



MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

Material name	ALUMINIUM SHEET COIL AND FOIL - BARE AND COATED
MSDS Number	1352
Version #	03
Revision date	October 12, 2012.
Chemical description	Article
Product use	Various fabricated aluminum parts and products
Synonym(s)	Alloys 0333, 1050, 1100, 1350, 3003, 3004, 3005, 3105, 5005, 5042, 5050, 5052, 5082, 5083, 5086, 5182, 5454, 5754, 6061, 8011
Manufacturer	

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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. Bare or coated coil/sheet. Various colors. 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 upper 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.

Inhalation

Dust and fumes from processing: Can cause irritation of the upper respiratory tract.

Health effects from mechanical processing (e.g., cutting, grinding): Chronic overexposures: Can cause scarring of the lungs (pulmonary fibrosis), central nervous system damage, secondary Parkinson's disease and reproductive harm in males.

Additional health effects from elevated temperature processing (e.g., welding, melting): Acute overexposures: Can cause metal fume fever (nausea, fever, chills, shortness of breath and malaise) and the accumulation of fluid in the lungs (pulmonary edema). Chronic overexposures: Can cause asthma, benign lung disease (siderosis) and lung cancer.

Combustion of the coatings can generate Hydrogen chloride and Hydrogen fluoride. Acute overexposures: Can cause severe irritation of the respiratory tract and the accumulation of fluid in the lungs (pulmonary edema). Effects can be delayed up to 24 hours.

Carcinogenicity and Reproductive Hazard

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

Dust from mechanical processing: Does not present any cancer hazards. Can present a reproductive hazard (Manganese).

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

Medical conditions aggravated by exposure to product

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

Potential environmental effects

Not expected to be harmful to aquatic organisms.

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 (Aluminum Alloys)	7429-90-5	>82
Magnesium (Aluminum Alloys)	7439-95-4	<5.0
Manganese (Aluminum Alloys)	7439-96-5	<1.5
Iron (Aluminum Alloys)	7439-89-6	<1.0
Silicon (Aluminum Alloys)	7440-21-3	<1.0
Chromium (Aluminum Alloys)	7440-47-3	<0.35
Coatings [†] (Coatings)	Various	0 - 30

Additional Information

[†] Coatings include: vinyl, epoxy, polyester, siliconized polyester, acrylic, fluorocarbons, polyurethane, resins, petroleum, chromium conversion and titanium conversion. 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

If molten material gets on skin, cool rapidly with cold water. Get medical treatment for thermal burn.

Dust and fumes from processing: 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. If breathing is difficult, provide oxygen. Loosen any tight clothing on neck or chest. Provide cardiopulmonary resuscitation for persons without pulse or respirations. Consult a physician.
Most important symptoms and effects, both acute and delayed	Health effects from mechanical processing (e.g., cutting, grinding): Dust from processing: Can cause irritation of the upper respiratory tract. Chronic overexposures: Can cause scarring of the lungs (pulmonary fibrosis), central nervous system damage, secondary Parkinson's disease and reproductive harm in males. Additional health effects from elevated temperature processing (e.g., welding, melting): Dust and fumes from processing: Acute overexposure: Can cause metal fume fever (nausea, fever, chills, shortness of breath and malaise) and the accumulation of fluid in the lungs (pulmonary edema). Chronic overexposures: Can cause asthma, benign lung disease (siderosis) and lung cancer.
Notes to physician	In case of shortness of breath, give oxygen. Symptoms may be delayed.
General advice	If exposed or concerned: get medical attention/advice.
5. Fire Fighting Measures	
General fire hazards	Small chips, fine turnings, and dust from processing may be readily ignitable.
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	
Special hazards arising from the substance or mixture	May be a potential hazard under the following conditions: <ul style="list-style-type: none"> • 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.
Protective equipment and precautions for firefighters	Fire fighters should wear NIOSH approved, positive pressure, self-contained breathing apparatus and full protective clothing when appropriate.
Hazardous combustion products	Combustion of the coatings can generate hydrogen chloride, hydrogen fluoride, carbon monoxide, carbon dioxide, aldehydes and/or low molecular weight hydrocarbons.
Fire fighting equipment/instructions	Do not disturb the material until completely cool.
Explosion data	
Sensitivity to mechanical impact	Not sensitive.
Sensitivity to static discharge	Not applicable.

