



# MATERIAL SAFETY DATA SHEET

## 1. Product and Company Identification

<b>Material name</b>	<b>WROUGHT ALUMINUM PRODUCTS, 3xxx SERIES ALLOYS</b>
<b>SDS Number</b>	665
<b>Version #</b>	06
<b>Revision date</b>	March 18, 2013.
<b>Chemical description</b>	Massive, solid metal.
<b>CAS Number</b>	Mixture
<b>Product use</b>	Various fabricated aluminum parts and products
<b>Recommended Restrictions</b>	Commercial or industrial use.
<b>Synonym(s)</b>	3xxx Series Alloys, 3xxx Cladding, 0033, 0346_DA3113, 3003, 3003F, 3003-C06C, 3005, 3103, 3104, 3104BLND, 3105, 3PORC, Alclad 3003, Alclad 3004, AM01, Clad 3003, C01S, C02D, C03H, C03Z, C04N, C05N, C06C, C06D, C06E, C06S, C06T, C08A, C08Z, C10H, C10T, C12H, C13C, C13P, C14P, C156, C15B, C15P, C162, C189, C18D, C19E, C1A8, C20B, C21H, C229, C22M, C23E, C23M, C24M, C24P, C25N, C26E, C26Z, C27E, C27H, C27P, C27Z, C28P, C29D, C29P, C2A3, C300, C30N, C30P, C31D, C31N, C32D, C32J, C32N, C32P, C33D, C33N, C33P, C34A, C34D, C34N, C35B, C35D, C35E, C35N, C35P, C36N, C37P, C38H, C38N, C38U, C39H, C40U, C42U, C430F, C434F, C43Z, C441F, C445F, C447F, C44R, C45K, C45Z, C469F, C46U, C46Z, C474F, C475, C47B, C47D, C47E, C47K, C47U, C483F, C48D, C48E, C48U, C49B, C49K, C50K, C50U, C517, C518, C519F, C51K, C51U, C52U, C53B, C53R, C547F, C548F, C54W, C55E, C55W, C568, C56A, C56K, C56R, C56W, C57E, C582F, C58B, C58E, C58H, C58W, C590F, C59B, C59E, * C604F, C60R, C612F, C615F, C616F, C617F, C61W, C628F, C63R, C63Z, C64R, C64Z, C70E, C70W, C71D, C71E, C720, C72D, C72E, C72W, C73D, C73E, C74U, C75U, C76H, C76S, C77A, C783, C784, C786, C788, C78C, C78R, C791, C793, C80S, C82C, C83C, C84C, C85Z, C87U, C88S, C91B, C91D, C92B, C93B, C94B, C94S, C94U, C95C, C96N, C98C, C98D, C98T, C99T, CH14, CK32, CP63, CU54, CZ88, DN3N, DA3103, DA3022, DA3118, HG321/0399, KB11, MC365, MC369, MC370, MC371, MC372 MC373, MC374, MC378, MC380, MC382, MC386, MC387, MC389, MC392, MC395, MC396, MC398, MC399, MC400, MC401, MC402, MC403, MC404, MC405, MC406, MC413, MC414, MC424, MC425, MD52, MD176, MD189, MD228, MD229, MD239, MD240, MD241, MD243, MD263RB, MD263RH, MD263RL, MD267, MD268, MD271, MD272, MD276, MD278, MD281, MD285, MD286, MD287, MD288, MD289, MD291, MD297, MD299, MD305, MD306, MD307, MD308, MD310, MD311, MD312, MD313, MD314, MD315, MD321, MD324, MD327, MD329, MD330, MD333, MD334, MD338, MD339, MD340, MD341, MD347, MD350, * MD351, MD352, MD354, MD355, MD356, MD357, MD359, MD360, MD362, MN363, MN381, MN397, MN421, MN422, MN423, MN427, MN428, RA108, RA135, RA169, RA173, RA190, RA203, RA211, RA220, RA236, RA240, RA245, RA254, RA258, RA259, RA261, RA263, RA264, RA269, RA270, Showa HG311, X301.
<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: <a href="mailto:accmsds@alcoa.com">accmsds@alcoa.com</a>
<b>Emergency Information</b>	USA: 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 Material 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. Hazards Identification

### Emergency overview

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

Explosion/fire hazards may be present when (See Sections 5, 7 and 10 for additional information):

- Dust or fines 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).

Dust and fume from processing: Can cause irritation of the eyes, skin and respiratory tract.

### Potential health effects

The health effects listed below are not likely to occur unless processing of this product generates dusts or fumes.

