MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

Material Name	**REMELT INGOT AND CAST ALUMINUM PRODUCTS, 3xx.x SERIES ALLOYS**
MSDS Number	684
Chemical Formula	Mixture
Recommended Restrictions	Does not include alloys: C31R, C62D, C64E, C662, C66S, C677, C683, C684, C68E (See MSDS Number 973)
Product use	Various fabricated aluminum parts and products
Synonym(s)	3xx.x series alloys * Granulated, pebbled, aluminizing, foundry-rich alloy, rotor, remelt scrap ingot (RSI) * A356.2N, A356.2S, A356.2Sr, A356.2Sr, AC4A, AC4CH, AC603, AlSi11, AlSi7, AlSi7Cu1.5Mg, AlSi9, AS5U3G, AS5U3GBF, AS7G03, B319.1S, B356.2S, C003F, C004F, C010F, C011F, C012F, C013F, C014F, C015F * C016F, C017F, C018F, C03R, C05R, C06R, C06Z, C07R, C08R, C091F, C10R, C119, C11R, C12R, C14R, C15R, C160F, C161F, C162F, C163F, C190F, C191F, C192F, C194F, C196F, C197F, C198F, C199F, C19R, C200F * C201F, C202F, C204F, C206F, C207F, C209F, C20R, C210F, C211F, C212F, C213F, C214F, C215F, C216F, C219F, C220F, C221F, C223F, C226F, C227F, C228F, C229F, C230F, C232F, C244F, C24F, C252F, C253, C253F * C254F, C255F, C256F, C257F, C264, C277, C279F, C280F, C281F, C285F, C286F, C298F, C29R, C3, C316F, C318F, C320F, C321F, C322F, C323F, C324F, C325F, C327F, C336F, C339F, C349F, C354F, C359F, C36R * C377, C37F, C37R, C380, C38R, C391, C394, C400F, C401, C401F, C402, C402F, C403F, C404F, C405F, C406F, C407F, C408F, C409F, C415F, C41R, C431F, C432F, C437, C43R, C443F, C444F, C446F, C448, C448F * C449F, C453, C454F, C455F, C457F, C458F, C460F, C470, C487, C514, C576, C57F, C580, C601, C603, C605, C606, C60K, C60N, C60S, C60T, C611, C612, C613, C61K, C61N, C61P, C61S, C623, C624, C626, C627, C6 * C629, C62E, C62J, C62K, C62M, C62N, C62P, C630, C631, C632, C633, C634, C635, C636, C63A, C63J, C63N, C63P, C642, C644, C649, C64K, C64M, C64P, C64T, C64U, C650, C652, C653, C656, C65B, C65D, C65K * C661, C66D, C66K, C67J, C67S, C67T, C68D, C68P, C68S, C68T, C698, C69D, C69M, C69N, C69S, C72A, C90F, C92Z, C93Z, CE40, CE66, CH62, CR37, CR80, CZ29, INAFSB-310, L2653, NA380.1, NA380.1
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 Material Safety Data Sheet, 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):
- 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 fumes from processing: Can cause irritation of the eyes, skin and respiratory tract.

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.

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.

Inhalation

Health effects from mechanical processing (e.g., cutting, grinding):
Dust: 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), respiratory sensitization, scarring of the lungs (pulmonary fibrosis), central nervous system damage, secondary Parkinson's disease and reproductive harm.

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), the accumulation of fluid in the lungs (pulmonary edema) and reduced ability of the blood to carry oxygen (methemaglobin). Chronic overexposures: Can cause respiratory sensitization, scarring of the lungs (pulmonary fibrosis) and lung cancer.

Carcinogenicity and Reproductive Hazard

Product as shipped: Does not present any cancer or reproductive hazards.
Dust from mechanical processing: Can present a cancer hazard (Cadmium, Cobalt, Lead, Nickel). Can present a reproductive hazard (Lead, Manganese).
Dust and fumes from welding or elevated temperature processing: Can present a cancer hazard (Cobalt compounds, 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 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	>75
Silicon	7440-21-3	<18.1
Nickel†	7440-02-0	<5.1
Zinc	7440-66-6	<5.1
Copper	7440-50-8	<4.6
Cerium	7440-45-1	<2.1
Magnesium	7439-95-4	<1.6
Manganese	7439-96-5	<1.2
Iron	7439-89-6	<1.2
Cobalt‡	7440-48-4	<1.1
Chromium	7440-47-3	<0.5
Lead¢	7439-92-1	0 - 0.3
Cadmium¤	7440-43-9	0 - 0.03

Additional Information

† - Alloys: C336F, C394, C401, C402, C406F, C432F and C437.
‡ - Alloys: C339F, C394, C401 and C402.
¢ - Present as impurity. While Lead is not intentionally added to this mixture, it could potentially enter through the recycle stream.
¤ - Present as impurity. While Cadmium is not intentionally added to this mixture, it could potentially enter through the recycle stream. Alloys: A356.2S.
Additional compounds which may be formed during processing are listed in Section 8.