6. Accidental Release Measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel	Avoid contact with sharp edges or heated metal. Avoid inhalation of fumes from molten product. Molten, heated and cold aluminum look alike; do not touch unless you know it is cold. Avoid contact even after material solidifies. Use personal protection recommended in Section 8 of the SDS.
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For emergency responders

Avoid contact with sharp edges or heated metal. Avoid inhalation of fumes from molten product. Molten, heated and cold aluminum look alike; do not touch unless you know it is cold. Avoid contact even after material solidifies. Use personal protection recommended in Section 8 of the SDS.

Environmental precautions

No special environmental precautions required.

Evacuation procedures

Molten metal: Persons not wearing appropriate protective equipment should be excluded from area of spill until clean-up has been completed.

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. Protect from water run-on including precipitation.

Methods and material for containment and cleaning up

Clean up in accordance with all applicable regulations.

Reference to other sections

For personal protection, see section 8 of the SDS. For waste disposal, see section 13 of the SDS.

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.

Storage

Store in a dry place. Protect from water run-on including precipitation.

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 chips, 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, 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.

Personal protective equipment

Eye / face protection

Wear safety glasses with side shields. Wear a face shield when working with molten material.

Skin and body protection

Avoid contact with sharp edges or heated metal. Long sleeved clothing. Leather gloves. Wear impervious gloves to avoid direct skin contact. Molten metal: Wear fire/flame resistant/retardant clothing. Wear heat resistant gloves. Neck shroud. Spats. Safety shoes.

Thermal hazards

Hot aluminum does not necessarily glow red. Contact with molten material can cause thermal burns. When material is heated, wear gloves to protect against thermal burns.

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, Acid gas cartridges for Hydrogen chloride, Acid gas cartridge for Hydrogen fluoride gas.

Environmental exposure controls

No special environmental precautions required.

Hygiene measures

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

Recommended monitoring procedures

Follow standard monitoring procedures.

General

Personnel who handle and work with molten metal should utilize primary protective clothing like polycarbonate face shields, fire resistant tapper's jackets, neck shades (snoods), leggings, spats and similar equipment to prevent burn injuries. In addition to primary protection, secondary or day-to-day work clothing that is fire resistant and sheds metal splash is recommended for use with molten metal. Synthetic materials should never be worn even as secondary clothing (undergarments).

Occupational exposure limits

U.S. - OSHA Components

	Type	Value	Form
Aluminum (7429-90-5)	TWA	15 mg/m3	(Total dust)

U.S. - OSHA**Components**

Components	Type	Value	Form
Chromium (7440-47-3)	TWA	1 mg/m3	
Manganese (7439-96-5)	Ceiling	5 mg/m3	Fume
Silicon (7440-21-3)	TWA	5 mg/m3	Respirable fraction.
		15 mg/m3	(total dust)

Additional components

Additional components	Type	Value	Form
Chromium (II) compounds (CAS No. Not available)	TWA	0.5 mg/m3	
Chromium (III) compounds (CAS No. Not available)	TWA	0.5 mg/m3	(as Cr)
Chromium (VI) compounds (18540-29-9)	TWA	0.005 mg/m3	(as Cr)
		0.0025 mg/m3	Action (as Cr)
Hydrogen fluoride (7664-39-3)	TWA	3 ppm	(as F)
Iron oxide (1309-37-1)	TWA	10 mg/m3	Fume.
Manganese compounds, inorganic (CAS No. Not available)	Ceiling	5 mg/m3	(as Mn) Fume

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

Additional components	Type	Value
Chromium (VI) compounds, certain water insoluble forms (CAS No. Not available)	TWA	0.005 mg/m3
Chromium (VI) compounds (18540-29-9)	TWA	0.005 mg/m3

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

Components	Type	Value	Form
Aluminum (7429-90-5)	PEL	5 mg/m3	Respirable dust.
		15 mg/m3	Total dust.
Additional components	Type	Value	Form
Aluminum oxide (non-fibro us) (1344-28-1)	PEL	5 mg/m3	Respirable fraction.
		15 mg/m3	Total dust.
Hydrogen chloride (7647-01-0)	Ceiling	7 mg/m3	
		5 ppm	
Magnesium oxide (1309-48-4)	PEL	15 mg/m3	Total particulate.
Ozone (10028-15-6)	PEL	0.2 mg/m3	
		0.1 ppm	

