



MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

Material Name	ALUMINUM ALLOYS WITH LOW BERYLLIUM
MSDS Number	1056
Chemical Formula	Mixture
Product use	Wrought aluminum products
Synonym(s)	2618A, Alumec 79, Alumec 89, Alumec 99, Alumec F7, Alumec HT, C89T, C805, E357.0, E357.1, E357.2, F357.0, F357.1, F357.2.
Manufacturer information	Alcoa Inc. 201 Isabella Street Pittsburgh, PA 15212-5858 US Health and Safety: +1-412-553-4649
Emergency Information	USA: Chemtrec: +1-703-527-3887 +1-800-424-9300 ALCOA: +1-412-553-4001
Website	For a current MSDS, refer to Alcoa websites: www.alcoa.com or Internally at my.alcoa.com 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): <ul style="list-style-type: none">• Dust or fines are dispersed in air.• Chips, fines or dust are in contact with water.• Dust and fines are in contact with certain metal oxides (e.g., rust, copper oxide).• Molten metal is in contact with water/moisture or certain metal oxides (e.g., rust, copper oxide). Dust and fumes from processing: Can cause irritation of the eyes, skin and upper respiratory tract.
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Potential health effects

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.

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

Eyes Dust and fumes from processing: Can cause irritation.

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

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

Inhalation Health effects from mechanical processing (e.g., cutting, grinding): Can cause irritation of the upper respiratory tract. Chronic overexposures: Can cause reduction in the number of red blood cells (anemia), skin abnormalities (pigmentation changes), scarring of the lungs (pulmonary fibrosis), respiratory sensitization, central nervous system damage, secondary Parkinson's disease and reproductive harm in males.

Additional health effects from elevated temperature processing (e.g., welding): 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 benign lung disease and lung cancer.

Carcinogenicity and Reproductive Hazard

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

Dust and fumes from mechanical processing: Can present a cancer hazard (Nickel, Beryllium). Can present a reproductive hazard for males (Manganese).

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

Dross Handling

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 or by calling +1-412-553-4649.

Medical conditions aggravated by exposure to product

Dust or fume 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	>86
Zinc	7440-66-6	<10.6
Magnesium	7439-95-4	<6.6
Copper	7440-50-8	<5.1
Silicon	7440-21-3	<1.5
Manganese	7439-96-5	<1.5
Iron	7439-89-6	<1.5
Nickel	7440-02-0	<1.5
Chromium	7440-47-3	<0.36
Beryllium	7440-41-7	<0.002

Additional Information

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

4. First Aid Measures

First aid procedures

Eye contact

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

Skin contact

Dust and fumes from processing or Contact with residual oil/oil coating: Wash with soap and water for at least 15 minutes. Get medical attention if irritation develops or persists.

Inhalation

Dust and fume from processing: Remove to fresh air. Check for clear airway, breathing, and presence of pulse. Provide cardiopulmonary resuscitation for persons without pulse or respirations. Consult a physician.

5. Fire Fighting Measures

Flammable/Combustible Properties

This product does not present fire or explosion hazards as shipped. Small chips, fine turnings, and dust from processing may be readily ignitable.

Fire / Explosion Hazards

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.
- * Dust and fines in contact with certain metal oxides (e.g., rust). 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.

Extinguishing media

Suitable extinguishing media

Use Class D extinguishing agents on fines, dust or molten metal. Use coarse water spray on chips and turnings.

Unsuitable extinguishing media

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.

Protection of firefighters

Protective equipment for firefighters

Fire fighters should wear NIOSH approved, positive pressure, self-contained breathing apparatus and full protective clothing when appropriate.

6. Accidental Release Measures

Spill or leak procedure

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 and rust free. Allow the spill to cool before remelting as scrap.

7. Handling and Storage

Handling

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.

Storage

Keep dry.

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) brochures listed in Section 16.

Use non-sparking handling equipment. 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. 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 small chunks, fines or dust to contact water, particularly in enclosed areas.

Avoid all ignition sources. Good housekeeping practices must be maintained. 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 and containers which come in contact with molten metal must be preheated or specially coated and rust free. Molds and ladles must be preheated or oiled prior to casting. Any surfaces that may contact molten metal (i.e., 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.