The following statements summarize the health effects generally expected in cases of overexposures. User specific situations should be assessed by a qualified individual. Additional health information can be found in Section 11.

#### Eyes

Dust and fumes from processing: Can cause irritation.

#### Skin

Contact with residual oil/oil coating: Can cause irritation. Prolonged or repeated skin contact may cause dermatitis.

Dust and fumes from processing: Can cause irritation. Prolonged or repeated skin contact may cause sensitization and allergic contact dermatitis.

#### 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), central nervous system damage, secondary Parkinson's disease and reproductive harm in males.

Additional health effects from elevated temperature processing (e.g., welding, melting):

Dust and fumes from processing: Can cause irritation of the respiratory tract. Acute overexposures: Can cause metal fume fever (nausea, fever, chills, 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 respiratory sensitization and lung cancer.

#### Ingestion

Not relevant, due to the form of the product.

### Carcinogenicity and Reproductive Hazard

Product as shipped: Does not present any cancer or reproductive hazards.

Dust from mechanical processing: Can present a cancer hazard (Lead, Nickel). Can present a reproductive hazard (Lead, Manganese).

Dust and fumes from welding or elevated temperature processing: Can present a cancer hazard (Hexavalent chromium compounds, Lead compounds, Nickel compounds, Welding fumes). Can present a reproductive hazard (Lead compounds, Manganese compounds).

### Medical conditions aggravated by exposure to product

Dust and fumes from processing: Asthma, chronic lung disease, Secondary Parkinson's disease and skin rashes.

## 3. Composition / Information on Ingredients

### Composition comments

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

Components	CAS #	Percent
Aluminum	7429-90-5	>92
Zinc	7440-66-6	<2.8
Manganese	7439-96-5	<2
Silicon	7440-21-3	<1.9
Magnesium	7439-95-4	<1.6
Iron	7439-89-6	<1.1
Chromium	7440-47-3	<0.5
Nickel†	7440-02-0	0 - 0.1
Lead‡	7439-92-1	0 - 0.1

<b>Additional Information</b>	<p>† - Present as impurity. While Nickel is not intentionally added to this mixture, it could potentially enter through the recycle stream.</p> <p>‡ - Present as impurity. While Lead is not intentionally added to this mixture, it could potentially enter through the recycle stream.</p> <p>Additional compounds which may be formed during processing are listed in Section 8.</p>
<b>4. First Aid Measures</b>	
<b>First aid procedures</b>	
<b>Eye contact</b>	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 and effects, both acute and delayed</b>	Dust and fumes from processing: May cause allergic skin reaction. May cause allergic respiratory reaction. Repeated or prolonged skin contact may cause skin irritation and/or dermatitis and sensitization of susceptible persons. Chronic exposure to breathing low levels of manganese dust or fume over a long period of time can result in "manganism," a disease of the central nervous system similar to Parkinson's Disease, gait impairment, muscle spasms and behavioral changes. Contains nickel, which can cause lung or nasal cancer. Long-term breathing of this material may cause chronic lung disease. Lead may damage kidney function, the blood forming system and the reproductive system. 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.
<b>Notes to physician</b>	If breathing is difficult, give oxygen. Symptoms may be delayed.
<b>General advice</b>	If exposed or concerned: get medical attention/advice.
<b>5. Fire Fighting Measures</b>	
<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>Extinguishing media</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>Protection of firefighters</b>	
<b>Specific hazards arising from the chemical</b>	<p>May be a potential hazard under the following conditions:</p> <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>Protective equipment and precautions for firefighters</b>	Fire fighters should wear NIOSH approved, positive pressure, self-contained breathing apparatus and full protective clothing when appropriate.
<b>Hazardous combustion products</b>	None known.
<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 impossible to extinguish, protect surroundings and allow fire to burn itself out.

## Explosion data

<b>Sensitivity to mechanical impact</b>	Not applicable.
<b>Sensitivity to static discharge</b>	Take precautionary measures against static discharges when there is a risk of dust explosion.

## 6. Accidental Release Measures

<b>Personal precautions</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>Environmental precautions</b>	No special environmental precautions required.
<b>Evacuation procedures</b>	Keep unnecessary personnel away.
<b>Spill or leak procedure</b>	Collect scrap for recycling. If molten: Contain the flow using dry sand or salt flux as a dam. 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.