4. First Aid Measures

First aid procedures

Eye contact

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

Skin contact	Wash with soap and water for at least 15 minutes. Get medical attention if irritation develops or persists.
Inhalation	Dust and fumes 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, copper oxide). 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	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

Handling	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.
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, tools and natural bristle brush. Cover and reseal partially empty containers. Provide grounding and bonding where necessary to prevent accumulation of static charges during metal dust handling and transfer operations (See Section 15). Local ventilation and vacuum systems must be designed to handle explosive dusts. Dry vacuums and electrostatic precipitators must not be used, unless specifically approved for use with flammable/explosive dusts. 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. Dust accumulation on the floor, ledges and beams can present a risk of ignition, flame propagation and secondary explosions. Do not use compressed air to remove settled material from floors, beams or equipment.

Requirements for Remelting of Scrap Material or Ingot

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

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

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

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

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

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.

Exposure data

Components

U.S. - OSHA - Specifically Regulated Chemicals	
Cadmium¤ (7440-43-9)	5 µg/m3 TWA (Do not eat, drink or chew tobacco or gum or apply cosmetics in regulated areas. Carcinogen - dust can cause lung and kidney disease, See 29 CFR 1910.1027); 2.5 µg/m3 Action Level
Lead¢ (7439-92-1)	30 µg/m3 Action Level (Poison, See 29 CFR 1910.1025); 50 µg/m3 TWA

Compounds Formed During Processing

U.S. - OSHA - Specifically Regulated Chemicals	
Chromium (VI) compounds (18540-29-9)	5 µg/m3 TWA (Cancer hazard, See 29 CFR 1910.1026, Cr); 2.5 µg/m3 Action Level (Cr)
Lead compounds, inorganic (CASNo. Not available)	30 µg/m3 Action Level (Poison, See 29 CFR 1910.1025, Pb); 50 µg/m3 TWA (Pb)

Occupational exposure limits

U.S. - OSHA

Components	**Type**	**Value**	**Form**
Aluminum (7429-90-5)	TWA	5 mg/m3	(respirable fraction)
	TWA (total dust)	15 mg/m3	(total dust)
Cadmium¤ (7440-43-9)	TWA	5 µg/m3	
Chromium (7440-47-3)	TWA	1 mg/m3	
Cobalt‡ (7440-48-4)	TWA	0.1 mg/m3	(dust and fume)
Copper (7440-50-8)	TWA	1 mg/m3	(dust and mist)
	TWA (fume)	0.1 mg/m3	(fume)
Lead¢ (7439-92-1)	TWA	50 µg/m3	
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	Type	Value	Form
Aluminum oxide (non-fibrous) (1344-28-1)	TWA	5 mg/m3	(respirable fraction)
	TWA (total dust)	15 mg/m3	(total dust)
Chromium (II) compounds (CASNo. Not available)	TWA	0.5 mg/m3	(Cr)
Chromium (III) compounds (CASNo. Not available)	TWA	0.5 mg/m3	(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	(fume)
Lead compounds, inorganic (CASNo. Not available)	TWA	50 µg/m3	(Pb)
Magnesium oxide (1309-48-4)	TWA	15 mg/m3	(fume, total particulate)
Manganese compounds, inorganic (CASNo. Not available)	Ceiling	5 mg/m3	(Mn)
Nickel compounds, insoluble (CASNo. Not available)	TWA	1 mg/m3	(Ni)
Nitric oxide (10102-43-9)	TWA	25 ppm	
		30 mg/m3	
Nitrogen dioxide (10102-44-0)	Ceiling	5 ppm	
		9 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	3 mg/m3	(respirable fraction)
		10 mg/m3	(8 Hour)
Cobalt‡ (7440-48-4)	TWA	0.02 mg/m3	(as Co)
Manganese (7439-96-5)	TWA	0.02 mg/m3	(respirable fraction, as Mn)
		0.05 mg/m3	(total dust, as Mn)

