulation to minimize explosion hazard.

### Response

If inhaled: If breathing is difficult, remove person to fresh air and keep comfortable for breathing. If experiencing respiratory symptoms: Call a poison center/doctor. IF ON SKIN: Wash with plenty of soap and water. If skin irritation or rash occurs: Get medical advice/attention. Wash contaminated clothing before reuse. If exposed or concerned: Get medical advice/attention. Get medical attention/advice if you feel unwell.

### Storage

Store locked up. Store in a dry place.

### Disposal

Reuse or recycle material whenever possible. Dispose of contents/container in accordance with local/regional/national/international regulations.

### Hazard(s) not otherwise classified (HNOC)

None known.

### Supplemental information

None.

### Specific hazards

Non-combustible as supplied. Small chips, fine turnings, and dust from processing may be readily ignitable.

May be a potential hazard under the following conditions:

- Dust clouds may be explosive. Even a minor dust cloud can explode violently. Dust accumulation on the floor, ledges and beams can present a risk of ignition, flame propagation and secondary explosions.
- Chips, fines and dust in contact with water can generate flammable/explosive hydrogen gas. These gases could present an explosion hazard in confined or poorly ventilated spaces. A thermite reaction, with considerable heat generation, can be initiated by a weak ignition source.
- Molten metal in contact with water/moisture or certain metal oxides (e.g., rust, copper oxide). Moisture entrapped by molten metal can be explosive. Contact of molten aluminum with certain metal oxides can initiate a thermite reaction. Finely divided metals (e.g., powders or wire) may have enough surface oxide to produce thermite reactions/explosions.

Dust and fume from processing: Contains nickel. May produce an allergic reaction.

## 3. Composition/information on ingredients

### Composition comments

Complete composition is provided below and may include some components classified as non-hazardous.

### Mixtures

Components	CAS #	Percent
Aluminum	7429-90-5	>70
Silicon	7440-21-3	<22
Zinc	7440-66-6	<10.8
Iron	7439-89-6	<5.5
Copper	7440-50-8	<5.1
Nickel†	7440-02-0	<2.3
Magnesium	7439-95-4	<2.1
Bismuth‡	7440-69-9	<2.1
Manganese	7439-96-5	<1.6
Chromium	7440-47-3	<0.3
Lead*	7439-92-1	0 - 0.06

### Additional Information

\* - Present as impurity. While Lead is not intentionally added to this mixture, it could potentially enter through the recycle stream.

† - Alloys: 4007, 4019, 4032, 4043, C239, C73W.

‡ - Alloys: 4013, 4026.

Additional compounds which may be formed during processing are listed in Section 8.

## 4. First-aid measures

### Eye contact

Dust and fumes from processing: Rinse eyes with plenty of water or saline for at least 15 minutes. Consult a physician.

<b>Skin contact</b>	Dust and fume from processing or contact with lubricant/residual oil: Wash with soap and water for at least 15 minutes. Get medical attention if irritation develops or persists.
<b>Inhalation</b>	Dust and fumes from processing: Remove to fresh air. Check for clear airway, breathing, and presence of pulse. If breathing is difficult, provide oxygen. Loosen any tight clothing on neck or chest. Provide cardiopulmonary resuscitation for persons without pulse or respirations. Consult a physician.
<b>Ingestion</b>	Not relevant, due to the form of the product.
<b>Most important symptoms/effects, acute and delayed</b>	Dust and fumes from processing: May cause allergic skin reaction. May cause allergic respiratory reaction. May cause sensitization of susceptible persons by skin contact or by inhalation of dust.  Additional health effects from elevated temperature processing (e.g., welding, melting): Heating above the melting point releases metallic oxides which may cause metal fume fever by inhalation. The symptoms are shivering, fever, malaise and muscular pain.  Contact with residual oil/oil coating: Prolonged skin contact may cause skin irritation and/or dermatitis. See Section 11 of the SDS for additional information on health hazards.
<b>Medical conditions aggravated by exposure</b>	Dust and fume from processing: Asthma, chronic lung disease, and skin rashes.
<b>Indication of immediate medical attention and special treatment needed</b>	Symptoms may be delayed.
<b>General information</b>	If exposed or concerned: get medical attention/advice.
<b>5. Fire-fighting measures</b>	
<b>Suitable extinguishing media</b>	Use Class D extinguishing agents on fines, dust or molten metal. Use coarse water spray on chips and turnings.
<b>Unsuitable extinguishing media</b>	DO NOT USE halogenated extinguishing agents on small chips/fines. DO NOT USE water in fighting fires around molten metal. These fire extinguishing agents will react with the burning material.
<b>Specific hazards arising from the chemical</b>	May be a potential hazard under the following conditions: <ul style="list-style-type: none"> <li>• Dust clouds may be explosive. Even a minor dust cloud can explode violently. Dust accumulation on the floor, ledges and beams can present a risk of ignition, flame propagation and secondary explosions.</li> <li>• Chips, fines and dust in contact with water can generate flammable/explosive hydrogen gas. These gases could present an explosion hazard in confined or poorly ventilated spaces.</li> <li>• Dust and fines in contact with certain metal oxides (e.g., rust, copper oxide). A thermite reaction, with considerable heat generation, can be initiated by a weak ignition source.</li> <li>• Molten metal in contact with water/moisture or certain metal oxides (e.g., rust, copper oxide). Moisture entrapped by molten metal can be explosive. Contact of molten aluminum with certain metal oxides can initiate a thermite reaction. Finely divided metals (e.g., powders or wire) may have enough surface oxide to produce thermite reactions/explosions.</li> </ul>
<b>Hazardous combustion products</b>	None known.
<b>Special protective equipment and precautions for firefighters</b>	Firefighters should wear NIOSH approved, positive pressure, self-contained breathing apparatus and full protective clothing when appropriate.
<b>Fire-fighting equipment/instructions</b>	Use gentle surface application of Class D extinguishing agent or dry inert granular material (e.g., sand) to cover and ring the burning material. If possible, isolate the burning material to prevent fire spread, and allow the material to burn itself out.
<b>General fire hazards</b>	This product does not present fire or explosion hazards as shipped. Small chips, fine turnings, and dust from processing may be readily ignitable.
<b>6. Accidental release measures</b>	
<b>Personal precautions, protective equipment and emergency procedures</b>	Avoid generating dust. Avoid contact with sharp edges or heated metal. Molten, heated and cold aluminum look alike; do not touch unless you know it is cold. Use personal protection recommended in Section 8 of the SDS.
<b>Evacuation procedures</b>	Keep unnecessary personnel away.
<b>Methods and materials for containment and cleaning up</b>	Collect scrap for recycling. If molten: Use dry sand to contain the flow of material. All tooling (e.g., shovels or hand tools) and containers which come in contact with molten metal must be preheated or specially coated, rust free and approved for such use. Allow the spill to cool before remelting as scrap.
<b>Environmental precautions</b>	No special environmental precautions required.

## 7. Handling and storage

### Handling

Keep material dry. Avoid generating dust. Avoid breathing dust/fume. Avoid contact with sharp edges or heated metal. Hot and cold aluminum are not visually different. Hot aluminum does not necessarily glow red. Use personal protection recommended in Section 8 of the SDS. Wash hands before breaks and at the end of workday.

### Storage

Store in a dry place.

### Requirements for Processes Which Generate Dusts or Fines

If processing of this product generates dust or if extremely fine particulate is generated, obtain and follow the safety procedures and equipment guides contained in Aluminum Association Bulletin F-1 and National Fire Protection Association (NFPA) codes and standards listed in Section 16.

Use non-sparking handling equipment, tools and natural bristle brush. Cover and reseal partially empty containers. Provide grounding and bonding where necessary to prevent accumulation of static charges during metal dust handling and transfer operations (See Section 15).