## 7. Handling and Storage

<b>Handling</b>	Keep material dry. Avoid generating dust. 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.
<b>Storage</b>	Store in a dry place.
<b>Requirements for Processes Which Generate Dusts or Fines</b>	<p>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) brochures listed in Section 16.</p> <p>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).</p> <p>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. 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.</p> <p>Do not allow chips, fines or dust to contact water, particularly in enclosed areas.</p> <p>Good housekeeping practices must be maintained. Avoid all ignition sources. 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.</p>

## 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 a 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 MSDS No. 1013, Aluminum Dross with Low Beryllium. Copies of this MSDS are available on [www.alcoa.com](http://www.alcoa.com) or by calling +412-553-4649.

## 8. Exposure Controls / Personal Protection

### Engineering controls

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.

### Personal protective equipment

#### Eye / face protection

Wear safety glasses with side shields. If molten: Goggles/face shield are recommended.

#### Skin and body protection

Wear impervious gloves to avoid repeated or prolonged skin contact with residual oils and to avoid any skin injury. The need for personal protective equipment (gloves) should be based upon a hazard assessment and recommendations from health / safety professionals.

#### Hand protection

Wear impervious gloves to avoid repeated or prolonged skin contact with residual oils and to avoid any skin injury.

#### Thermal hazards

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.

#### Respiratory protection

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.

### Hygiene measures

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and immediately after handling the product.

### Recommended monitoring procedures

Follow standard monitoring procedures.

## General

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).

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.

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.

## Occupational exposure limits

### U.S. - OSHA

Components	Type	Value	Form
Aluminum (CAS 7429-90-5)	TWA	5 mg/m <sup>3</sup>	Respirable dust
		15 mg/m <sup>3</sup>	(Total dust)
Chromium (CAS 7440-47-3)	TWA	1 mg/m <sup>3</sup>	
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>	Respirable fraction.
		15 mg/m <sup>3</sup>	(total dust)
Compounds Formed	Type	Value	Form
During Processing			
Aluminum oxide (non-fibrous) (CAS 1344-28-1)	TWA	5 mg/m <sup>3</sup>	Respirable fraction.
		15 mg/m <sup>3</sup>	Total dust.
Chromium (II) compounds (CAS No. Not available)	TWA	0.5 mg/m <sup>3</sup>	
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)
Chromium (VI) compounds (CAS 18540-29-9)	TWA	0.005 mg/m <sup>3</sup>	(as Cr)
		0.0025 mg/m <sup>3</sup>	Action (as Cr)
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>	(as Pb)
		0.03 mg/m <sup>3</sup>	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>	
Nitric oxide (CAS 10102-43-9)	TWA	30 mg/m <sup>3</sup>	
		25 ppm	
Oil mist, mineral (CAS 8012-95-1)	TWA	5 mg/m <sup>3</sup>	Mist.
Ozone (CAS 10028-15-6)	TWA	0.2 mg/m <sup>3</sup>	
		0.1 ppm	
Zinc oxide (CAS 1314-13-2)	TWA	5 mg/m <sup>3</sup>	Respirable fraction.
		5 mg/m <sup>3</sup>	Fume.
		15 mg/m <sup>3</sup>	Total dust.

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

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

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

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

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

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

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Components	Type	Value	Form
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	Type	Value	Form
<b>During Processing</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	

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Compounds Formed	Type	Value	Form
<b>During Processing</b>			
Aluminum oxide (non-fibrous) (CAS 1344-28-1)	TWA	1 mg/m3	Respirable fraction, as Al
Chromium (VI) compounds, certain water insoluble forms (CAS No. Not available)	TWA	0.01 mg/m3	as Cr
Chromium (VI) compounds, water soluble forms (CAS No. Not available)	TWA	0.05 mg/m3	as Cr
Ozone (CAS 10028-15-6)	TWA	0.2 ppm	(Heavy, moderate or light workloads (≤2 hours))
		0.1 ppm	(light work)
		0.08 ppm	(moderate work)
		0.05 ppm	(heavy work)

**US. ACGIH Threshold Limit Values**

Components	Type	Value	Form
Aluminum (CAS 7429-90-5)	TWA	1 mg/m3	Respirable fraction.
Chromium (CAS 7440-47-3)	TWA	0.5 mg/m3	
Lead‡ (CAS 7439-92-1)	TWA	0.05 mg/m3	