Alcoa**Components**

Components	Type	Value	Form
Aluminum (7429-90-5)	TWA	3 mg/m3	Respirable fraction
		10 mg/m3	Total dust
Manganese (7439-96-5)	TWA	0.05 mg/m3	Total dust.
		0.02 mg/m3	Respirable fraction.
Additional components	Type	Value	Form
Aluminum oxide (non-fibro us) (1344-28-1)	TWA	3 mg/m3	Respirable fraction.
		10 mg/m3	Total dust.
Chromium (VI) compounds (18540-29-9)	TWA	0.25 µg/m3	
Hydrogen fluoride (7664-39-3)	STEL	1.64 mg/m3	Peak (as F) (Skin)
	TWA	0.5 mg/m3	(as F) (Skin)

Alcoa			
Additional components	Type	Value	Form
Manganese compounds, inorganic (CAS No. Not available)	TWA	0.05 mg/m3	total dust, as Mn
		0.02 mg/m3	respirable fraction, as Mn
ACGIH			
Additional components	Type	Value	Form
Aluminum oxide (non-fibrous) (1344-28-1)	TWA	1 mg/m3	Respirable fraction, as Al
Chromium (VI) compounds, certain water insoluble forms (CAS No. Not available)	TWA	0.01 mg/m3	as Cr
Chromium (VI) compounds, water soluble forms (CAS No. Not available)	TWA	0.05 mg/m3	as Cr
Hydrogen fluoride (7664-39-3)	Ceiling	2 ppm	(as F) (Skin)
	TWA	2.5 mg/m3	(as F) (Skin)
		0.5 ppm	(as F) (Skin)
Ozone (10028-15-6)	TWA	0.2 ppm	(Heavy, moderate or light workloads (≤2 hours))
		0.1 ppm	(light work)
		0.08 ppm	(moderate work)
		0.05 ppm	(heavy work)
US. ACGIH Threshold Limit Values			
Components	Type	Value	Form
Aluminum (7429-90-5)	TWA	1 mg/m3	Respirable fraction.
Chromium (7440-47-3)	TWA	0.5 mg/m3	
Manganese (7439-96-5)	TWA	0.2 mg/m3	
Additional components	Type	Value	Form
Chromium (III) compounds (CAS No. Not available)	TWA	0.5 mg/m3	
Hydrogen chloride (7647-01-0)	Ceiling	2 ppm	
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 (CAS No. Not available)	TWA	0.2 mg/m3	
Ozone (10028-15-6)	TWA	0.05 ppm	
US. ACGIH. BEIs. Biological Exposure Indices			
Additional components	Type	Value	
Hydrogen fluoride (7664-39-3)	BEI	3 mg/g	
		10 mg/g	

9. Physical & Chemical Properties

Appearance	Solid.
Form	Bare or coated coil/sheet.
Color	Various colors.
Odor	Odorless
Odor threshold	Not Applicable
pH	Not applicable
Vapor pressure	Not applicable
Vapor density	Not applicable
Boiling point	Not Applicable

Melting point/Freezing point	900 - 1200 °F (482.2 - 648.9 °C)
Solubility (water)	Insoluble
Density	2.63 - 3.12 g/cm ³
Relative density	Not available.
Flash point	Not applicable
Flammability limits in air, upper, % by volume	Not applicable
Flammability limits in air, lower, % by volume	Not applicable
Auto-ignition temperature	Not Applicable
VOC	Not applicable
Percent volatile	Not applicable
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>Explosions can occur with coils of foil that have been submerged or partially submerged in water for an extended period of time. Water can penetrate between the layers of foil, react with the aluminum surface and generate heat and hydrogen gas. When the coils are removed from the cooling effects of the water, rapid temperature increases can occur causing steam explosions which result in the rupture of the coils and discharge of debris.</p> <p>Coils of foil may be a potential hazard under the following conditions:</p> <ul style="list-style-type: none"> • Coil has been annealed (annealing removes residual oil that could prevent penetration of water) • Foil is very thin gauge (5-9 µm thickness which increases surface area) • Coil has been immersed for an extended period of time (several hours or more) • Wetted coil has recently been removed from the cooling effects of the water <p>In such situations, the coils should be isolated (30 meters from any personnel) for at least 72 hours as soon as possible after removal from the water. Coils making crackling sounds or emitting steam should not be approached or transported in commerce. Wetted coils should not be charged into a furnace for remelting until completely dry.</p> <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.
Incompatible materials	<p>Chips, fines, dust and molten metal are considerably more reactive with the following:</p> <ul style="list-style-type: none"> • 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 decomposition products	Combustion of the coatings can generate Carbon monoxide, Carbon dioxide, Hydrogen chloride, Chlorinated hydrocarbons, Hydrogen fluoride and partially oxidized hydrocarbons.
Possibility of hazardous reactions	<p>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. Thermite reactions can occur with oxides of lead, copper, iron, bismuth and certain other metals.</p>