Local ventilation and vacuum systems must be designed to handle explosive dusts. Dry vacuums and electrostatic precipitators must not be used, unless specifically approved for use with flammable/explosive dusts (aluminum). Dust collection systems must be dedicated to aluminum dust only and should be clearly labeled as such. Do not co-mingle fines of aluminum with fines of iron, iron oxide (rust) or other metal oxides.

Do not allow chips, fines or dust to contact water, particularly in enclosed areas.

Avoid all ignition sources. Good housekeeping practices must be maintained. Dust accumulation on the floor, ledges and beams can present a risk of ignition, flame propagation and secondary explosions. Do not use compressed air to remove settled material from floors, beams or equipment

### Requirements for Remelting of Scrap Material or Ingot

Molten metal and water can be an explosive combination. The risk is greatest when there is sufficient molten metal to entrap or seal off the water. Water and other forms of contamination on or contained in scrap or remelt ingot are known to have caused explosions in melting operations. While the products may have minimal surface roughness and internal voids, there remains the possibility of moisture contamination or entrapment. If confined, even a few drops of water can lead to violent explosions.

All tooling, containers, molds and ladles which come in contact with molten metal must be preheated or specially coated, rust free and approved for such use. Any surfaces that may contact molten metal (e.g., concrete) should be specially coated.

Drops of molten metal in water (e.g. from plasma arc cutting), while not normally an explosion hazard, can generate enough flammable hydrogen gas to present an explosion hazard. Vigorous circulation of the water and removal of the particles minimize the hazards.

During melting operations, the following minimum guidelines should be observed:

- Inspect all materials prior to furnace charging and completely remove surface contamination such as water, ice, snow, deposits of grease and oil or other surface contamination resulting from weather exposure, shipment, or storage.
- Store materials in dry, heated areas with any cracks or cavities pointed downwards.
- Preheat and dry large items adequately before charging into a furnace containing molten metal. This is typically done by use of a drying oven or homogenizing furnace. The drying cycle should bring the metal temperature of the coldest item of the batch to 400°F (200°C) and then hold at that temperature for 6 hours.

Thermite explosions have been reported when aluminum alloys were melted in furnaces used for alloying with lead, bismuth or other metals with low melting temperatures. These metals, when added as high purity ingots, can seep through cracks in furnace liners and become oxidized. During subsequent melts in the furnace, molten aluminum can contact these metal oxides resulting in a thermite explosion.

### Dross Handling

Small amounts of beryllium (<0.0002% or <2 ppm) can be present in aluminum alloys either from naturally occurring beryllium in aluminum ore or as a alloying element in the aluminum recycling stream. This beryllium does not present an health hazard during processing (grinding, cutting or welding) of aluminum products. However, beryllium may concentrate in the dross formed when aluminum scrap is remelted. Therefore, the potential for exposures to beryllium when handling dross must be considered. Control of airborne dust levels would be critical in reducing or eliminating this potential. For more information on the hazards associated with handling dross that contains beryllium, refer to Alcoa SDS No. 1013, Aluminum Dross with Low Beryllium. Copies of this SDS are available on [www.alcoa.com](http://www.alcoa.com) or by calling +412-553-4649.

## 8. Exposure controls/personal protection

### Occupational exposure limits

#### U.S. - OSHA

#### Components

Components	Type	Value	Form
Aluminum (CAS 7429-90-5)	TWA	5 mg/m <sup>3</sup> 15 mg/m <sup>3</sup>	Respirable fraction Total dust
Chromium (CAS 7440-47-3)	TWA	1 mg/m <sup>3</sup>	
Copper (CAS 7440-50-8)	TWA	1 mg/m <sup>3</sup> 0.1 mg/m <sup>3</sup>	Dust and mist. Fume.
Manganese (CAS 7439-96-5)	Ceiling	5 mg/m <sup>3</sup>	Fume
Nickel† (CAS 7440-02-0)	TWA	1 mg/m <sup>3</sup>	
Silicon (CAS 7440-21-3)	TWA	5 mg/m <sup>3</sup> 15 mg/m <sup>3</sup>	Respirable fraction. Total dust

#### Compounds Formed During Processing

Compounds Formed During Processing	Type	Value	Form
Aluminum oxide (non-fibrous) (CAS 1344-28-1)	TWA	5 mg/m <sup>3</sup> 15 mg/m <sup>3</sup>	Respirable fraction. Total dust.
Chromium (II) compounds (CAS No. Not available)	TWA	0.5 mg/m <sup>3</sup>	(as Cr)
Chromium (III) compounds (CAS No. Not available)	TWA	0.5 mg/m <sup>3</sup>	(as Cr)
Chromium (VI) compounds, certain water insoluble forms (CAS No. Not available)	TWA	0.0025 mg/m <sup>3</sup>	Action Level as Cr(VI))
Chromium (VI) compounds (CAS 18540-29-9)	TWA	0.0025 mg/m <sup>3</sup>	Action Level as Cr(VI)
Iron oxide (CAS 1309-37-1)	TWA	10 mg/m <sup>3</sup>	Fume.
Lead compounds, inorganic (CAS No. Not available)	TWA	0.05 mg/m <sup>3</sup> 0.03 mg/m <sup>3</sup>	(as Pb) Action Level (as Pb)
Manganese compounds, inorganic (CAS No. Not available)	Ceiling	5 mg/m <sup>3</sup>	(as Mn) Fume
Nickel compounds, insoluble (CAS No. Not available)	TWA	1 mg/m <sup>3</sup>	(as Ni)
Nitric oxide (CAS 10102-43-9)	TWA	30 mg/m <sup>3</sup>	
Oil mist, mineral (CAS 8012-95-1)	TWA	25 ppm 5 mg/m <sup>3</sup>	Mist.
Ozone (CAS 10028-15-6)	TWA	0.2 mg/m <sup>3</sup>	
Zinc oxide (CAS 1314-13-2)	TWA	0.1 ppm 5 mg/m <sup>3</sup> 5 mg/m <sup>3</sup> 15 mg/m <sup>3</sup>	Respirable fraction. Fume. Total dust.

#### US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

#### Components

Components	Type	Value	Form
Lead* (CAS 7439-92-1)	TWA	0.05 mg/m <sup>3</sup>	

#### Compounds Formed During Processing

Compounds Formed During Processing	Type	Value	Form
Chromium (VI) compounds, certain water insoluble forms (CAS No. Not available)	TWA	0.005 mg/m <sup>3</sup>	as Cr(VI)

**US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)**

<b>Compounds Formed During Processing</b>	<b>Type</b>	<b>Value</b>	<b>Form</b>
Chromium (VI) compounds, water soluble forms (CAS No. Not available)	TWA	0.005 mg/m3	
Chromium (VI) compounds (CAS 18540-29-9)	TWA	0.005 mg/m3	as Cr(VI)

**US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)**

<b>Compounds Formed During Processing</b>	<b>Type</b>	<b>Value</b>	<b>Form</b>
Magnesium oxide (CAS 1309-48-4)	PEL	15 mg/m3	Total particulate.
Nitrogen dioxide (CAS 10102-44-0)	Ceiling	9 mg/m3	
Oil mist, mineral (CAS 8012-95-1)	PEL	5 ppm 5 mg/m3	Mist.

**ACGIH**

<b>Compounds Formed During Processing</b>	<b>Type</b>	<b>Value</b>	<b>Form</b>
Aluminum oxide (non-fibrous) (CAS 1344-28-1)	TWA	1 mg/m3	Respirable fraction, as Al
Chromium (VI) compounds, water soluble forms (CAS No. Not available)	TWA	0.05 mg/m3	(as Cr)
Chromium (VI) compounds (CAS 18540-29-9)	TWA	0.05 mg/m3	Soluble compounds as Cr
Ozone (CAS 10028-15-6)	TWA	0.2 ppm	(Heavy, moderate or light workloads (≤2 hours))

**US ACGIH Threshold Limit Values: Short Term Exposure Limit (STEL): mg/m3**

<b>Compounds Formed During Processing</b>	<b>Type</b>	<b>Value</b>	<b>Form</b>
Zinc oxide (CAS 1314-13-2)	STEL	10 mg/m3	Respirable fraction.