**US. ACGIH Threshold Limit Values**

<b>Components</b>	<b>Type</b>	<b>Value</b>	<b>Form</b>
Manganese (CAS 7439-96-5)	TWA	0.2 mg/m3	
Nickel† (CAS 7440-02-0)	TWA	1.5 mg/m3	Inhalable fraction.
<b>Compounds Formed</b>	<b>Type</b>	<b>Value</b>	<b>Form</b>
<b>During Processing</b>			
Chromium (III) compounds (CAS No. Not available)	TWA	0.5 mg/m3	
Chromium (VI) compounds, water soluble forms (CAS No. Not available)	TWA	0.05 mg/m3	
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	0.2 mg/m3	
Nickel compounds, insoluble (CAS No. Not available)	TWA	0.2 mg/m3	Inhalable fraction.
Nitric oxide (CAS 10102-43-9)	TWA	25 ppm	
Nitrogen dioxide (CAS 10102-44-0)	TWA	0.2 ppm	
Oil mist, mineral (CAS 8012-95-1)	TWA	5 mg/m3	Inhalable fraction.
Ozone (CAS 10028-15-6)	TWA	0.05 ppm	
Zinc oxide (CAS 1314-13-2)	STEL TWA	10 mg/m3 2 mg/m3	Respirable fraction. Respirable fraction.

**9. Physical & Chemical Properties**

<b>Form</b>	Solid.
<b>Color</b>	Silver colored.
<b>Odor</b>	Odorless
<b>pH</b>	Not applicable
<b>Auto-ignition temperature</b>	Not applicable
<b>Boiling point</b>	Not determined
<b>Density</b>	2.70 - 2.75 g/cm3 (0.098-0.099 lb/in3)
<b>Flash point</b>	Not applicable
<b>Flammability limits in air, upper, % by volume</b>	Not applicable
<b>Flammability limits in air, lower, % by volume</b>	Not applicable
<b>Melting point/Freezing point</b>	1149.8 - 1220 °F (621 - 660 °C)
<b>Odor threshold</b>	Not applicable
<b>Partition coefficient (n-octanol/water)</b>	Not applicable.
<b>Percent volatile</b>	Not applicable
<b>Other data</b>	
<b>Dynamic viscosity</b>	Not applicable
<b>Oxidising properties</b>	Not applicable.
<b>Solubility (water)</b>	Insoluble
<b>Specific gravity</b>	Not applicable
<b>Relative density</b>	Not determined
<b>Vapor density</b>	Not applicable



Vapor pressure Not applicable

## 10. Chemical Stability & Reactivity Information

### Chemical stability

Stable under normal conditions of use, storage, and transportation as shipped.

### Conditions to avoid

Chips, fines, dust and molten metal are considerably more reactive with the following:

- 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.
- Heat: Oxidizes at a rate dependent upon temperature and particle size.

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.

Coils of foil may be a potential hazard under the following conditions:

- Coil has been annealed (annealing removes residual oil that could prevent penetration of water)
- Foil is very thin gauge (5-9  $\mu\text{m}$  thickness which increases surface area)
- Coil has been immersed for an extended period of time (several hours or more)
- Wetted coil has recently been removed from the cooling effects of the water

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.

### Possibility of hazardous reactions

Hazardous polymerization does not occur.

### Incompatible materials

Chips, fines, dust and molten metal are considerably more reactive with the following:

- Acids and alkalis: Reacts to generate flammable/explosive hydrogen gas. Generation rate is greatly increased with smaller particles (e.g., fines and dusts).
- 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.
- Halogenated compounds: Many halogenated hydrocarbons, including halogenated fire extinguishing agents, can react violently with finely divided or molten aluminum.
- 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.
- Iron powder and water: Explosive reaction forming hydrogen gas when heated above 1470°F (800°C).

### Hazardous decomposition products

No hazardous decomposition products are known.

## 11. Toxicological Information

### Health effects associated with ingredients

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

Manganese dust or fumes: Chronic overexposures: Can cause inflammation of the lung tissues, scarring of the lungs (pulmonary fibrosis), central nervous system damage, Secondary Parkinson's Disease and reproductive harm in males.

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

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.

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).

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.

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).

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).

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

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.

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).

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).

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).

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).