Compounds Formed During Processing	Type	Value	Form
Aluminum oxide (non-fibrous) (1344-28-1)	TWA	3 mg/m3	(respirable fraction)
		10 mg/m3	(8 Hour)
Chromium (VI) compounds (18540-29-9)	TWA	0.25 ug/m3	(as Cr)
Cobalt compounds, inorganic (CASNo. Not available)	TWA	0.02 mg/m3	(as Co)
Manganese compounds, inorganic (CASNo. Not available)	TWA	0.05 mg/m3	(total dust, as Mn)
		0.02 mg/m3	(respirable fraction, as Mn)
Nickel compounds, insoluble (CASNo. Not available)	TWA	0.1 mg/m3	(as Ni)

ACGIH

Components	Type	Value	Form
Aluminum (7429-90-5)	TWA	1 mg/m3	(respirable fraction)
Cadmium¤ (7440-43-9)	TWA	0.002 mg/m3	(respirable fraction)
		0.01 mg/m3	
Chromium (7440-47-3)	TWA	0.5 mg/m3	
Cobalt‡ (7440-48-4)	TWA	0.02 mg/m3	
Copper (7440-50-8)	TWA	1 mg/m3	(Cu, dust and mist)
	TWA (fume)	0.2 mg/m3	(fume)
Lead¢ (7439-92-1)	TWA	0.05 mg/m3	
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)
Chromium (III) compounds (CASNo. Not available)	TWA	0.5 mg/m3	(as Cr)
Chromium (VI) compounds, certain water insoluble forms (CASNo. Not available)	TWA	0.01 mg/m3	(as Cr)

Compounds Formed During Processing	Type	Value	Form
Chromium (VI) compounds, water soluble forms (CASNo. Not available)	TWA	0.05 mg/m3	(as Cr)
Cobalt compounds, inorganic (CASNo. Not available)	TWA	0.02 mg/m3	(Co)
Iron oxide (1309-37-1)	TWA	5 mg/m3	(respirable fraction)
Lead compounds, inorganic (CASNo. Not available)	TWA	0.05 mg/m3	(Pb)
Magnesium oxide (1309-48-4)	TWA	10 mg/m3	(inhalable fraction)
Manganese compounds, inorganic (CASNo. Not available)	TWA	0.2 mg/m3	(Mn)
Nickel compounds, insoluble (CASNo. Not available)	TWA	0.2 mg/m3	(Ni, inhalable fraction)
Nitric oxide (10102-43-9)	TWA	25 ppm	
Nitrogen dioxide (10102-44-0)	STEL	5 ppm	
	TWA	3 ppm	
Ozone (10028-15-6)	TWA	0.2 ppm	
	TWA (heavy work)	0.05 ppm	(heavy work)
	TWA (light work)	0.1 ppm	
	TWA (moderate work)	0.08 ppm	(moderate 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 appropriate gloves to avoid any skin injury.

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: N95, N100 for Lead.

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).

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.

9. Physical & Chemical Properties

Form	Solid.
Appearance	Silver colored.
Boiling point	Not determined
Melting point	899.6 - 1220 °F (482 - 660 °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)	Insoluble
Density	2.5 - 3.12 g/cm3
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 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.
• 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 Will 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 (milling, cutting, grinding).

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

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).

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.

Cerium: Can cause irritation of eyes and skin. Chronic overexposures: Can cause lung damage.

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.

Cobalt: Can cause irritation of eyes, skin and respiratory tract. Skin contact: Can cause allergic reactions. Acute and chronic overexposures: Can cause respiratory sensitization, asthma, scarring of the lungs (pulmonary fibrosis) and damage to the heart muscle (cardiomyopathy). IARC/NTP: Listed as possibly carcinogenic to humans by IARC (Group 2B).

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

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

Cadmium dust, fumes and mist: Can cause severe irritation of respiratory tract. Acute overexposures: Can cause metal fume fever (shortness of breath and malaise), inflammation of the lung tissue and fluid in the lungs (pulmonary edema). Effects can be delayed for several hours. Chronic overexposures: Can cause lung damage, renal tube damage, placenta damage, testicular damage, liver damage, fetal malformations, reduction in the number of red blood cells (anemia), high blood pressure (hypertension), emphysema and central nervous system effects. Can accumulate in the body over time. IARC/NTP: Listed as "known to be a human carcinogen" by the NTP. Listed as carcinogenic to humans by IARC (Group 1). Cadmium and cadmium compounds: Associated with lung tumors, prostate tumors, kidney tumors and testicular tumors.