**US ACGIH Threshold Limit Values: Time Weighted Average (TWA): mg/m3 & ppm**

<b>Compounds Formed During Processing</b>	<b>Type</b>	<b>Value</b>	
Nitric oxide (CAS 10102-43-9)	TWA	25 ppm	
Nitrogen dioxide (CAS 10102-44-0)	TWA	0.2 ppm	

**US ACGIH Threshold Limit Values: Time Weighted Average (TWA): mg/m3, non-standard units**

<b>Components</b>	<b>Type</b>	<b>Value</b>	<b>Form</b>
Aluminum (CAS 7429-90-5)	TWA	1 mg/m3	Respirable fraction.
Chromium (CAS 7440-47-3)	TWA	0.5 mg/m3	
Copper (CAS 7440-50-8)	TWA	1 mg/m3 0.2 mg/m3	Dust and mist. Fume.
Lead* (CAS 7439-92-1)	TWA	0.05 mg/m3	
Manganese (CAS 7439-96-5)	TWA	0.1 mg/m3	Inhalable fraction.
Nickel† (CAS 7440-02-0)	TWA	0.02 mg/m3 1.5 mg/m3	Respirable fraction. Inhalable fraction.
Chromium (III) compounds (CAS No. Not available)	TWA	0.5 mg/m3	

**US ACGIH Threshold Limit Values: Time Weighted Average (TWA): mg/m3, non-standard units**

<b>Compounds Formed During Processing</b>	<b>Type</b>	<b>Value</b>	<b>Form</b>
Chromium (VI) compounds, certain water insoluble forms (CAS No. Not available)	TWA	0.01 mg/m3	(as Cr)
Chromium (VI) compounds (CAS 18540-29-9)	TWA	0.01 mg/m3	Insoluble compounds as Cr
Iron oxide (CAS 1309-37-1)	TWA	5 mg/m3	Respirable fraction.
Lead compounds, inorganic (CAS No. Not available)	TWA	0.05 mg/m3	
Magnesium oxide (CAS 1309-48-4)	TWA	10 mg/m3	Inhalable fraction.
Manganese compounds, inorganic (CAS No. Not available)	TWA	0.1 mg/m3	Inhalable fraction.
		0.02 mg/m3	Respirable fraction.
Nickel compounds, insoluble (CAS No. Not available)	TWA	0.2 mg/m3	Inhalable fraction.
Oil mist, mineral (CAS 8012-95-1)	TWA	5 mg/m3	Inhalable fraction.
Zinc oxide (CAS 1314-13-2)	TWA	2 mg/m3	Respirable fraction.

**Alcoa**

<b>Components</b>	<b>Type</b>	<b>Value</b>	<b>Form</b>
Aluminum (CAS 7429-90-5)	TWA	3 mg/m3	Respirable fraction
		10 mg/m3	Total dust
Manganese (CAS 7439-96-5)	TWA	0.05 mg/m3	Total dust.
		0.02 mg/m3	Respirable fraction.
Nickel† (CAS 7440-02-0)	TWA	1 mg/m3	

**Compounds Formed During Processing**

<b>Compounds Formed During Processing</b>	<b>Type</b>	<b>Value</b>	<b>Form</b>
Aluminum oxide (non-fibrous) (CAS 1344-28-1)	TWA	3 mg/m3	Respirable fraction.
		10 mg/m3	Total dust.
Chromium (VI) compounds (CAS 18540-29-9)	TWA	0.25 µg/m3	
Manganese compounds, inorganic (CAS No. Not available)	TWA	0.05 mg/m3	Total dust, as Mn.
		0.02 mg/m3	Respirable fraction, as Mn.
Nickel compounds, insoluble (CAS No. Not available)	TWA	0.1 mg/m3	Insoluble
Oil mist, mineral (CAS 8012-95-1)	TWA	0.5 mg/m3	(8 Hour)

<b>General</b>	<p>Personnel who handle and work with molten metal should utilize primary protective clothing like polycarbonate face shields, fire resistant tapper's jackets, neck shades (snoods), leggings, spats and similar equipment to prevent burn injuries. In addition to primary protection, secondary or day-to-day work clothing that is fire resistant and sheds metal splash is recommended for use with molten metal. Synthetic materials should never be worn even as secondary clothing (undergarments).</p> <p>Minimize breathing oil vapors and mist. Remove oil contaminated clothing; launder or dry-clean before reuse. Remove oil contaminated shoes and thoroughly clean and dry before reuse. Cleanse skin thoroughly after contact, before breaks and meals, and at the end of the work period. Oil coating is readily removed from skin with waterless hand cleaners followed by a thorough washing with soap and water.</p> <p>Sampling to establish lead level exposure is advised where exposure to airborne particulate or fumes is possible. Consult OSHA Lead Standard 29 CFR 1910.1025 for specific health/industrial hygiene precautions and requirements to follow when handling lead compounds.</p>
<b>Appropriate engineering controls</b>	Dust and fumes from processing: Use with adequate explosion-proof ventilation designed to handle particulates to meet the limits listed in Section 8, Exposure Guidelines.
<b>Individual protection measures, such as personal protective equipment</b>	
<b>Eye/face protection</b>	Wear safety glasses with side shields. Wear a face shield when working with molten material.
<b>Skin protection</b>	
<b>Hand protection</b>	Wear impervious gloves to avoid repeated or prolonged skin contact with residual oils and to avoid any skin injury. When material is heated, wear gloves to protect against thermal burns.
<b>Other</b>	The need for personal protective equipment should be based upon a hazard assessment and recommendations from health / safety professionals. Wear impervious gloves to avoid repeated or prolonged skin contact with residual oils and to avoid any skin injury. Molten metal: Wear fire/flame resistant/retardant clothing.
<b>Respiratory protection</b>	Dust and fumes from processing: Use NIOSH-approved respiratory protection as specified by an Industrial Hygienist or other qualified professional if concentrations exceed the limits listed in Section 8. Suggested respiratory protection: P95, P100 for Lead.
<b>Thermal hazards</b>	Contact with molten material can cause thermal burns. Hot aluminum does not necessarily glow red. When material is heated, wear gloves to protect against thermal burns. Flame retardant protective clothing is recommended.
<b>General hygiene considerations</b>	Handle in accordance with good industrial hygiene and safety practice. When using, do not eat, drink or smoke. Wash hands before breaks and immediately after handling the product.

## 9. Physical and chemical properties

<b>Form</b>	Solid.
<b>Color</b>	Silver colored.
<b>Odor</b>	Odorless
<b>Odor threshold</b>	Not applicable
<b>Density</b>	2.64 - 2.74 g/cm <sup>3</sup> (0.0954 - 0.099 lb/in <sup>3</sup> )
<b>Bulk density</b>	Not determined
<b>pH</b>	Not applicable
<b>Melting point/freezing point</b>	1149.8 - 1220 °F (621 - 660 °C)
<b>Initial boiling point and boiling range</b>	Not determined
<b>Flash point</b>	Not applicable
<b>Evaporation rate</b>	Not applicable.
<b>Flammability (solid, gas)</b>	Not applicable.
<b>Upper/lower flammability or explosive limits</b>	
<b>Flammability limit - upper (%)</b>	Not applicable
<b>Flammability limit - lower (%)</b>	Not applicable
<b>Explosive properties</b>	Dust may form an explosive mixture in the atmosphere.
<b>Dust explosion properties</b>	
<b>St class</b>	Very strong explosion.
<b>Vapor pressure</b>	Not applicable
<b>Vapor density</b>	Not applicable



<b>Relative density</b>	Not determined
<b>Solubility(ies)</b>	Insoluble
<b>Partition coefficient (n-octanol/water)</b>	Not established.
<b>Auto-ignition temperature</b>	Not applicable
<b>Decomposition temperature</b>	Not applicable.
<b>Viscosity</b>	Not applicable.