Product	Test Results
WROUGHT ALUMINUM PRODUCTS, 3xxx SERIES ALLOYS (Mixture)	Acute Oral LD50 Rat: 22921.3438 mg/kg estimated
<b>Components</b>	<b>Test Results</b>
Nickel† (7440-02-0)	Acute Oral LD50 Rat: > 9000 mg/kg
Zinc (7440-66-6)	Acute Oral LD50 Rat: 630 mg/kg
<b>Compounds Formed During Processing</b>	<b>Test Results</b>
Nitrogen dioxide (10102-44-0)	Acute Inhalation LC50 Guinea pig: 30 mg/l 1 Hours Acute Inhalation LC50 Rat: 88 mg/l 4 Hours
Iron oxide (1309-37-1)	Acute Oral LD50 Rat: > 10000 mg/kg
Zinc oxide (1314-13-2)	Acute Inhalation LC50 Mouse: > 5.7 mg/l 4 Hours Acute Oral LD50 Mouse: 7950 mg/kg Acute Oral LD50 Rat: > 5000 mg/kg Acute Oral LD50 Rat: > 5 g/kg Acute Other LD50 Rat: 240 mg/kg
Aluminum oxide (non-fibrous) (1344-28-1)	Acute Oral LD50 Rat: > 5000 mg/kg
Silica, amorphous (69012-64-2)	Acute Oral LD50 Mouse: > 15000 mg/kg Acute Oral LD50 Rat: > 22500 mg/kg
<b>Acute effects</b>	Not classified. Based on available data, the classification criteria are not met.
<b>Skin corrosion/irritation</b>	Dust and fume from processing: Non-corrosive.
<b>Serious eye damage/irritation</b>	Dust in the eyes: May cause minor irritation on eye contact.
<b>Respiratory sensitizer</b>	Dust and fumes from processing: May cause allergy or asthma symptoms or breathing difficulties if inhaled.
<b>Sensitization</b>	Dust and fume from processing: May cause allergic skin disorders in sensitive individuals.
<b>Carcinogenicity</b>	Product as shipped: Does not present any cancer hazards.  Dust from mechanical processing: Can present a cancer hazard (Lead, Nickel).  Dust and fumes from welding or elevated temperature processing: Can present a cancer hazard (Hexavalent chromium compounds, Lead compounds, Nickel 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, 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.
Nickel compounds, insoluble (CAS No. Not available)	A1 Confirmed human carcinogen.
Nickel† (CAS 7440-02-0)	A5 Not suspected as a human carcinogen.
Nitrogen dioxide (CAS 10102-44-0)	A4 Not classifiable as a human carcinogen.
Oil mist, mineral (CAS 8012-95-1)	A2 Suspected human carcinogen.
Ozone (CAS 10028-15-6)	A4 Not classifiable as a human carcinogen.

**IARC Monographs. Overall Evaluation of Carcinogenicity**

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.
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)	2B Possibly carcinogenic to humans.
Silica, amorphous (CAS 69012-64-2)	3 Not classifiable as to carcinogenicity to humans.

**US NTP Report on Carcinogens: Anticipated 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)	Reasonably Anticipated to be a Human Carcinogen.

**US NTP Report on Carcinogens: Known carcinogen**

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.
Nickel† (CAS 7440-02-0)	Known To Be Human Carcinogen.
Oil mist, mineral (CAS 8012-95-1)	Known To Be Human Carcinogen.

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

Chromium (VI) compounds (CAS 18540-29-9)	Cancer hazard.
Chromium (VI) compounds, certain water insoluble forms (CAS No. Not available)	Cancer hazard.

<b>Teratogenicity</b>	Not classified. Based on available data, the classification criteria are not met.
<b>Reproductive toxicity</b>	Product as shipped: Does not present any reproductive hazards.  Dust from mechanical processing: Can present a reproductive hazard (Lead, Manganese).  Dust and fumes from welding or elevated temperature processing: Can present a reproductive hazard (Lead compounds, Manganese compounds).
<b>Germ cell mutagenicity</b>	Not classified. Based on available data, the classification criteria are not met.
<b>Interactive effects</b>	Asthma, chronic lung disease, skin rashes and secondary Parkinson's disease.
<b>Neurological effects</b>	Dust and fumes from processing: May cause central nervous system effects. Chronic exposure to breathing low levels of manganese dust or fume over a long period of time can result in "manganism," a disease of the central nervous system similar to Parkinson's Disease, gait impairment, muscle spasms and behavioral changes.
<b>Specific target organ toxicity - single exposure</b>	Not classified. Based on available data, the classification criteria are not met.
<b>Specific target organ toxicity - repeated exposure</b>	Not classified. Based on available data, the classification criteria are not met.
<b>Aspiration hazard</b>	Not applicable.

Further information None known.

## 12. Ecological Information

Ecotoxicity Not expected to be harmful to aquatic organisms.