8. Exposure Controls / Personal Protection

Engineering controls

Dust and fumes from mechanical processing: Use with adequate explosion-proof ventilation to meet the limits listed in Section 8.

Exposure data

The U.S. Department of Energy has proposed an Action Level for Beryllium of 0.2 ug/m3 TWA. The ACGIH has proposed a new Threshold Limit Value for Beryllium of 0.00005 mg/m3 TWA and 0.0002 mg/m3 STEL.

Compounds Formed During Processing

U.S. - OSHA - Specifically Regulated Chemicals

Chromium (VI) compounds (18540-29-9)

2.5 µg/m3 Action Level (as Cr.); 5 µg/m3 TWA (as Cr, Cancer hazard - See 29 CFR 1910.1026)

Occupational exposure limits

U.S. - OSHA

Components

Components	Type	Value	Form
Aluminum (7429-90-5)	TWA	5 mg/m3	(respirable fraction)
	TWA (total dust)	15 mg/m3	(total dust)
Beryllium (7440-41-7)	Ceiling	5 µg/m3	
	Peak	25 µg/m3	(30 minutes)
Chromium (7440-47-3)	TWA	2 µg/m3	
	TWA	1 mg/m3	
Copper (7440-50-8)	TWA	1 mg/m3	(dust and mist)
	TWA (fume)	0.1 mg/m3	(fume)
Manganese (7439-96-5)	Ceiling	5 mg/m3	(fume)
Nickel (7440-02-0)	TWA	1 mg/m3	
Silicon (7440-21-3)	TWA	5 mg/m3	(respirable fraction)
	TWA (total dust)	15 mg/m3	(total dust)

Compounds Formed During Processing

Compounds Formed During Processing	Type	Value	Form
Aluminum oxide (non-fibrous) (1344-28-1)	TWA	5 mg/m3	(respirable fraction)
	TWA (total dust)	15 mg/m3	(total dust)
Beryllium compounds (Not available)	Ceiling	5 µg/m3	

Compounds Formed During Processing	Type	Value	Form
		5 µg/m3	(as Be)
	Peak	25 µg/m3	(30 minutes, as Be)
		25 µg/m3	(30 minutes)
	TWA	2 µg/m3	
		2 µg/m3	(as Be)
Chromium (II) compounds (Not available)	TWA	0.5 mg/m3	(as Cr)
Chromium (III) compounds (Not available)	TWA	0.5 mg/m3	(as Cr)
Chromium (VI) compounds (18540-29-9)	Action	2.5 µg/m3	(as Cr)
	TWA (as Cr)	5 µg/m3	(as Cr)
Iron oxide (1309-37-1)	TWA	10 mg/m3	
Magnesium oxide (1309-48-4)	TWA	15 mg/m3	(total particulate)
Manganese compounds, inorganic (Not available)	Ceiling	5 mg/m3	(as Mn)
Nickel compounds, insoluble (Not available)	TWA	1 mg/m3	(as Ni)
Nitric oxide (10102-43-9)	TWA	25 ppm	
		30 mg/m3	
Nitrogen dioxide (10102-44-0)	Ceiling	5 ppm	
		9 mg/m3	
Oil mist, mineral (8012-95-1)	TWA	5 mg/m3	
Ozone (10028-15-6)	TWA	0.1 ppm	
		0.2 mg/m3	
Zinc oxide (1314-13-2)	TWA	5 mg/m3	(respirable fraction)
	TWA (fume)	5 mg/m3	(fume)
	TWA (total dust)	15 mg/m3	(total dust)

Alcoa

Components	Type	Value	Form
Aluminum (7429-90-5)	TWA	10 mg/m3	(8 Hour)
		5 mg/m3	(respirable fraction)
Beryllium (7440-41-7)	STEL	1 ug/m3	
	TWA	0.2 ug/m3	(8 Hour)
Manganese (7439-96-5)	TWA	0.02 mg/m3	(respirable fraction)
		0.05 mg/m3	(total dust)