## 10. Stability and reactivity

<b>Reactivity</b>	Hazardous polymerization does not occur.
<b>Chemical stability</b>	Stable under normal conditions of use, storage, and transportation as shipped.
<b>Possibility of hazardous reactions</b>	Hazardous polymerization does not occur.
<b>Conditions to avoid</b>	<p>Grinding, sanding, buffing and polishing operations may generate potentially explosive aluminum dust, fines or particulate that must not be co-mingled with dust, fines or particulate of steel, iron, iron oxide (rust) or other metal oxides. Vacuum and dust collection systems utilized for processing aluminum must be placarded as follows:</p> <p>WARNING – Aluminum Metal Only – Fire or Explosion Can Result with Other Metals.</p> <p>Chips, fines, dust and molten metal are considerably more reactive with the following:</p> <ul style="list-style-type: none"> <li>• Heat: Oxidizes at a rate dependent upon temperature and particle size.</li> <li>• Water: Slowly generates flammable/explosive hydrogen gas and heat. Generation rate is greatly increased with smaller particles (e.g., fines and dusts). Molten metal can react violently/explosively with water or moisture, particularly when the water is entrapped.</li> </ul> <p>Explosions can occur with coils of foil that have been submerged or partially submerged in water for an extended period of time. Water can penetrate between the layers of foil, react with the aluminum surface and generate heat and hydrogen gas. When the coils are removed from the cooling effects of the water, rapid temperature increases can occur causing steam explosions which result in the rupture of the coils and discharge of debris.</p> <p>Coils of foil may be a potential hazard under the following conditions:</p> <ul style="list-style-type: none"> <li>• Coil has been annealed (annealing removes residual oil that could prevent penetration of water)</li> <li>• Foil is very thin gauge (5-9 µm thickness which increases surface area)</li> <li>• Coil has been immersed for an extended period of time (several hours or more)</li> <li>• Wetted coil has recently been removed from the cooling effects of the water</li> </ul> <p>In such situations, the coils should be isolated (30 meters from any personnel) for at least 72 hours as soon as possible after removal from the water. Coils making crackling sounds or emitting steam should not be approached or transported in commerce. Wetted coils should not be charged into a furnace for remelting until completely dry.</p>
<b>Incompatible materials</b>	<p>Chips, fines, dust and molten metal are considerably more reactive with the following:</p> <ul style="list-style-type: none"> <li>• Strong oxidizers: Violent reaction with considerable heat generation. Can react explosively with nitrates (e.g., ammonium nitrate and fertilizers containing nitrate) when heated or molten.</li> <li>• Acids and alkalis: Reacts to generate flammable/explosive hydrogen gas. Generation rate is greatly increased with smaller particles (e.g., fines and dusts).</li> <li>• Halogenated compounds: Many halogenated hydrocarbons, including halogenated fire extinguishing agents, can react violently with finely divided or molten aluminum.</li> <li>• Iron oxide (rust) and other metal oxides (e.g., copper and lead oxides): A violent thermite reaction generating considerable heat can occur. Reaction with aluminum fines and dusts requires only very weak ignition sources for initiation. Molten aluminum can react violently with iron oxide without external ignition source.</li> <li>• Iron powder and water: Explosive reaction forming hydrogen gas when heated above 1470°F (800°C).</li> </ul>
<b>Hazardous decomposition products</b>	No hazardous decomposition products are known.

## 11. Toxicological information

### Health effects associated with ingredients

The following health effects are not likely to occur unless sawing or cutting generates dust or unless material is heated to melting.

Aluminum dust/fines and fumes: Low health risk by inhalation. Generally considered to be biologically inert (milling, cutting, grinding).

Silicon (inert dusts): Chronic overexposures: Can cause chronic bronchitis and narrowing of airways.

Copper dust/mists: Can cause irritation of the eyes, mucous membranes, skin, and respiratory tract. Chronic overexposures: Can cause reduction in the number of red blood cells (anemia), skin abnormalities (pigmentation changes) and hair discoloration.

Nickel dust and fume: Can cause irritation of eyes, skin and respiratory tract. Eye contact: Can cause inflammation of the eyes and eyelids (conjunctivitis). Skin contact: Can cause sensitization and allergic contact dermatitis. Chronic overexposures: Can cause perforation of the nasal septum, inflammation of the nasal passages (sinusitis), respiratory sensitization, asthma and scarring of the lungs (pulmonary fibrosis). Nickel alloys IARC/NTP: Reviewed and not recommended for listing by NTP. Listed as possibly carcinogenic to humans by IARC (Group 2B).

Chromium dust and fumes: Can cause irritation of eye, skin and respiratory tract. Metallic chromium and trivalent chromium: Not classifiable as to their carcinogenicity to humans by IARC.

Lead dust or fume: Can cause irritation of eyes and upper respiratory tract. Acute overexposures: Can cause nausea and muscle cramps. Chronic overexposures: Can cause weakness in the extremities (peripheral neuropathy), abdominal cramps, gastrointestinal tract effects, kidney damage, liver damage, central nervous system damage, damage to the blood forming organs, blood cell damage and reproductive harm. Can cause reduced fertility and fetal toxicity in pregnant women. IARC/NTP: Listed as "reasonably anticipated to be a human carcinogen" by the NTP. Listed as possibly carcinogenic to humans by IARC (Group 2B).

Some products are supplied with an oil coating or have residual oil from the manufacturing process. Oil: Can cause irritation of skin. Skin contact (prolonged or repeated): Can cause dermatitis.

### Health effects associated with compounds formed during processing

The following could be expected if welded, remelted or otherwise processed at elevated temperatures:

Alumina (aluminum oxide): Low health risk by inhalation. Generally considered to be biologically inert.

Silica, amorphous: Acute overexposures: Can cause dryness of eyes, nose and upper respiratory tract.

Zinc oxide fumes: Can cause irritation of upper respiratory tract. Acute overexposures: Can cause metal fume fever (nausea, fever, chills, shortness of breath and malaise).

Iron oxide: Chronic overexposures: Can cause benign lung disease (siderosis). Ingestion: Can cause irritation of gastrointestinal tract, bleeding, changes in the pH of the body fluids (metabolic acidosis) and liver damage.

Copper fume: Can cause irritation of the eyes, mucous membranes, and respiratory tract. Acute overexposures: Can cause metal fume fever (nausea, fever, chills, shortness of breath and malaise).

Nickel compounds: Associated with lung cancer, cancer of the vocal cords and nasal cancer. IARC/NTP: Listed as "known to be a human carcinogen" by the NTP. Listed as carcinogenic to humans by IARC (Group 1).

Magnesium oxide fumes: Can cause irritation of the eyes and respiratory tract. Acute overexposures: Can cause metal fume fever (nausea, fever, chills, shortness of breath and malaise).

Bismuth compounds: Chronic overexposures: Can cause blue-gray discoloration of mucous membranes, foul breath, skin rash, liver damage and kidney damage.

Manganese oxide fumes: Can cause irritation of the eyes, skin, and respiratory tract. Acute overexposures: Can cause metal fume fever (nausea, fever, chills, shortness of breath and malaise).

Chromium (III) compounds: Can cause irritation of eye, skin and respiratory tract. IARC/NTP: Not classifiable as to their carcinogenicity to humans by IARC.

Hexavalent chromium compounds (chromium VI): Can cause irritation of eye, skin and respiratory tract. Skin contact: Can cause irritant dermatitis, allergic reactions and skin ulcers. Chronic overexposures: Can cause perforation of the nasal septum, respiratory sensitization, asthma, the accumulation of fluid in the lungs (pulmonary edema), lung damage, kidney damage, lung cancer, nasal cancer and cancer of the gastrointestinal tract. IARC/NTP: Listed as "known to be a human carcinogen" by the NTP. Listed as carcinogenic to humans by IARC (Group 1).