Product	Species	Test Results
WROUGHT ALUMINUM PRODUCTS, 3xxx SERIES ALLOYS (CAS Mixture)		
Crustacea	EC50	Daphnia 1.9961 mg/l, 48 hours, estimated
Fish	LC50	Fish 2.2885 mg/l, 96 hours, estimated
Components	Species	Test Results
Aluminum (CAS 7429-90-5)		
<b>Aquatic</b>		
Crustacea	LC50	Water flea (Daphnia magna) 3.5 mg/l, 24 hours
Fish	LC50	Rainbow trout,donaldson trout (Oncorhynchus mykiss) 0.31 mg/l, 96 hours 0.16 mg/l, 96 hours 0.12 mg/l, 96 hours
Chromium (CAS 7440-47-3)		
<b>Aquatic</b>		
Crustacea	EC50	Water flea (Daphnia magna) 0.01 - 0.7 mg/l, 48 hours
Fish	LC50	Fathead minnow (Pimephales promelas) 10 - 100 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	Rock bass (Ambloplites rupestris) 2.059 - 2.986 mg/l, 96 hours
Zinc (CAS 7440-66-6)		
<b>Aquatic</b>		
Crustacea	EC50	Water flea (Daphnia magna) 2.8 mg/l, 48 hours
Fish	LC50	Fathead minnow (Pimephales promelas) 0.211 - 0.269 mg/l, 96 hours
Compounds Formed During Processing	Species	Test Results
Aluminum oxide (non-fibrous) (CAS 1344-28-1)		
Nitrogen dioxide (CAS 10102-44-0)		
<b>Aquatic</b>		
Fish	LC50	Tench (Tinca tinca) 19.6 mg/l, 96 hours
Ozone (CAS 10028-15-6)		
<b>Aquatic</b>		
Fish	LC50	Rainbow trout,donaldson trout (Oncorhynchus mykiss) 0.0081 - 0.0106 mg/l, 96 hours

Compounds Formed During Processing	Species	Test Results
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Zinc oxide (CAS 1314-13-2)

**Aquatic**

Fish LC50 Fathead minnow (*Pimephales promelas*) 2246 mg/l, 96 hours

**Persistence and degradability** Not inherently biodegradable.  
**Bioaccumulative potential** The product is not bioaccumulating.  
**Mobility in soil** Not considered mobile.  
**Mobility in general** Not applicable.  
**Other adverse effects** Not available.

**13. Disposal Considerations**

**Disposal instructions** Reuse or recycle material whenever possible. If reuse or recycling is not possible, disposal must be made according to local or governmental regulations.  
**Waste codes** 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.  
TCLP testing is recommended for Chromium and Lead.  
**Waste from residues / unused products** Dispose of in accordance with local regulations.  
**Contaminated packaging** Not applicable.

**14. Transport Information**

**General Shipping Information**

**Basic shipping requirements:**

**UN number** -  
**Proper shipping name** Not regulated  
**Hazard class** -  
**Packing group** -

**General Shipping Notes**

- When "Not regulated", enter the proper freight classification, MSDS 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 & special precautions. Otherwise, it is presumed that the information is not available/not relevant.

**15. Regulatory Information**

**Inventory status**

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)

**Inventory information** Japan - ENCS Inventory: Pure metals are not specifically listed by CAS or ENCS number. The class of compounds for each of these metals is listed on the ENCS inventory.

**US federal regulations**

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.

**Drug Enforcement Administration (DEA). List 2, Essential Chemicals (21 CFR 1310.02(b) and 1310.04(f)(2) and Chemical Code Number**

Not listed.

**Drug Enforcement Administration (DEA). List 1 & 2 Exempt Chemical Mixtures (21 CFR 1310.12(c))**

Not regulated.

**DEA Exempt Chemical Mixtures Code Number**

Not regulated.

**US EPCRA (SARA Title III) Section 302 - Extremely Hazardous Spill: Reportable quantity**

Nitric oxide (CAS 10102-43-9)	10 LBS
Nitrogen dioxide (CAS 10102-44-0)	10 LBS
Ozone (CAS 10028-15-6)	100 LBS

**US EPCRA (SARA Title III) Section 302 - Extremely Hazardous Substance: Threshold Planning Quantity**

Nitric oxide (CAS 10102-43-9)	100 LBS
Nitrogen dioxide (CAS 10102-44-0)	100 LBS
Ozone (CAS 10028-15-6)	100 LBS