Compounds Formed During Processing	Type	Value	Form
Aluminum oxide (non-fibrous) (1344-28-1)	TWA	5 mg/m3	(respirable fraction)
		10 mg/m3	(8 Hour)
Beryllium compounds (Not available)	STEL	1 ug/m3	(as Be)
	TWA	0.2 ug/m3	(as Be)
Chromium (VI) compounds (18540-29-9)	TWA	0.25 ug/m3	(as Cr)
Manganese compounds, inorganic (Not available)	TWA	0.05 mg/m3	(total dust, as Mn)
		0.02 mg/m3	(respirable fraction, as Mn)
Nickel compounds, insoluble (Not available)	TWA	0.1 mg/m3	(as Ni)
Oil mist, mineral (8012-95-1)	TWA	0.5 mg/m3	(8 Hour)

ACGIH

Components	Type	Value	Form
Aluminum (7429-90-5)	TWA	1 mg/m3	(respirable fraction)
Beryllium (7440-41-7)	TWA	0.05 ug/m3	
Chromium (7440-47-3)	TWA	0.5 mg/m3	
Copper (7440-50-8)	TWA	1 mg/m3	(dust and mist, as Cu)
	TWA (fume)	0.2 mg/m3	(fume)
Manganese (7439-96-5)	TWA	0.2 mg/m3	
Nickel (7440-02-0)	TWA	1.5 mg/m3	(inhalable fraction)

Compounds Formed During Processing	Type	Value	Form
Aluminum oxide (non-fibrous) (1344-28-1)	TWA	1 mg/m3	(respirable fraction, as Al)
Beryllium compounds (Not available)	TWA	0.05 ug/m3	(as Be)
Chromium (III) compounds (Not available)	TWA	0.5 mg/m3	(as Cr)
Chromium (VI) compounds, certain water insoluble forms (Not available)	TWA	0.01 mg/m3	(as Cr)

Compounds Formed During Processing	Type	Value	Form
Chromium (VI) compounds, water soluble forms (Not available)	TWA	0.05 mg/m3	(as Cr)
Iron oxide (1309-37-1)	TWA	5 mg/m3	(respirable fraction)
Magnesium oxide (1309-48-4)	TWA	10 mg/m3	(inhalable fraction)
Manganese compounds, inorganic (Not available)	TWA	0.2 mg/m3	(as Mn)
Nickel compounds, insoluble (Not available)	TWA	0.2 mg/m3	(inhalable fraction, as Ni)
Nitric oxide (10102-43-9)	TWA	25 ppm	
Nitrogen dioxide (10102-44-0)	STEL	5 ppm	
	TWA	3 ppm	
Oil mist, mineral (8012-95-1)	STEL	10 mg/m3	(sampled by method that does not collect vapor)
	TWA	5 mg/m3	(sampled by method that does not collect vapor)
Ozone (10028-15-6)	TWA	0.08 ppm	(moderate work)
		0.1 ppm	(light work)
		0.2 ppm	(any workload, <= 2 hours)
	TWA (heavy work)	0.05 ppm	(heavy work)
Zinc oxide (1314-13-2)	STEL	10 mg/m3	(respirable fraction)
	TWA	2 mg/m3	(respirable fraction)

Personal protective equipment

Eye / face protection	Wear safety glasses with side shields.
Skin protection	Wear impervious gloves to avoid direct skin contact.
Respiratory protection	Dust and fumes from mechanical 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. Suitable respiratory protective device recommended: Filter NIOSH P95.

General

Beryllium can concentrate 10-fold or higher in dross. This can create a potential for over-exposures to beryllium during dross handling, particularly when dust levels are not adequately controlled. Appropriate exposure assessments should be conducted by a qualified Industrial Hygienist for all tasks involving welding, cutting and grinding. Engineering controls or other measures (e.g., approved respiratory protection) may be necessary to reduce dust and beryllium concentrations depending on the exposure potential. The presence of airborne beryllium has been detected during the welding of aluminum alloys with beryllium content as low as 0.002% by weight. In accordance with OSHA 29 CFR 1910.252: Welding or cutting operations involving beryllium-containing base or filler metals shall be done using local exhaust ventilation and airline respirators unless atmospheric tests under the most adverse conditions have established that the workers' exposures is within the acceptable concentrations defined by 29 CFR 1910.1000. In all cases, workers in the immediate vicinity of the welding or cutting operations shall be protected as necessary by local exhaust ventilation or airline respirators.