Lead (inorganic compounds): IARC/NTP: Listed as "reasonably anticipated to be a human carcinogen" by the NTP. Listed as probably carcinogenic to humans by IARC (Group 2A).

If the product is heated well above ambient temperatures or machined, oil vapor or mist may be generated.

Oil vapor or mist: Can cause irritation of respiratory tract. Acute overexposures: Can cause bronchitis, headache, central nervous system effects (nausea, dizziness and loss of coordination) and drowsiness (narcosis).

Welding, plasma arc cutting, and arc spray metalizing can generate ozone.

Ozone: Can cause irritation of eyes, nose and upper respiratory tract. Acute overexposures: Can cause shortness of breath, tightness of chest, headache, cough, nausea and narrowing of airways. Effects are reversible on cessation of exposure. Acute overexposures (high concentrations): Can cause respiratory distress, respiratory tract damage, bleeding and the accumulation of fluid in the lungs (pulmonary edema). Effects can be delayed up to 1-2 hours. Additional information: Studies (inhalation) with experimental animals have found genetic damage, reproductive harm, blood cell damage, lung damage and death.

Welding fumes: IARC/NTP: Listed as possibly carcinogenic to humans by IARC (Group 2B). Additional information: In one study, occupational asthma was associated with exposures to fumes from aluminum welding.

Plasma arc cutting of aluminum can generate oxides of nitrogen.

Oxides of nitrogen (NO and NO<sub>2</sub>): Can cause irritation of eyes, skin and respiratory tract. Acute overexposures: Can cause reduced ability of the blood to carry oxygen (methemoglobin). Can cause cough, shortness of breath, accumulation of fluid in the lungs (pulmonary edema) and death. Effects can be delayed up to 2-3 weeks.

Nitrogen dioxide (NO<sub>2</sub>): Chronic overexposures: Can cause scarring of the lungs (pulmonary fibrosis).

#### Information on likely routes of exposure

**Eye contact** Dust and fumes from processing: May be irritating to eyes.

**Inhalation** Health effects from mechanical processing (e.g., cutting, grinding): Dust: Can cause irritation of the upper respiratory tract. Chronic overexposures: Can cause scarring of the lungs (pulmonary fibrosis), reduction in the number of red blood cells (anemia), and skin abnormalities (pigmentation changes).

Additional health effects from elevated temperature processing (e.g., welding, melting): Dust and fumes from processing: Can cause irritation of the respiratory tract. Acute overexposure: Can cause metal fume fever (nausea, chills, fever, shortness of breath and malaise), reduced ability of the blood to carry oxygen (methemoglobin) and the accumulation of fluid in the lungs (pulmonary edema). Chronic overexposures: Can cause benign lung disease (siderosis) and lung cancer.

**Ingestion** Not relevant, due to the form of the product.

**Skin contact** Contact with residual oil/oil coating: Frequent or prolonged contact may defat and dry the skin, leading to discomfort and dermatitis.

Dust and fumes from processing: Can cause mechanical irritation. Prolonged or repeated skin contact may cause sensitization and allergic contact dermatitis. Contains Nickel. May produce an allergic reaction.

**Symptoms related to the physical, chemical and toxicological characteristics** Dust and fume from processing: Upper respiratory tract irritation. Contains nickel. May produce an allergic reaction. May cause sensitization of susceptible persons by skin contact or by inhalation of dust. Heating above the melting point releases metallic oxides which may cause metal fume fever by inhalation. The symptoms are shivering, fever, malaise and muscular pain.

Contact with residual oil/oil coating: Repeated or prolonged skin contact with the unexposed coating may cause skin irritation and/or dermatitis and sensitization of susceptible persons.

#### Information on toxicological effects

**Acute toxicity** Not classified. Based on available data, the classification criteria are not met.

Components	Species	Test Results
Aluminum (CAS 7429-90-5)		
<b>Acute</b>		
<i>Inhalation</i>		
LC50	Rat	> 2.3 mg/l 7.6 mg/l
<i>Oral</i>		
LD50	Rat	> 2000 mg/kg
Nickel† (CAS 7440-02-0)		
<b>Acute</b>		
<i>Oral</i>		
LD50	Rat	> 9000 mg/kg
Zinc (CAS 7440-66-6)		
<b>Acute</b>		
<i>Oral</i>		
LD50	Rat	630 mg/kg
Compounds Formed During Processing	Species	Test Results
Aluminum oxide (non-fibrous) (CAS 1344-28-1)		
<b>Acute</b>		
<i>Inhalation</i>		
LC50	Rat	> 2.3 mg/l 7.6 mg/l
<i>Oral</i>		
LD50	Rat	> 5000 mg/kg
Iron oxide (CAS 1309-37-1)		
<b>Acute</b>		
<i>Oral</i>		
LD50	Rat	> 10000 mg/kg
Nitric oxide (CAS 10102-43-9)		
<b>Acute</b>		
<i>Inhalation</i>		
LC50	Rat	115 mg/l, 1 Hours 57.5 mg/l, 4 Hours
Nitrogen dioxide (CAS 10102-44-0)		
<b>Acute</b>		
<i>Inhalation</i>		
LC50	Guinea pig Rat	30 ppm, 1 Hours 88 ppm, 4 Hours
Silica, amorphous (CAS 69012-64-2)		
<b>Acute</b>		
<i>Oral</i>		
LD50	Mouse Rat	> 15000 mg/kg > 22500 mg/kg
Zinc oxide (CAS 1314-13-2)		
<b>Acute</b>		
<i>Inhalation</i>		
LC50	Mouse	> 5.7 mg/l, 4 Hours
<i>Oral</i>		
LD50	Mouse Rat	7950 mg/kg > 5000 mg/kg

Compounds Formed During Processing	Species	Test Results
		> 5 g/kg
<i>Other</i> LD50	Rat	240 mg/kg
<b>Skin corrosion/irritation</b>	Non-corrosive.	
<b>Serious eye damage/eye irritation</b>	Not classified. Dust and fume from processing: May cause minor irritation on eye contact.	
<b>Respiratory or skin sensitization</b>	Contains nickel. May produce an allergic reaction. May cause sensitization of susceptible persons by skin contact or by inhalation of dust.	
<b>Respiratory sensitization</b>	Not classified. Based on available data, the classification criteria are not met.	
<b>Skin sensitization</b>	Dust and fume from processing: Contains nickel. May produce an allergic reaction. May cause an allergic skin reaction. May cause sensitization by skin contact.	
	Contact with residual oil/oil coating: Mildly irritating to skin with prolonged exposure. May cause eczema-like skin disorders (dermatitis).	
<b>Germ cell mutagenicity</b>	Not classified. Based on available data, the classification criteria are not met.	
<b>Pre-existing conditions aggravated by exposure</b>	Dust and fumes from processing: Asthma, chronic lung disease, and skin rashes.	
<b>Carcinogenicity</b>	Dust and fume from processing: Dust from mechanical processing: Can present a cancer hazard (Nickel, Lead).	
	Dust and fumes from welding or elevated temperature processing: Can present a cancer hazard (Hexavalent chromium compounds, Nickel compounds, Lead compounds, Welding fumes).	
<b>ACGIH Carcinogens</b>		
Aluminum (CAS 7429-90-5)	A4 Not classifiable as a human carcinogen.	
Aluminum oxide (non-fibrous) (CAS 1344-28-1)	A4 Not classifiable as a human carcinogen.	
Chromium (CAS 7440-47-3)	A4 Not classifiable as a human carcinogen.	
Chromium (III) compounds (CAS No. Not available)	A4 Not classifiable as a human carcinogen.	
Chromium (VI) compounds (CAS 18540-29-9)	A1 Confirmed human carcinogen.	
Chromium (VI) compounds, certain water insoluble forms (CAS No. Not available)	A1 Confirmed human carcinogen.	
Chromium (VI) compounds, water soluble forms (CAS No. Not available)	A1 Confirmed human carcinogen.	
Iron oxide (CAS 1309-37-1)	A4 Not classifiable as a human carcinogen.	
Lead compounds, inorganic (CAS No. Not available)	A3 Confirmed animal carcinogen with unknown relevance to humans.	
Lead* (CAS 7439-92-1)	A3 Confirmed animal carcinogen with unknown relevance to humans.	
Magnesium oxide (CAS 1309-48-4)	A4 Not classifiable as a human carcinogen.	
Manganese (CAS 7439-96-5)	A4 Not classifiable as a human carcinogen.	
Nickel compounds, insoluble (CAS No. Not available)	A1 Confirmed human carcinogen.	
Nickel† (CAS 7440-02-0)	A5 Not suspected as a human carcinogen.	
Oil mist, mineral (CAS 8012-95-1)	A2 Suspected human carcinogen.	
	A4 Not classifiable as a human carcinogen.	
<b>IARC Monographs. Overall Evaluation of Carcinogenicity</b>		
Chromium (CAS 7440-47-3)	3 Not classifiable as to carcinogenicity to humans.	
Chromium (III) compounds (CAS No. Not available)	3 Not classifiable as to carcinogenicity to humans.	
Chromium (VI) compounds (CAS 18540-29-9)	1 Carcinogenic to humans.	
Chromium (VI) compounds, certain water insoluble forms (CAS No. Not available)	1 Carcinogenic to humans.	
Chromium (VI) compounds, water soluble forms (CAS No. Not available)	1 Carcinogenic to humans.	
Iron oxide (CAS 1309-37-1)	3 Not classifiable as to carcinogenicity to humans.	
Lead compounds, inorganic (CAS No. Not available)	2A Probably carcinogenic to humans.	
Lead* (CAS 7439-92-1)	2B Possibly carcinogenic to humans.	
Nickel compounds, insoluble (CAS No. Not available)	1 Carcinogenic to humans.	
Nickel† (CAS 7440-02-0)	1 Carcinogenic to humans.	
Silica, amorphous (CAS 69012-64-2)	3 Not classifiable as to carcinogenicity to humans.	
<b>US. National Toxicology Program (NTP) Report on Carcinogens</b>		
Chromium (VI) compounds (CAS 18540-29-9)	Known To Be Human Carcinogen.	