Health effects associated with compounds formed during processing

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

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

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

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).

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).

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).

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).

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.

Cobalt compounds: Can cause irritation of eyes, skin and respiratory tract. Skin contact: Can cause allergic reactions. Acute and chronic overexposures: Can cause respiratory sensitization, asthma, kidney damage and damage to the heart muscle (cardiomyopathy). IARC/NTP: Listed as possibly carcinogenic to humans by IARC (Group 2B).

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

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

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

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 (methemaglobin). 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 No data available for this product.

Components

Toxicology Data - Selected LD50s and LC50s

Cadmium¤ (7440-43-9)	Oral LD50 Rat 2330 mg/kg; Inhalation LC50 Rabbit 8 mg/L 4 h
Cobalt‡ (7440-48-4)	Inhalation LC50 Rat >10 mg/L 1 h; Oral LD50 Rat 6170 mg/kg
Iron (7439-89-6)	Oral LD50 Rat 984 mg/kg

Components

Toxicology Data - Selected LD50s and LC50s

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
Nitric oxide (10102-43-9)	Inhalation LC50 Rat 1068 mg/m3 4 h
Nitrogen dioxide (10102-44-0)	Inhalation LC50 Rat 88 ppm 4 h; Inhalation LC50 Rat 165 mg/m3 4 h; Inhalation LC50 Rat 220 mg/m3 1 h
Ozone (10028-15-6)	Inhalation LC50 Rat 4800 ppb 4 h
Zinc oxide (1314-13-2)	Oral LD50 Rat >5000 mg/kg

Carcinogenicity No information available for product.

Components

ACGIH - Threshold Limit Values - Carcinogens

Aluminum (7429-90-5)	A4 - Not Classifiable as a Human Carcinogen
Cadmium¤ (7440-43-9)	A2 - Suspected Human Carcinogen
Chromium (7440-47-3)	A4 - Not Classifiable as a Human Carcinogen
Cobalt‡ (7440-48-4)	A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans
Lead¢ (7439-92-1)	A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans
Nickel† (7440-02-0)	A5 - Not Suspected as a Human Carcinogen

IARC - Group 1 (Carcinogenic to Humans)

Cadmium¤ (7440-43-9)	Monograph 58 [1993]; Supplement 7 [1987]

IARC - Group 2B (Possibly Carcinogenic to Humans)

Cobalt‡ (7440-48-4)	Monograph 86 [2006] (without tungsten carbide); Monograph 52 [1991]
Nickel† (7440-02-0)	Monograph 49 [1990]; Supplement 7 [1987]

NTP (National Toxicology Program) - Report on Carcinogens - Known Human Carcinogens

Cadmium¤ (7440-43-9)	Known Human Carcinogen

NTP (National Toxicology Program) - Report on Carcinogens - Reasonably Anticipated to be Human Carcinogens

Lead¢ (7439-92-1)	Reasonably Anticipated To Be A Human Carcinogen

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

Cadmium¤ (7440-43-9)	Carcinogen - dust can cause lung and kidney disease - See 29 CFR 1910.1027

Compounds Formed During Processing

ACGIH - Threshold Limit Values - Carcinogens

Aluminum oxide (non-fibrous) (1344-28-1)	A4 - Not Classifiable as a Human Carcinogen
Chromium (III) compounds (CASNo. Not available)	A4 - Not Classifiable as a Human Carcinogen
Chromium (VI) compounds, certain water insoluble forms (CASNo. Not available)	A1 - Confirmed Human Carcinogen
Chromium (VI) compounds, water soluble forms (CASNo. Not available)	A1 - Confirmed Human Carcinogen
Cobalt compounds, inorganic (CASNo. Not available)	A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans
Iron oxide (1309-37-1)	A4 - Not Classifiable as a Human Carcinogen
Lead compounds, inorganic (CASNo. Not available)	A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans
Magnesium oxide (1309-48-4)	A4 - Not Classifiable as a Human Carcinogen
Nickel compounds, insoluble (CASNo. 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)

Chromium (VI) compounds (18540-29-9)	Monograph 49 [1990] (evaluated as a group)
Nickel compounds, insoluble (CASNo. Not available)	Monograph 49 [1990] (evaluated as a group)

IARC - Group 2A (Probably Carcinogenic to Humans)

Lead compounds, inorganic (CASNo. Not available)	Monograph 87 [2006]; Supplement 7 [1987] (Lead & inorganic lead compounds evaluated as Group 2B on Suppl 7. Now as Group 2A on Monograph 87.)