Good industrial hygiene practices, including reducing beryllium exposures to the greatest extent possible, are recommended. Beryllium work areas should be established where employees are exposed to beryllium levels above the occupational exposure limits recommended by Alcoa or where the potential exists for significant skin contact with dusts containing beryllium. Access to these work areas should be restricted and the number of employees exposed to beryllium should be limited.

Adequate protective work clothing should be provided to employees in beryllium work areas to prevent contamination of personal clothing. This work clothing should not be worn outside the work area. Special laundering practices should be followed (e.g., separation of contaminated clothing, use of water soluble laundry bags) and personnel assigned to launder contaminated clothing should be advised of beryllium's presence and potential health effects.

Good housekeeping and personal hygiene practices should be implemented. Dry cleaning of dust (e.g., broom sweeping, use of compressed air) should not be permitted. When vacuuming, high efficiency particulate (HEPA) filters are recommended. Food, tobacco and cosmetic products should be prohibited in the work area. Employees in beryllium work areas should be required to shower at the end of the work shift.

Medical surveillance is recommended for all employees exposed to >0.1 ug/m³ beryllium as a TWA or >1.0 ug/m³ beryllium as a STEL. Surveillance should include baseline chest X-rays (periodic as required by a physician) and annual respiratory history, spirometry, and serum lymphocyte transformation tests (LTT-Be). Employees sensitized or showing symptoms of beryllium related disease should be restricted from further exposure to beryllium.

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.

9. Physical & Chemical Properties

Form	Solid.
Appearance	Silvery
Boiling point	Not applicable
Melting point	1000 - 1150 °F (537.8 - 621.1 °C)
Flash point	Not applicable
Auto-ignition temperature	Not applicable
Flammability limits in air, lower, % by volume	Not applicable
Flammability limits in air, upper, % by volume	Not applicable
Vapor pressure	Not applicable
Vapor density	Not applicable
Solubility (water)	None
Density	2.7 - 2.8 g/cm ³ (0.098 - 0.101 lb/in ³)
pH	Not applicable
Odor	Odorless.
Partition coefficient (n-octanol/water)	Not applicable

10. Chemical Stability & Reactivity Information

Chemical stability	Stable under normal conditions of use, storage, and transportation as shipped.
Conditions to avoid	<p>Chips, fines, dust and molten metal are considerably more reactive with the following:</p> <ul style="list-style-type: none">• 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.• 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.• Acids and alkalis: Reacts to generate flammable/explosive hydrogen gas. Generation rate is greatly increased with smaller particles (e.g., fines and dusts).• 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 polymerization	Hazardous polymerization does not occur.

11. Toxicological Information

Health effects associated with ingredients

Aluminum dust/fines and fumes: Low health risk by inhalation. Generally considered to be biologically inert.

Beryllium: Can cause lung sensitization in susceptible individuals. Skin contact: Can cause irritant dermatitis, allergic contact dermatitis and lumps on the skin (granulomas). Acute overexposures: Can cause inflammation of the lung tissues (Acute Beryllium Disease). Acute Beryllium Disease can be fatal but is unlikely to occur when processing beryllium-containing aluminum alloys.

Chronic exposures: Chronic inhalation of dust and fumes by sensitized individuals can result in a serious, progressive disease called Chronic Beryllium Disease (CBD). This disease is an allergic condition in which the lung tissues become inflamed. This inflammation, sometimes accompanied with scarring of the lungs (pulmonary fibrosis), restricts the uptake of oxygen into the blood stream. CBD can, over time, be fatal.

Beryllium studies with experimental animals by inhalation have found lung tumors. IARC/NTP: Listed as "known to be a human carcinogen" by the NTP. Listed as carcinogenic to humans by IARC (Group 1).

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.

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.

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.

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).