Chromium (VI) compounds, certain water insoluble forms (CAS No. Not available) Known To Be Human Carcinogen.  
 Chromium (VI) compounds, water soluble forms (CAS No. Not available) Known To Be Human Carcinogen.  
 Lead compounds, inorganic (CAS No. Not available) Reasonably Anticipated to be a Human Carcinogen.  
 Lead\* (CAS 7439-92-1) Reasonably Anticipated to be a Human Carcinogen.  
 Nickel† (CAS 7440-02-0) Known To Be Human Carcinogen.  
 Reasonably Anticipated to be a Human Carcinogen.  
 Oil mist, mineral (CAS 8012-95-1) Known To Be Human Carcinogen.

**Reproductive toxicity** Dust and fume from processing: Can present a reproductive hazard (Lead). Additional health effects from elevated temperature processing (e.g., welding, melting): Can present a reproductive hazard (Manganese compounds, Lead compounds).

**Routes of exposure** Skin contact. Inhalation.

**Teratogenicity** Not classified. Based on available data, the classification criteria are not met.

**Specific target organ toxicity - single exposure** Not classified. Based on available data, the classification criteria are not met.

**Specific target organ toxicity - repeated exposure** May cause damage to organs (Respiratory system) through prolonged or repeated exposure by inhalation. May cause damage to organs (Central nervous system) through prolonged or repeated exposure by inhalation.

**Aspiration hazard** Not classified. Based on available data, the classification criteria are not met.

**Chronic effects** Dust or fume from processing: Contains nickel, which can cause lung or nasal cancer. Long-term breathing of this material may cause chronic lung disease.

**Further information** None known.

## 12. Ecological information

**Ecotoxicity** Not expected to be harmful to aquatic organisms.

Components		Species	Test Results
Chromium (CAS 7440-47-3)			
<b>Aquatic</b>			
Crustacea	EC50	Water flea (Daphnia magna)	0.01 - 0.7 mg/l, 48 hours
Fish	LC50	Carp (Cyprinus carpio)	14.3 mg/l, 96 hours
Copper (CAS 7440-50-8)			
<b>Aquatic</b>			
Crustacea	EC50	Water flea (Daphnia magna)	0.036 mg/l, 48 hours
Fish	LC50	Fathead minnow (Pimephales promelas)	0.0319 - 0.0544 mg/l, 96 hours
Iron (CAS 7439-89-6)			
<b>Aquatic</b>			
Crustacea	LC50	Cockle (Cerastoderma edule)	100 - 330 mg/l, 48 hours
		Common shrimp, sand shrimp (Crangon crangon)	33 - 100 mg/l, 48 hours
Fish	LC50	Channel catfish (Ictalurus punctatus)	> 500 mg/l, 96 hours
Lead* (CAS 7439-92-1)			
<b>Aquatic</b>			
Fish	LC50	Rainbow trout, donaldson trout (Oncorhynchus mykiss)	1.17 mg/l, 96 hours
Manganese (CAS 7439-96-5)			
<b>Aquatic</b>			
Crustacea	EC50	Water flea (Daphnia magna)	40 mg/l, 48 hours
Nickel† (CAS 7440-02-0)			
<b>Aquatic</b>			
Crustacea	EC50	Water flea (Daphnia magna)	1 mg/l, 48 hours
Fish	LC50	Fathead minnow (Pimephales promelas)	2.923 mg/l, 96 hours

Components	Species		Test Results
Zinc (CAS 7440-66-6)			
<b>Aquatic</b>			
Crustacea	EC50	Water flea (Daphnia magna)	2.8 mg/l, 48 hours
Fish	LC50	Rainbow trout,donaldson trout (Oncorhynchus mykiss)	0.56 mg/l, 96 hours

Compounds Formed During Processing	Species		Test Results
Zinc oxide (CAS 1314-13-2)			
<b>Aquatic</b>			
Fish	LC50	Fathead minnow (Pimephales promelas)	2246 mg/l, 96 hours

<b>Persistence and degradability</b>	No information available for product.
<b>Bioaccumulative potential</b>	Bioaccumulation is unlikely to be significant because of the low water solubility of this product.
<b>Mobility in soil</b>	Not considered mobile.
<b>Mobility in general</b>	Not applicable.
<b>Other adverse effects</b>	None known.

### 13. Disposal considerations

<b>Disposal instructions</b>	Reuse or recycle material whenever possible. If reuse or recycling is not possible, disposal must be made according to local or governmental regulations.
<b>Waste codes</b>	RCRA Status: Must be determined at the point of waste generation. If material is disposed as a waste, it must be characterized under RCRA according to 40 CFR, Part 261, or state equivalent in the U.S. RCRA waste codes other than described here may apply depending on use of the product. Status must be determined at the point of waste generation. Refer to 40 CFR 261 or state equivalent in the U.S. TCLP testing is recommended for Chromium, Lead in a waste disposal scenario.
<b>Waste from residues / unused products</b>	Dispose of in accordance with local regulations.
<b>Contaminated packaging</b>	Dispose of in accordance with local regulations.

### 14. Transport information

#### General Shipping Information

##### Basic Shipping Information

<b>ID number</b>	-
<b>Proper shipping name</b>	Not regulated
<b>Hazard class</b>	-
<b>Packing group</b>	-

#### General Shipping Notes

- When "Not regulated", enter the proper freight classification, SDS Number and Product Name onto the shipping paperwork.