**US EPCRA (SARA Title III) Section 313 - Toxic Chemical: De minimis concentration**

Aluminum (CAS 7429-90-5)	1.0 %
Aluminum oxide (non-fibrous) (CAS 1344-28-1)	1.0 %
Chromium (CAS 7440-47-3)	1.0 %
Chromium (II) compounds (CAS No. Not available)	1.0 % N090
Chromium (III) compounds (CAS No. Not available)	1.0 % N090
Chromium (VI) compounds (CAS 18540-29-9)	0.1 % N090
Chromium (VI) compounds, certain water insoluble forms (CAS No. Not available)	0.1 % N090
Lead compounds, inorganic (CAS No. Not available)	0.1 % N420 Substance is not eligible for the de minimis exemption except for the purposes of supplier notification requirements.
Lead‡ (CAS 7439-92-1)	0.1 % Substance is not eligible for the de minimis exemption except for the purposes of supplier notification requirements.
Manganese (CAS 7439-96-5)	1.0 %
Manganese compounds, inorganic (CAS No. Not available)	1.0 % N450
Nickel compounds, insoluble (CAS No. Not available)	0.1 % N495
Nickel† (CAS 7440-02-0)	0.1 %
Ozone (CAS 10028-15-6)	1.0 %
Zinc (CAS 7440-66-6)	1.0 %
Zinc oxide (CAS 1314-13-2)	1.0 % N982

**US EPCRA (SARA Title III) Section 313 - Toxic Chemical: Reportable threshold**

Lead compounds, inorganic (CAS No. Not available)	100 LBS N420
Lead‡ (CAS 7439-92-1)	100 LBS

**US EPCRA (SARA Title III) Section 313 - Toxic Chemical: Listed substance**

Aluminum (CAS 7429-90-5)	Listed.
Aluminum oxide (non-fibrous) (CAS 1344-28-1)	Listed.
Chromium (CAS 7440-47-3)	Listed.
Chromium (III) compounds (CAS No. Not available)	Listed. N090
Chromium (VI) compounds (CAS 18540-29-9)	Listed. N090
Chromium (VI) compounds, certain water insoluble forms (CAS No. Not available)	Listed. N090
Lead compounds, inorganic (CAS No. Not available)	Listed. N420
Lead‡ (CAS 7439-92-1)	Listed.
Manganese (CAS 7439-96-5)	Listed.
Manganese compounds, inorganic (CAS No. Not available)	Listed. N450
Nickel compounds, insoluble (CAS No. Not available)	Listed. N495
Nickel† (CAS 7440-02-0)	Listed.
Ozone (CAS 10028-15-6)	Listed.
Zinc (CAS 7440-66-6)	Listed.
Zinc oxide (CAS 1314-13-2)	Listed. N982

**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.

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

Chromium (VI) compounds (CAS 18540-29-9) Listed: February 27, 1987 Carcinogenic.  
 Chromium (VI) compounds, certain water insoluble forms (CAS No. Not available) Listed: February 27, 1987 Carcinogenic.  
 Lead compounds, inorganic (CAS No. Not available) Listed: October 1, 1992 Carcinogenic.  
 Lead‡ (CAS 7439-92-1) Listed: October 1, 1992 Carcinogenic.  
 Nickel compounds, insoluble (CAS No. Not available) Listed: May 7, 2004 Carcinogenic.  
 Nickel† (CAS 7440-02-0) Listed: October 1, 1989 Carcinogenic.

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

Chromium (VI) compounds (CAS 18540-29-9) Listed: December 19, 2008 Developmental toxin.  
 Chromium (VI) compounds, certain water insoluble forms (CAS No. Not available) Listed: December 19, 2008 Developmental toxin.  
 Lead compounds, inorganic (CAS No. Not available) Listed: February 27, 1987 Developmental toxin.  
 Lead‡ (CAS 7439-92-1) Listed: February 27, 1987 Developmental toxin.

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

Chromium (VI) compounds (CAS 18540-29-9) Listed: December 19, 2008 Female reproductive toxin.  
 Chromium (VI) compounds, certain water insoluble forms (CAS No. Not available) Listed: December 19, 2008 Female reproductive toxin.  
 Lead compounds, inorganic (CAS No. Not available) Listed: February 27, 1987 Female reproductive toxin.  
 Lead‡ (CAS 7439-92-1) Listed: February 27, 1987 Female reproductive toxin.

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

Chromium (VI) compounds (CAS 18540-29-9) Listed: December 19, 2008 Male reproductive toxin.  
 Chromium (VI) compounds, certain water insoluble forms (CAS No. Not available) Listed: December 19, 2008 Male reproductive toxin.  
 Lead compounds, inorganic (CAS No. Not available) Listed: February 27, 1987 Male reproductive toxin.  
 Lead‡ (CAS 7439-92-1) Listed: February 27, 1987 Male reproductive toxin.