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

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:

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).

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).

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).

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).

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.

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).

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

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

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 NO₂): 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 (NO₂): Chronic overexposures: Can cause scarring of the lungs (pulmonary fibrosis).

Component analysis - LD50

Components

Toxicology Data - Selected LD50s and LC50s

Iron (7439-89-6)	Oral LD50 Rat: 984 mg/kg
Magnesium (7439-95-4)	Oral LD50 Rat: 230 mg/kg
Manganese (7439-96-5)	Oral LD50 Rat: 9 g/kg
Nickel (7440-02-0)	Oral LD50 Rat: >9000 mg/kg
Silicon (7440-21-3)	Oral LD50 Rat: 3160 mg/kg

Compounds Formed During Processing

Toxicology Data - Selected LD50s and LC50s

Aluminum oxide (non-fibrous) (1344-28-1)	Oral LD50 Rat: >5000 mg/kg
Iron oxide (1309-37-1)	Oral LD50 Rat: >10000 mg/kg

Component analysis - LD50

Compounds Formed During Processing

Toxicology Data - Selected LD50s and LC50s

Nitric oxide (10102-43-9)	Inhalation LC50 Rat: 1068 mg/m3/4H
Nitrogen dioxide (10102-44-0)	Inhalation LC50 Rat: 88 ppm/4H; Inhalation LC50 Rat:165 mg/m3/4H; Inhalation LC50 Rat:220 mg/m3/1H
Oil mist, mineral (8012-95-1)	Oral LD50 Mouse: 22 g/kg
Ozone (10028-15-6)	Inhalation LC50 Rat: 4800 ppb/4H
Zinc oxide (1314-13-2)	Oral LD50 Rat: >5000 mg/kg

Carcinogenicity Hazardous by OSHA criteria. Cancer hazard. Risk of cancer cannot be excluded with prolonged exposure.

Components

ACGIH - Threshold Limit Values - Carcinogens

Aluminum (7429-90-5)	A4 - Not Classifiable as a Human Carcinogen
Beryllium (7440-41-7)	A1 - Confirmed Human Carcinogen
Chromium (7440-47-3)	A4 - Not Classifiable as a Human Carcinogen
Nickel (7440-02-0)	A5 - Not Suspected as a Human Carcinogen

IARC - Group 1 (Carcinogenic to Humans)

Beryllium (7440-41-7)	Monograph 58 [1993], Supplement 7 [1987]
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IARC - Group 2B (Possibly Carcinogenic to Humans)

Nickel (7440-02-0)	Monograph 49 [1990], Supplement 7 [1987]
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NTP (National Toxicology Program) - Report on Carcinogens - Known Human Carcinogens

Beryllium (7440-41-7)	Known Human Carcinogen
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Compounds Formed During Processing

ACGIH - Threshold Limit Values - Carcinogens

Aluminum oxide (non-fibrous) (1344-28-1)	A4 - Not Classifiable as a Human Carcinogen
Beryllium compounds (Not available)	A1 - Confirmed Human Carcinogen
Chromium (III) compounds (Not available)	A4 - Not Classifiable as a Human Carcinogen
Chromium (VI) compounds, certain water insoluble forms (Not available)	A1 - Confirmed Human Carcinogen
Chromium (VI) compounds, water soluble forms (Not available)	A1 - Confirmed Human Carcinogen
Iron oxide (1309-37-1)	A4 - Not Classifiable as a Human Carcinogen
Magnesium oxide (1309-48-4)	A4 - Not Classifiable as a Human Carcinogen
Nickel compounds, insoluble (Not available)	A1 - Confirmed Human Carcinogen
Nitrogen dioxide (10102-44-0)	A4 - Not Classifiable as a Human Carcinogen
Ozone (10028-15-6)	A4 - Not Classifiable as a Human Carcinogen

IARC - Group 1 (Carcinogenic to Humans)

Beryllium compounds (Not available)	Monograph 58 [1993] (evaluated as a group), Supplement 7 [1987] (evaluated as a group)
Chromium (VI) compounds (18540-29-9)	Monograph 49 [1990] (evaluated as a group)
Nickel compounds, insoluble (Not available)	Monograph 49 [1990] (evaluated as a group)