Compounds Formed During Processing

IARC - Group 2B (Possibly Carcinogenic to Humans)

Welding fumes (CASNo. Not available)	Monograph 49 [1990]

NTP (National Toxicology Program) - Report on Carcinogens - Known Human Carcinogens

Chromium (VI) compounds (18540-29-9)	Known Human Carcinogen
Nickel compounds, insoluble (CASNo. 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

12. Ecological Information

Ecotoxicity

Components

Ecotoxicity - Freshwater Algae Data

Copper (7440-50-8)	72 Hr EC50 Pseudokirchneriella subcapitata: 0.0426 - 0.0535 mg/L [static]; 96 Hr EC50 Pseudokirchneriella subcapitata: 0.031 - 0.054 mg/L [static]
Nickel† (7440-02-0)	72 Hr EC50 Pseudokirchneriella subcapitata: 0.18 mg/L; 96 Hr EC50 Pseudokirchneriella subcapitata: 0.174 - 0.311 mg/L [static]
Zinc (7440-66-6)	96 Hr EC50 Pseudokirchneriella subcapitata: 0.11 - 0.271 mg/L [static]; 72 Hr EC50 Pseudokirchneriella subcapitata: 0.09 - 0.125 mg/L [static]

Ecotoxicity - Freshwater Fish Species Data

Cadmium¤ (7440-43-9)	96 Hr LC50 Oncorhynchus mykiss: 0.003 mg/L [flow-through]; 96 Hr LC50 Oncorhynchus mykiss: 0.006 mg/L [static]; 96 Hr LC50 Cyprinus carpio: 0.002 mg/L; 96 Hr LC50 Cyprinus carpio: 4.26 mg/L [semi-static]; 96 Hr LC50 Cyprinus carpio: 0.24 mg/L [static]; 96 Hr LC50 Lepomis macrochirus: 21.1 mg/L [flow-through]; 96 Hr LC50 Oryzias latipes: 0.016 mg/L; 96 Hr LC50 Pimephales promelas: 0.0004-0.003 mg/L
Cobalt‡ (7440-48-4)	96 Hr LC50 Brachydanio rerio: >100 mg/L [static]
Copper (7440-50-8)	96 Hr LC50 Pimephales promelas: 0.0068 - 0.0156 mg/L; 96 Hr LC50 Pimephales promelas: <0.3 mg/L [static]; 96 Hr LC50 Pimephales promelas: 0.2 mg/L [flow-through]; 96 Hr LC50 Oncorhynchus mykiss: 0.052 mg/L [flow-through]; 96 Hr LC50 Lepomis macrochirus: 1.25 mg/L [static]; 96 Hr LC50 Cyprinus carpio: 0.3 mg/L [semi-static]; 96 Hr LC50 Cyprinus carpio: 0.8 mg/L [static]; 96 Hr LC50 Poecilia reticulata: 0.112 mg/L [flow-through]
Iron (7439-89-6)	96 Hr LC50 Morone saxatilis: 13.6 mg/L [static]; 96 Hr LC50 Cyprinus carpio: 0.56 mg/L [semi-static]
Lead¢ (7439-92-1)	96 Hr LC50 Cyprinus carpio: 0.44 mg/L [semi-static]; 96 Hr LC50 Oncorhynchus mykiss: 1.17 mg/L [flow-through]; 96 Hr LC50 Oncorhynchus mykiss: 1.32 mg/L [static]
Nickel† (7440-02-0)	96 Hr LC50 Brachydanio rerio: >100 mg/L; 96 Hr LC50 Cyprinus carpio: 1.3 mg/L [semi-static]; 96 Hr LC50 Cyprinus carpio: 10.4 mg/L [static]
Zinc (7440-66-6)	96 Hr LC50 Pimephales promelas: 2.16-3.05 mg/L [flow-through]; 96 Hr LC50 Pimephales promelas: 0.211-0.269 mg/L [semi-static]; 96 Hr LC50 Pimephales promelas: 2.66 mg/L [static]; 96 Hr LC50 Cyprinus carpio: 30 mg/L; 96 Hr LC50 Cyprinus carpio: 0.45 mg/L [semi-static]; 96 Hr LC50 Cyprinus carpio: 7.8 mg/L [static]; 96 Hr LC50 Lepomis macrochirus: 3.5 mg/L [static]; 96 Hr LC50 Oncorhynchus mykiss: 0.24 mg/L [flow-through]; 96 Hr LC50 Oncorhynchus mykiss: 0.