**US - New Jersey RTK - Substances: Listed substance**

Aluminum (CAS 7429-90-5) Listed.  
 Aluminum oxide (non-fibrous) (CAS 1344-28-1) Listed.  
 Chromium (CAS 7440-47-3) Listed.  
 Chromium (II) compounds (CAS No. Not available) Listed.  
 Chromium (VI) compounds, certain water insoluble forms (CAS No. Not available) Listed.  
 Iron oxide (CAS 1309-37-1) Listed.  
 Lead compounds, inorganic (CAS No. Not available) Listed.  
 Lead‡ (CAS 7439-92-1) Listed.  
 Magnesium (CAS 7439-95-4) Listed.  
 Magnesium oxide (CAS 1309-48-4) 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.  
 Nitric oxide (CAS 10102-43-9) Listed.  
 Nitrogen dioxide (CAS 10102-44-0) Listed.  
 Oil mist, mineral (CAS 8012-95-1) Listed.  
 Ozone (CAS 10028-15-6) Listed.  
 Silica, amorphous (CAS 69012-64-2) Listed.  
 Silicon (CAS 7440-21-3) Listed.  
 Zinc (CAS 7440-66-6) Listed.  
 Zinc oxide (CAS 1314-13-2) Listed.

**US - Pennsylvania RTK - Hazardous Substances: All compounds of this substance are considered environmental hazards**

Chromium (CAS 7440-47-3) LISTED  
 Lead‡ (CAS 7439-92-1) LISTED  
 Manganese (CAS 7439-96-5) LISTED  
 Nickel† (CAS 7440-02-0) LISTED  
 Zinc (CAS 7440-66-6) LISTED



**US - Pennsylvania RTK - Hazardous Substances: Special hazard**

Chromium (CAS 7440-47-3)	Special hazard.
Chromium (VI) compounds (CAS 18540-29-9)	Special hazard.
Chromium (VI) compounds, certain water insoluble forms (CAS No. Not available)	Special hazard.
Nickel† (CAS 7440-02-0)	Special hazard.

**US. Pennsylvania RTK - Hazardous Substances**

Aluminum (CAS 7429-90-5)	Listed.
Aluminum oxide (non-fibrous) (CAS 1344-28-1)	Listed.
Chromium (CAS 7440-47-3)	Listed.
Chromium (VI) compounds, certain water insoluble forms (CAS No. Not available)	Listed.
Iron oxide (CAS 1309-37-1)	Listed.
Lead‡ (CAS 7439-92-1)	Listed.
Magnesium (CAS 7439-95-4)	Listed.
Magnesium oxide (CAS 1309-48-4)	Listed.
Manganese (CAS 7439-96-5)	Listed.
Nickel† (CAS 7440-02-0)	Listed.
Nitric oxide (CAS 10102-43-9)	Listed.
Nitrogen dioxide (CAS 10102-44-0)	Listed.
Oil mist, mineral (CAS 8012-95-1)	Listed.
Ozone (CAS 10028-15-6)	Listed.
Silica, amorphous (CAS 69012-64-2)	Listed.
Silicon (CAS 7440-21-3)	Listed.
Zinc (CAS 7440-66-6)	Listed.
Zinc oxide (CAS 1314-13-2)	Listed.

**CERCLA (Superfund) reportable quantity**

Zinc: 1000  
 Chromium: 5000  
 Nickel†: 100  
 Lead‡: 10

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

<b>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
<b>Section 302 extremely hazardous substance</b>	No
<b>Section 311 hazardous chemical</b>	No

**16. Other Information**

<b>Recommended use</b>	Fabricated aluminum parts and products
<b>Recommended restrictions</b>	Commercial or industrial use.
<b>Further information</b>	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.
<b>Disclaimer</b>	The information in the sheet was written based on the best knowledge and experience currently available.
<b>This data sheet contains changes from the previous version in section(s):</b>	This document has undergone significant changes and should be reviewed in its entirety.
<b>MSDS Status</b>	March 18, 2013: Change(s) in Section: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15 and 16. December 3, 2009: New format. September 28, 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
	Preparer: Jim Perriello, +1-865-977-2051
	MSDS System Number: 115951

## Other information

- Guide to Occupational Exposure Values 2012, 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.
- 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 Systems

### 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 MSDS \*\*\*