IARC - Group 2B (Possibly Carcinogenic to Humans)

Welding fumes (Not available)	Monograph 49 [1990]
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NTP (National Toxicology Program) - Report on Carcinogens - Known Human Carcinogens

Beryllium compounds (Not available)	Known Human Carcinogen
Chromium (VI) compounds (18540-29-9)	Known Human Carcinogen
Nickel compounds, insoluble (Not available)	Known Human Carcinogen

U.S. - OSHA - Specifically Regulated Carcinogens (1910.1001 to 1910.1096)

Chromium (VI) compounds (18540-29-9)	Workers exposed to Cr(VI) are at an increased risk of developing lung cancer - see 29 CFR 1910.1026
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12. Ecological Information

Ecotoxicity No data available for this product.

Components

Ecotoxicity - Freshwater Algae Data

Copper (7440-50-8)	72 Hr EC50 Scenedesmus subspicatus: 120 µg/L
Nickel (7440-02-0)	72 Hr EC50 freshwater algae (4 species): 0.1 mg/L; 72 Hr EC50 Selenastrum capricornutum: 0.18 mg/L
Zinc (7440-66-6)	96 Hr EC50 Selenastrum capricornutum: 30 µg/L

Ecotoxicity - Freshwater Fish Species Data

Copper (7440-50-8)	96 Hr LC50 Pimephales promelas: 23 µg/L; 96 Hr LC50 Oncorhynchus mykiss: 13.8 µg/L; 96 Hr LC50 Lepomis macrochirus: 236 µg/L
Iron (7439-89-6)	96 Hr LC50 Morone saxatilis: 13.6 mg/L [static]
Nickel (7440-02-0)	96 Hr LC50 Oncorhynchus mykiss: 31.7 mg/L (adult); 96 Hr LC50 Pimephales promelas: 3.1 mg/L; 96 Hr LC50 Brachydanio rerio: >100 mg/L
Zinc (7440-66-6)	96 Hr LC50 Pimephales promelas: 6.4 mg/L

Ecotoxicity - Water Flea Data

Copper (7440-50-8)	96 Hr EC50 water flea: 10 µg/L; 96 Hr EC50 water flea: 200 µg/L
Nickel (7440-02-0)	96 Hr EC50 water flea: 510 µg/L
Zinc (7440-66-6)	72 Hr EC50 water flea: 5 µg/L

Compounds Formed During Processing

Ecotoxicity - Freshwater Fish Species Data

Chromium (VI) compounds (18540-29-9)	96 Hr LC50 Pimephales promelas: 36.2 mg/L; 96 Hr LC50 Oncorhynchus mykiss: 7.6 mg/L
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Ecotoxicity - Water Flea Data

Chromium (VI) compounds (18540-29-9)	24 Hr EC50 water flea: 435 µg/L
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Environmental Fate No data available for this product.

13. Disposal Considerations

Disposal instructions Reuse or recycle material whenever possible. Dispose in accordance with all applicable regulations. Keep scrap separate from other metal scrap.

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.

14. Transport Information

General Shipping Information

Basic shipping description:

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.

15. Regulatory Information

US federal regulations 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.

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.

Components

U.S. - CERCLA/SARA - Hazardous Substances and their Reportable Quantities

Beryllium (7440-41-7)	10 lb final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers); 4.54 kg final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers)
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Components

U.S. - CERCLA/SARA - Hazardous Substances and their Reportable Quantities

Chromium (7440-47-3)	5000 lb final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers); 2270 kg final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers)
Copper (7440-50-8)	5000 lb final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers); 2270 kg final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers)
Nickel (7440-02-0)	100 lb final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers); 45.4 kg final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers)
Zinc (7440-66-6)	1000 lb final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers); 454 kg final RQ (no reporting of releases of this hazardous substance is required if the diameter of the solid metal released is larger than 100 micrometers)