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 (milling, cutting, grinding).

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

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

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

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.

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.

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

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).

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.

Combustion of the coatings can generate Hydrogen chloride or Hydrogen fluoride. Hydrogen chloride gas: Can cause severe irritation and corrosive burns of eyes, skin and upper respiratory tract. Acute overexposures: Can cause the accumulation of fluid in the lungs (pulmonary edema).

Hydrogen fluoride: Can cause severe irritation of the eyes, mucous membranes, skin and respiratory tract. Acute overexposures: Can cause cough, shock, the accumulation of fluid in the lungs (pulmonary edema) and death. Effects can be delayed up to 24 hours.

Additional components

Test Results

Iron oxide (1309-37-1)

Acute Oral LD50 Rat: > 10000 mg/kg

Aluminum oxide (non-fibrous) (1344-28-1)

Acute Oral LD50 Rat: > 5000 mg/kg

Hydrogen chloride (7647-01-0)

Acute Dermal LD50 Mouse: 1449 mg/kg

Acute Inhalation LC50 Mouse: 1108 mg/l 1 Hours

Acute Inhalation LC50 Rat: 3124 mg/l 1 Hours

Acute Oral LD50 Rabbit: 900 mg/kg

Acute Other LD50 Mouse: 1449 mg/kg

Additional components

Hydrogen fluoride (7664-39-3)

Test Results

Acute Inhalation LC50 Rat: 4970 mg/l 5 Minutes
 Acute Inhalation LC50 Rat: 2689 mg/l 15 Minutes
 Acute Inhalation LC50 Rat: 2042 mg/l 30 Minutes
 Acute Inhalation LC50 Rat: 1278 mg/l 1 Hours

Routes of exposure

Eye contact. Skin contact. Inhalation.

Acute effects

Not classified.

Chronic effects

Dust or fume from processing:

Health effects from mechanical processing (e.g., cutting, grinding): Chronic overexposures: Can cause scarring of the lungs (pulmonary fibrosis), central nervous system damage, secondary Parkinson's disease, and reproductive harm in males.

Health effects from elevated temperature processing (e.g., welding, melting): Chronic overexposures: Can cause asthma, benign lung disease (siderosis) and lung cancer.

Skin corrosion/irritation

Non-corrosive.

Serious eye damage/eye irritation

Dust and fume from processing: Causes eye irritation.

Respiratory system.

Not classified.

Sensitization

Not a skin sensitizer.

Carcinogenicity

Dust from processing: Not classified.

Health effects from elevated temperature processing (e.g., welding, melting): Contains a substance which may cause cancer by inhalation.

ACGIH Carcinogens

Aluminum (CAS 7429-90-5)

A4 Not classifiable as a human carcinogen.

Aluminum oxide (non-fibrous) (CAS 1344-28-1)

A4 Not classifiable as a human carcinogen.

Chromium (CAS 7440-47-3)

A4 Not classifiable as a human carcinogen.

Chromium (III) compounds (CAS CAS No. Not availabl)

A4 Not classifiable as a human carcinogen.

Chromium (VI) compounds, certain water insoluble forms (CAS CAS No. Not availabl)

A1 Confirmed human carcinogen.

Chromium (VI) compounds, water soluble forms (CAS CAS No. Not availabl)

A1 Confirmed human carcinogen.