#### Disclaimer

This section provides basic classification information and, where relevant, information with respect to specific modal regulations, environmental hazards and special precautions. Otherwise, it is presumed that the information is not available/not relevant

### 15. Regulatory information

<b>US federal regulations</b>	In reference to Title VI of the Clean Air Act of 1990, this material does not contain nor was it manufactured using ozone-depleting chemicals. All electrical equipment must be suitable for use in hazardous atmospheres involving aluminum powder in accordance with 29 CFR 1910.307. The National Electrical Code, NFPA 70, contains guidelines for determining the type and design of equipment and installation which will meet this requirement.
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#### TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Chromium (VI) compounds (CAS 18540-29-9)	0.1 % Annual Export Notification required.
Chromium (VI) compounds, certain water insoluble forms (CAS No. Not available)	0.1 % Annual Export Notification required.
Chromium (VI) compounds, water soluble forms (CAS No. Not available)	0.1 % Annual Export Notification required.

#### CERCLA Hazardous Substance List (40 CFR 302.4)

Chromium (CAS 7440-47-3)	LISTED
Chromium (II) compounds (CAS No. Not available)	LISTED
Chromium (III) compounds (CAS No. Not available)	LISTED

Chromium (VI) compounds (CAS 18540-29-9)	LISTED
Copper (CAS 7440-50-8)	LISTED
Lead compounds, inorganic (CAS No. Not available)	LISTED
Lead* (CAS 7439-92-1)	LISTED
Manganese (CAS 7439-96-5)	LISTED
Manganese compounds, inorganic (CAS No. Not available)	LISTED
Nickel compounds, insoluble (CAS No. Not available)	LISTED
Nickel† (CAS 7440-02-0)	LISTED
Zinc oxide (CAS 1314-13-2)	LISTED

**US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)**

Chromium (VI) compounds (CAS 18540-29-9)	Cancer
Chromium (VI) compounds, certain water insoluble forms (CAS No. Not available)	Cancer
Chromium (VI) compounds, water soluble forms (CAS No. Not available)	Cancer
Lead compounds, inorganic (CAS No. Not available)	Reproductive toxicity
Lead* (CAS 7439-92-1)	Reproductive toxicity
Chromium (VI) compounds (CAS 18540-29-9)	Eye irritation
Chromium (VI) compounds, certain water insoluble forms (CAS No. Not available)	Eye irritation
Chromium (VI) compounds, water soluble forms (CAS No. Not available)	Eye irritation
Lead compounds, inorganic (CAS No. Not available)	Central nervous system
Lead* (CAS 7439-92-1)	Central nervous system
Chromium (VI) compounds (CAS 18540-29-9)	Skin sensitization
Chromium (VI) compounds, certain water insoluble forms (CAS No. Not available)	Skin sensitization
Chromium (VI) compounds, water soluble forms (CAS No. Not available)	Skin sensitization
Lead compounds, inorganic (CAS No. Not available)	Kidney
Lead* (CAS 7439-92-1)	Kidney
Lead compounds, inorganic (CAS No. Not available)	Blood
Lead* (CAS 7439-92-1)	Blood
Lead compounds, inorganic (CAS No. Not available)	Acute toxicity
Lead* (CAS 7439-92-1)	Acute toxicity

**Superfund Amendments and Reauthorization Act of 1986 (SARA)**

<b>Section 311/312 hazard categories</b>	Immediate Hazard - Yes	If particulates/fumes generated during processing
	Delayed Hazard - Yes	If particulates/fumes generated during processing
	Fire Hazard - No	
	Pressure Hazard - No	
	Reactivity Hazard - Yes	If molten

**SARA 302 Extremely hazardous substance** No

**SARA 311/312 Hazardous chemical** Yes

**SARA 313 (TRI reporting)**

Chemical name	CAS number	% by wt.
Aluminum	7429-90-5	>70
Zinc	7440-66-6	<10.8
Copper	7440-50-8	<5.1
Nickel†	7440-02-0	<2.3
Manganese	7439-96-5	<1.6

**US state regulations** WARNING: This product contains a chemical known to the State of California to cause cancer and birth defects or other reproductive harm.

**US. Massachusetts RTK - Substance List**

- Chromium (CAS 7440-47-3)
- Copper (CAS 7440-50-8)
- Iron oxide (CAS 1309-37-1)
- Lead\* (CAS 7439-92-1)
- Magnesium (CAS 7439-95-4)
- Magnesium oxide (CAS 1309-48-4)



Manganese (CAS 7439-96-5)  
Nickel† (CAS 7440-02-0)  
Zinc oxide (CAS 1314-13-2)

**US. New Jersey Worker and Community Right-to-Know Act**

Chromium (CAS 7440-47-3)	500 LBS
Chromium (II) compounds (CAS No. Not available)	500 LBS
Chromium (III) compounds (CAS No. Not available)	500 LBS
Chromium (VI) compounds (CAS 18540-29-9)	500 LBS
Chromium (VI) compounds, water soluble forms (CAS No. Not available)	500 LBS
Copper (CAS 7440-50-8)	500 LBS
Lead compounds, inorganic (CAS No. Not available)	500 LBS
Lead* (CAS 7439-92-1)	500 LBS
Manganese (CAS 7439-96-5)	500 LBS
Manganese compounds, inorganic (CAS No. Not available)	500 LBS
Nickel compounds, insoluble (CAS No. Not available)	500 LBS
Nickel† (CAS 7440-02-0)	500 LBS
Zinc oxide (CAS 1314-13-2)	500 LBS

**US. Pennsylvania RTK - Hazardous Substances**

Chromium (CAS 7440-47-3)  
Chromium (VI) compounds, certain water insoluble forms (CAS No. Not available)  
Chromium (VI) compounds, water soluble forms (CAS No. Not available)  
Copper (CAS 7440-50-8)  
Iron oxide (CAS 1309-37-1)  
Lead\* (CAS 7439-92-1)  
Magnesium (CAS 7439-95-4)  
Magnesium oxide (CAS 1309-48-4)  
Manganese (CAS 7439-96-5)  
Nickel† (CAS 7440-02-0)  
Zinc oxide (CAS 1314-13-2)

**US. Rhode Island RTK**

Chromium (CAS 7440-47-3)  
Chromium (II) compounds (CAS No. Not available)  
Chromium (VI) compounds (CAS 18540-29-9)  
Chromium (VI) compounds, water soluble forms (CAS No. Not available)  
Copper (CAS 7440-50-8)  
Lead compounds, inorganic (CAS No. Not available)  
Lead\* (CAS 7439-92-1)  
Manganese (CAS 7439-96-5)  
Manganese compounds, inorganic (CAS No. Not available)  
Nickel compounds, insoluble (CAS No. Not available)  
Nickel† (CAS 7440-02-0)  
Zinc oxide (CAS 1314-13-2)

**US. California Proposition 65**

**US - California Proposition 65 - CRT: Listed date/Carcinogenic substance**

Chromium (VI) compounds (CAS 18540-29-9)	Listed: February 27, 1987
Chromium (VI) compounds, certain water insoluble forms (CAS No. Not available)	Listed: February 27, 1987
Chromium (VI) compounds, water soluble forms (CAS No. Not available)	Listed: February 27, 1987
Lead compounds, inorganic (CAS No. Not available)	Listed: October 1, 1992
Lead* (CAS 7439-92-1)	Listed: October 1, 1992
Nickel compounds, insoluble (CAS No. Not available)	Listed: May 7, 2004
Nickel† (CAS 7440-02-0)	Listed: May 7, 2004

**US - California Proposition 65 - CRT: Listed date/Developmental toxin**

Chromium (VI) compounds (CAS 18540-29-9)	Listed: December 19, 2008
Chromium (VI) compounds, certain water insoluble forms (CAS No. Not available)	Listed: December 19, 2008
Chromium (VI) compounds, water soluble forms (CAS No. Not available)	Listed: December 19, 2008
Lead compounds, inorganic (CAS No. Not available)	Listed: February 27, 1987

Lead\* (CAS 7439-92-1) Listed: February 27, 1987

**US - California Proposition 65 - CRT: Listed date/Female reproductive toxin**

Chromium (VI) compounds (CAS 18540-29-9) Listed: December 19, 2008

Chromium (VI) compounds, certain water insoluble forms (CAS No. Not available) Listed: December 19, 2008

Chromium (VI) compounds, water soluble forms (CAS No. Not available) Listed: December 19, 2008

Lead compounds, inorganic (CAS No. Not available) Listed: February 27, 1987

Lead\* (CAS 7439-92-1) Listed: February 27, 1987

**US - California Proposition 65 - CRT: Listed date/Male reproductive toxin**

Chromium (VI) compounds (CAS 18540-29-9) Listed: December 19, 2008

Chromium (VI) compounds, certain water insoluble forms (CAS No. Not available) Listed: December 19, 2008

Chromium (VI) compounds, water soluble forms (CAS No. Not available) Listed: December 19, 2008

Lead compounds, inorganic (CAS No. Not available) Listed: February 27, 1987

Lead\* (CAS 7439-92-1) Listed: February 27, 1987

**International Inventories**

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

\*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)

A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

**16. Other information, including date of preparation or last revision**

**SDS Status**

March 10, 2015: Change(s) in Section: 1, 2, 4, 10, 11 and 16.