Ecotoxicity - Water Flea Data

Cadmium¤ (7440-43-9)	48 Hr EC50 Daphnia magna: 0.0244 mg/L [Static]
Copper (7440-50-8)	48 Hr EC50 Daphnia magna: 0.03 mg/L [Static]
Lead¢ (7439-92-1)	48 Hr EC50 water flea: 600 µg/L
Nickel† (7440-02-0)	48 Hr EC50 Daphnia magna: >100 mg/L; 48 Hr EC50 Daphnia magna: 1 mg/L [Static]
Zinc (7440-66-6)	48 Hr EC50 Daphnia magna: 0.139 - 0.908 mg/L [Static]

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

Ecotoxicity - Water Flea Data

Chromium (VI) compounds (18540-29-9)	24 Hr EC50 water flea: 435 µg/L

Environmental Fate No data available for product.

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: Not federally regulated in the U.S. if disposed of "as is."
RCRA waste codes other than described here may apply depending on use of the product. Status must be determined at the point of waste generation. Refer to 40 CFR 261 or state equivalent in the U.S. TCLP testing is recommended for Cadmium, chromium, and lead.

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 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.

Components

U.S. - CERCLA/SARA - Hazardous Substances and their Reportable Quantities	
Cadmium¤ (7440-43-9)	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)
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)
Lead¢ (7439-92-1)	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)
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)	454 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); 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)
U.S. - CERCLA/SARA - Section 313 - Emission Reporting	
Aluminum (7429-90-5)	1.0 % de minimis concentration (dust or fume only)
Cadmium¤ (7440-43-9)	0.1 % de minimis concentration
Chromium (7440-47-3)	1.0 % de minimis concentration
Cobalt‡ (7440-48-4)	0.1 % de minimis concentration
Copper (7440-50-8)	1.0 % de minimis concentration
Lead¢ (7439-92-1)	0.1 % Supplier notification limit; 0.1 % de minimis concentration (when contained in stainless steel, brass, or bronze)
Manganese (7439-96-5)	1.0 % de minimis concentration
Nickel† (7440-02-0)	0.1 % de minimis concentration

Components

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

Zinc (7440-66-6)	1.0 % de minimis concentration (dust or fume only)

U.S. - CERCLA/SARA - Section 313 - PBT Chemical Listing

Lead¢ (7439-92-1)	100 lb RT (this lower threshold does not apply to lead when it is contained in stainless steel, brass or bronze alloy)

State regulations

Components

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

Aluminum (7429-90-5)	Present
Cadmium¤ (7440-43-9)	Present
Chromium (7440-47-3)	Present
Cobalt‡ (7440-48-4)	Present (exempt when encapsulated in a capsule which meets the definition of Special Form Materials prescribed in 49 CFR 173.403(z))
Copper (7440-50-8)	Present
Iron (7439-89-6)	Present
Lead¢ (7439-92-1)	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

Cadmium¤ (7440-43-9)	carcinogen, initial date 10/1/87
Cobalt‡ (7440-48-4)	carcinogen, initial date 7/1/92 (powder)
Lead¢ (7439-92-1)	carcinogen, initial date 10/1/92
Nickel† (7440-02-0)	carcinogen, initial date 10/1/89

U.S. - California - Proposition 65 - Developmental Toxicity

Cadmium¤ (7440-43-9)	developmental toxicity, initial date 5/1/97
Lead¢ (7439-92-1)	developmental toxicity, initial date 2/27/87

U.S. - California - Proposition 65 - Reproductive Toxicity - Female

Lead¢ (7439-92-1)	female reproductive toxicity, initial date 2/27/87

U.S. - California - Proposition 65 - Reproductive Toxicity - Male

Cadmium¤ (7440-43-9)	male reproductive toxicity, initial date 5/1/97
Lead¢ (7439-92-1)	male reproductive toxicity, initial date 2/27/87