U.S. - CERCLA/SARA - Section 313 - Emission Reporting

Aluminum (7429-90-5)	1.0 % de minimis concentration (dust or fume only)
Beryllium (7440-41-7)	0.1 % de minimis concentration
Chromium (7440-47-3)	1.0 % de minimis concentration
Copper (7440-50-8)	1.0 % de minimis concentration
Manganese (7439-96-5)	1.0 % de minimis concentration
Nickel (7440-02-0)	0.1 % de minimis concentration
Zinc (7440-66-6)	1.0 % de minimis concentration (dust or fume only)

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories	Immediate Hazard - Yes
	Delayed Hazard - Yes
	Fire Hazard - No
	Pressure Hazard - No
	Reactivity Hazard - Yes

State regulations	WARNING: This product contains a chemical or chemicals known to the State of California to cause cancer. Chemicals known to the State of California to cause cancer: Beryllium and beryllium compounds, Chromium (hexavalent compounds), Nickel (metallic) and certain Nickel compounds.
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Components

U.S. - California - 8 CCR Section 339 - Director's List of Hazardous Substances

Aluminum (7429-90-5)	Present
Beryllium (7440-41-7)	Present (exempt when encapsulated in a capsule which meets the definition of Special Form Materials prescribed in 49 CFR 173.403(z))
Chromium (7440-47-3)	Present
Copper (7440-50-8)	Present
Iron (7439-89-6)	Present
Magnesium (7439-95-4)	Present
Manganese (7439-96-5)	Present
Nickel (7440-02-0)	Present
Zinc (7440-66-6)	Present

U.S. - California - Proposition 65 - Carcinogens List

Beryllium (7440-41-7)	carcinogen, initial date 10/1/87 Trace amount
Nickel (7440-02-0)	carcinogen, initial date 10/1/89

U.S. - Massachusetts - Right To Know List

Aluminum (7429-90-5)	Present
Beryllium (7440-41-7)	Carcinogen; Extraordinarily hazardous
Chromium (7440-47-3)	Carcinogen; Extraordinarily hazardous
Copper (7440-50-8)	Present
Magnesium (7439-95-4)	Present
Manganese (7439-96-5)	Present
Nickel (7440-02-0)	Carcinogen; Extraordinarily hazardous
Silicon (7440-21-3)	Present (dust, exempt when encapsulated or if particulates are not present and cannot be substantially generated through use of the product)
Zinc (7440-66-6)	Present

Components

U.S. - Minnesota - Hazardous Substance List

Aluminum (7429-90-5)	Present (dust)
Beryllium (7440-41-7)	Carcinogen
Chromium (7440-47-3)	Present
Copper (7440-50-8)	Present (dust, fume, and mist)
Manganese (7439-96-5)	Present
Nickel (7440-02-0)	Carcinogen
Silicon (7440-21-3)	Present (dust)

U.S. - New Jersey - Right to Know Hazardous Substance List

Aluminum (7429-90-5)	sn 0054
Beryllium (7440-41-7)	sn 0222
Chromium (7440-47-3)	sn 0432
Copper (7440-50-8)	sn 0528
Magnesium (7439-95-4)	sn 1136
Manganese (7439-96-5)	sn 1155 (dust and fume)
Nickel (7440-02-0)	sn 1341 (dust and fume)
Silicon (7440-21-3)	sn 3125 (powder)
Zinc (7440-66-6)	sn 2021 (dust and fume)

U.S. - Pennsylvania - RTK (Right to Know) - Special Hazardous Substances

Beryllium (7440-41-7)	Present
Chromium (7440-47-3)	Present
Nickel (7440-02-0)	Present

U.S. - Pennsylvania - RTK (Right to Know) List

Aluminum (7429-90-5)	Environmental hazard
Beryllium (7440-41-7)	Environmental hazard; Special hazardous substance
Chromium (7440-47-3)	Environmental hazard; Special hazardous substance
Copper (7440-50-8)	Environmental hazard
Magnesium (7439-95-4)	Present
Manganese (7439-96-5)	Environmental hazard
Nickel (7440-02-0)	Environmental hazard; Special hazardous substance
Silicon (7440-21-3)	Present
Zinc (7440-66-6)	Environmental hazard

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 New and Existing Chemicals (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	No
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

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.