March 13, 2013: Change(s) in Section: 1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15 and 16.

December 9, 2009: New format.

June 15, 2007: Change(s) in Section: EU classification.

October 23, 2006: Reviewed on a periodic basis in accordance with Alcoa policy. Change(s) in Section: 1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 12 and 15

August 14, 2003: Reviewed on a periodic basis in accordance with Alcoa policy. Change(s) in Section: 1, 2, 3, 8 and 15

Origination date: March 16, 1990

SDS System Number: 115952

**Revision date**

March 10, 2015.

**Version #**

09

**Further information**

Refer to NFPA 654, Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids, for safe handling.

**Revision Information**

Product and Company Identification: Synonyms

Hazards Identification: US Hazard Categories

Composition / Information on Ingredients: Ingredients

Physical & Chemical Properties: Multiple Properties

Transport Information: Material Transportation Information

Regulatory Information: United States

HazReg Data: North America

GHS: Qualifiers

**Disclaimer**

The information in the sheet was written based on the best knowledge and experience currently available.

**Other information**

- Guide to Occupational Exposure Values 2014, Compiled by the American Conference of Governmental Industrial Hygienists (ACGIH).
- NIOSH Pocket Guide to Chemical Hazards, U.S. Department of Health and Human Services, September 2005.
- TOXNET, U.S. National Library of Medicine
- expub, Expert Publishing, LLC., www.expub.com,
- Ariel, 3E Company, www.3Ecompany.com
- Aluminum Association's Bulletin F-1, "Guidelines for Handling Aluminum Fines Generated During Various Aluminum Fabricating Operations." The Aluminum Association, 1525 Wilson Boulevard, Suite 600, Arlington, Virginia 22209, www.aluminum.org.
- Aluminum Association, "Guidelines for Handling Molten Aluminum, The Aluminum Association, 1525 Wilson Boulevard, Suite 600, Arlington, Virginia 22209, www.aluminum.org.
- NFPA 484, Standard for Combustible Metals (NFPA phone: 800-344-3555)
- NFPA 654, Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids
- NFPA 70, Standard for National Electrical Code (Electrical Equipment, Grounding and Bonding)
- NFPA 77, Standard for Static Electricity
- NFPA 68, Standard on Explosion Protection by Deflagration Venting,
- NFPA 69, Standard on Explosion Prevention System

**Key/Legend:**

ACGIH American Conference of Governmental Industrial Hygienists  
 AICS Australian Inventory of Chemical Substances  
 CAS Chemical Abstract Services  
 CERCLA Comprehensive Environmental Response, Compensation, and Liability Act  
 CFR Code of Federal Regulations  
 CPR Cardio-pulmonary Resuscitation  
 DOT Department of Transportation  
 DSL Domestic Substances List (Canada)  
 EC Effective Concentration  
 ED Effective Dose  
 EINECS European Inventory of Existing Commercial Chemical Substances  
 ENCS Japan - Existing and New Chemical Substances  
 EWC European Waste Catalogue  
 EPA Environmental Protective Agency  
 IARC International Agency for Research on Cancer  
 LC Lethal Concentration  
 LD Lethal Dose  
 MAK Maximum Workplace Concentration (Germany) "maximale Arbeitsplatz-Konzentration"  
 NDSL Non-Domestic Substances List (Canada)  
 NIOSH National Institute for Occupational Safety and Health  
 NTP National Toxicology Program  
 OEL Occupational Exposure Limit  
 OSHA Occupational Safety and Health Administration  
 PIN Product Identification Number  
 PMCC Pensky Marten Closed Cup  
 RCRA Resource Conservation and Recovery Act  
 SARA Superfund Amendments and Reauthorization Act  
 SIMDUT Système d'Information sur les Matières Dangereuses Utilisées au Travail  
 STEL Short Term Exposure Limit  
 TCLP Toxic Chemicals Leachate Program  
 TDG Transportation of Dangerous Goods  
 TLV Threshold Limit Value  
 TSCA Toxic Substances Control Act  
 TWA Time Weighted Average  
 WHMIS Workplace Hazardous Materials Information System  
 m meter, cm centimeter, mm millimeter, in inch,  
 g gram, kg kilogram, lb pound, µg microgram,  
 ppm parts per million, ft feet

\*\*\* End of SDS \*\*\*

# WROUGHT ALUMINUM PRODUCTS, 4XXX SERIES ALLOYS



## Danger

### Hazard statement

May cause allergy or asthma symptoms or breathing difficulties if inhaled. May cause an allergic skin reaction. Suspected of causing cancer by inhalation. Causes damage to organs through prolonged or repeated exposure. May form combustible dust concentrations in air.

### Precautionary statement

#### Prevention

Obtain special instructions before use. Contaminated work clothing must not be allowed out of the workplace. Do not breathe dust/fume/gas/mist/vapors/spray. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Avoid release to the environment. Wear protective gloves. Wear protective gloves/protective clothing/eye protection/face protection. In case of inadequate ventilation wear respiratory protection. Do not eat, drink or smoke when using this product. In case of inadequate ventilation wear respiratory protection. Do not breathe dust/fume. Prevent dust accumulation to minimize explosion hazard. Wash thoroughly after handling.

#### Response

**IF INHALED:** If breathing is difficult, remove person to fresh air and keep comfortable for breathing. If experiencing respiratory symptoms: Call a poison center/doctor.

**IF ON SKIN:** Wash with plenty of soap and water. If skin irritation or rash occurs: Get medical advice/attention. Wash contaminated clothing before reuse. If exposed or concerned: Get medical advice/attention. Get medical attention/advice if you feel unwell.

#### Storage

Store locked up. Store in a dry place.

#### Disposal

Reuse or recycle material whenever possible. Dispose of contents/container in accordance with local/regional/national/international regulations.

### Supplemental information

Contains nickel. May produce an allergic reaction.

Non-combustible as supplied. Small chips, fine turnings and dust from processing may be readily ignitable.

Explosion/fire hazards may be present when:

- Dust, fines or particulate are dispersed in air.
- Chips, dust or fines are in contact with water.
- Dust and fines are in contact with certain metal oxides (e.g., rust, copper oxide).
- Molten metal in contact with water/moisture or certain metal oxides (e.g., rust, copper oxide).

**FIRE FIGHTING MEASURES:** Use Class D extinguishing agents on fines, dust or molten metal. Use coarse water spray on chips and turnings.

DO NOT USE halogenated extinguishing agents on small chips/fines.

DO NOT USE water in fighting fires around molten metal.

These fire extinguishing agents will react with the burning material.

**IN CASE OF SPILL:** Collect scrap for recycling. If molten: Use dry sand to contain the flow of material. All tooling (e.g., shovels or hand tools) and containers which come in contact with molten metal must be preheated or specially coated, rust free and approved for such use. Allow the spill to cool before remelting as scrap.

See Alcoa SDS Number 0666.

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