U.S. - Massachusetts - Right To Know List

Aluminum (7429-90-5)	Present
Cadmium¤ (7440-43-9)	Carcinogen; Extraordinarily hazardous
Chromium (7440-47-3)	Carcinogen; Extraordinarily hazardous
Cobalt‡ (7440-48-4)	Present
Copper (7440-50-8)	Present
Lead¢ (7439-92-1)	Teratogen
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

U.S. - Minnesota - Hazardous Substance List

Aluminum (7429-90-5)	Present (dust)
Cadmium¤ (7440-43-9)	Carcinogen (dust and fume)
Chromium (7440-47-3)	Present
Cobalt‡ (7440-48-4)	Present (dust and fume)
Copper (7440-50-8)	Present (dust, fume, and mist)
Lead¢ (7439-92-1)	Carcinogen (elemental, inorganic, fume, and dust)
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
Cadmium¤ (7440-43-9)	sn 0305

State regulations

Components

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

Cerium (7440-45-1)	sn 0352
Chromium (7440-47-3)	sn 0432
Cobalt‡ (7440-48-4)	sn 0520
Copper (7440-50-8)	sn 0528
Lead¢ (7439-92-1)	sn 1096
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

Cadmium¤ (7440-43-9)	Present (including powder)
Chromium (7440-47-3)	Present
Nickel† (7440-02-0)	Present

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

Aluminum (7429-90-5)	Environmental hazard
Cadmium¤ (7440-43-9)	Environmental hazard (dust, fume, powder); Special hazardous substance (powder)
Chromium (7440-47-3)	Environmental hazard; Special hazardous substance
Cobalt‡ (7440-48-4)	Environmental hazard
Copper (7440-50-8)	Environmental hazard (dust and fume)
Lead¢ (7439-92-1)	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

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories Immediate Hazard - Yes, If particulates are generated during processing
Delayed Hazard - Yes, If particulates are generated during processing
Fire Hazard - No
Pressure Hazard - No
Reactivity Hazard - Yes, If molten

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)	No
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 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.

16. Other Information

MSDS History Origination date: March 16, 1990
Supersedes: May 27, 2009
Revision date: April 29, 2010

MSDS Status	April 29, 2010: Change(s) in Section: 1 and 3. May 27, 2009: New format. April 4, 2007: Reviewed on a periodic basis in accordance with Alcoa policy. Change(s) in Section: 1, 2, 3, 4, 5, 7, 8, 10, 11, 12, 13, 14 and 15. March 15, 2004: Reviewed on a periodic basis in accordance with Alcoa policy. Change(s) in Section: 1 and 8.
Prepared By	Hazardous Materials Control Committee Preparer: Jon N. Peace, 412-553-2293/Robert W. Barr, 412-553-2618/Jim Perriello, 480-278-6928
MSDS System Number	115672

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

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 ***

REMELT INGOT AND CAST ALUMINUM PRODUCTS, 3xx.x SERIES ALLOYS

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 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 respiratory tract. Prolonged or repeated skin contact may cause sensitization and allergic contact dermatitis.
Health effects from mechanical processing (e.g., cutting, grinding): Chronic overexposures: Can cause reduction in the number of red blood cells, skin abnormalities, respiratory sensitization, scarring of the lungs, central nervous system damage, secondary Parkinson's disease and reproductive harm.
Additional health effects from elevated temperature processing (e.g., welding, melting): Acute overexposures: Can cause metal fume fever, the accumulation of fluid in the lungs, and reduced ability of the blood to carry oxygen. Chronic overexposures: Can cause respiratory sensitization, scarring of the lungs and lung cancer.

FIRST AID

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

Skin contact Wash with soap and water for at least 15 minutes. Get medical attention if irritation develops or persists.

Inhalation Dust and fumes 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.

See Alcoa Material Safety Data Sheet No. 684 for more information about use and disposal.
Emergency Phone: (412) 553-4001.

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 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.

HANDLING AND STORAGE

Handling Keep material dry. Avoid generating dust. Avoid contact with sharp edges or heated metal.

Contains:

Aluminum	7429-90-5
Silicon	7440-21-3
Nickel†	7440-02-0
Zinc	7440-66-6
Copper	7440-50-8
Cerium	7440-45-1
Magnesium	7439-95-4
Manganese	7439-96-5
Iron	7439-89-6
Cobalt‡	7440-48-4
Chromium	7440-47-3
Lead¢	7439-92-1
Cadmium¤	7440-43-9

Alcoa Inc.
201 Isabella Street, Pittsburgh PA 15212-5858 United States