16. Other Information

MSDS History

Origination date: September 7, 1999
Supersedes: October 24, 2008
Revision date: April 29, 2009

MSDS Status

April 29, 2009: Change(s) in Section: 2, 7, 10 and 11.
October 24, 2008: New format.

September 28, 2007: Change(s) in Section: 1, 2, 3 and 8.

December 20, 2006: Reviewed on a periodic basis in accordance with Alcoa policy. Change(s) in Section: 1, 2, 3, 4, 5, 7, 8, 10, 11, 12 and 15.

December 4, 2003: Reviewed on a periodic basis in accordance with Alcoa policy. Change(s) in Section: 1 and 2.

Prepared By

Hazardous Materials Control Committee

Preparer: Jon N. Peace, 412-553-2293/Robert W. Barr, 412-553-2618

MSDS System Number

151060

Other information

- 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 65, Standard for Processing and Finishing of Aluminum (NFPA phone: 800-344-3555)
- NFPA 651, Standard for Manufacture of Aluminum and Magnesium Powder
- NFPA 70, Standard for National Electrical Code (Electrical Equipment, Grounding and Bonding)
- NFPA 77, Standard for Static Electricity
- Guide to Occupational Exposure Values-2008, Compiled by the American Conference of Governmental Industrial Hygienists (ACGIH).
- Documentation of the Threshold Limit Values and Biological Exposure Indices, Sixth Edition, 1991, Compiled by the American Conference of Governmental Industrial Hygienists, Inc. (ACGIH).
- NIOSH Pocket Guide to Chemical Hazards, U.S. Department of Health and Human Services, February 2004.
- Patty's Industrial Hygiene and Toxicology: Volume II: Toxicology, 4th ed., 1994, Patty, F. A.; edited by Clayton, G. D. and Clayton, F. E.: New York: John Wiley & Sons, Inc.
- expub, www.expub.com, Expert Publishing, LLC.

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 ***

ALUMINUM ALLOYS WITH LOW BERYLLIUM

WARNING

Non-combustible as supplied. Small chips, fine turnings and dust from processing may be readily ignitable. Explosion/fire hazards may be present when: Dust or fines are dispersed in air; Chips, fines or dust are in contact with water; Dust and fines are in contact with certain metal oxides (e.g., rust, copper oxide). Molten metal is in contact with water/moisture or certain metal oxides (e.g., rust, copper oxide).

Dust and fumes from processing: Can cause irritation of the eyes, skin and upper respiratory tract. Chronic overexposures: Can cause reduction in the number of red blood cells, skin abnormalities, scarring of the lungs, respiratory sensitization, central nervous system damage, secondary Parkinson's disease and reproductive harm in males.

FIRST AID

Eye contact	Dust and fume from processing: Rinse eyes with plenty of water or saline for at least 15 minutes. Consult a physician.
Skin contact	Dust and fumes from processing or Contact with residual oil/oil coating: Wash with soap and water for at least 15 minutes. Get medical attention if irritation develops or persists.
Inhalation	Dust and fume from processing: Remove to fresh air. Check for clear airway, breathing, and presence of pulse. Provide cardiopulmonary resuscitation for persons without pulse or respirations. Consult a physician.

FIRE FIGHTING

Suitable extinguishing media	Use Class D extinguishing agents on fines, dust or molten metal. Use coarse water spray on chips and turnings.
Extinguishing media which must not be used for safety reasons	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.

SPILL PROCEDURES

Spill or leak procedure	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 and rust free. Allow the spill to cool before remelting as scrap.
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HANDLING AND STORAGE

Handling	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.
Storage	Keep dry.

See Alcoa Material Safety Data Sheet No. 1056 for more information about use and disposal.
Emergency Phone: (412) 553-4001.

Contains:

Aluminum	7429-90-5
Zinc	7440-66-6
Magnesium	7439-95-4
Copper	7440-50-8
Silicon	7440-21-3
Manganese	7439-96-5
Iron	7439-89-6
Nickel	7440-02-0
Chromium	7440-47-3
Beryllium	7440-41-7