Hydrogen chloride (CAS 7647-01-0)

A4 Not classifiable as a human carcinogen.

Hydrogen fluoride (CAS 7664-39-3)

A4 Not classifiable as a human carcinogen.

Iron oxide (CAS 1309-37-1)

A4 Not classifiable as a human carcinogen.

Magnesium oxide (CAS 1309-48-4)

A4 Not classifiable as a human carcinogen.

Ozone (CAS 10028-15-6)

A4 Not classifiable as a human carcinogen.

IARC Monographs. Overall Evaluation of Carcinogenicity

Chromium (CAS 7440-47-3)

3 Not classifiable as to carcinogenicity to humans.

Chromium (III) compounds (CAS CAS No. Not availabl)

3 Not classifiable as to carcinogenicity to humans.

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

1 Carcinogenic to humans.

Chromium (VI) compounds, certain water insoluble forms (CAS CAS No. Not availabl)

1 Carcinogenic to humans.

Hydrogen chloride (CAS 7647-01-0)

3 Not classifiable as to carcinogenicity to humans.

Hydrogen fluoride (CAS 7664-39-3)

3 Not classifiable as to carcinogenicity to humans.

Iron oxide (CAS 1309-37-1)

3 Not classifiable as to carcinogenicity to humans.

Silica, amorphous (CAS 69012-64-2)

3 Not classifiable as to carcinogenicity to humans.

US NTP Report on Carcinogens: Known carcinogen

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

Known To Be Human Carcinogen.

Chromium (VI) compounds, certain water insoluble forms (CAS CAS No. Not availabl)

Known To Be Human Carcinogen.

US OSHA Specifically Regulated Substances: Cancer hazard

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

Cancer hazard.

Chromium (VI) compounds, certain water insoluble forms (CAS CAS No. Not availabl)

Cancer hazard.

Teratogenicity

Not classified.

Reproductive toxicity

Not classified.

Germ cell mutagenicity

Not classified.

Synergistic materials	No data available for this product.
Interactive effects	Asthma, chronic lung disease, skin rashes and secondary Parkinson's disease.
Neurological effects	Dust or fume from processing May cause central nervous system effects.
Specific target organ toxicity - single exposure	Not classified.
Specific target organ toxicity - repeated exposure	Dust and fumes from processing: Causes damage to the following organs through prolonged or repeated exposure: Central nervous system. Lungs.
Aspiration hazard	Not applicable.
Symptoms	Irritating to eyes and respiratory system. Respiratory disorders Shortness of breath. Neurological disorders
Further information	Symptoms may be delayed.

12. Ecological Information

Ecotoxicological data

Components	Test Results
Aluminum (7429-90-5)	LC50 Rainbow trout,donaldson trout (Oncorhynchus mykiss): 0.16 mg/l 96 hours LC50 Rainbow trout,donaldson trout (Oncorhynchus mykiss): 0.12 mg/l 96 hours LC50 Rainbow trout,donaldson trout (Oncorhynchus mykiss): 0.31 mg/l 96 hours LC50 Water flea (Daphnia magna): 3.5 mg/l 24 hours
Iron (7439-89-6)	LC50 Channel catfish (Ictalurus punctatus): > 500 mg/l 96 hours LC50 Cockle (Cerastoderma edule): 100 - 330 mg/l 48 hours LC50 Common shrimp, sand shrimp (Crangon crangon): 33 - 100 mg/l 48 hours
Manganese (7439-96-5)	EC50 Water flea (Daphnia magna): 40 mg/l 48 hours
Chromium (7440-47-3)	EC50 Water flea (Daphnia magna): 0.01 - 0.7 mg/l 48 hours LC50 Fathead minnow (Pimephales promelas): 10 - 100 mg/l 96 hours

Additional components

	Test Results
Ozone (10028-15-6)	LC50 Rainbow trout,donaldson trout (Oncorhynchus mykiss): 0.0081 - 0.0106 mg/l 96 hours
Aluminum oxide (non-fibrous) (1344-28-1)	
Hydrogen chloride (7647-01-0)	LC50 Western mosquitofish (Gambusia affinis): 282 mg/l 96 hours
Hydrogen fluoride (7664-39-3)	LC50 Brown trout (Salmo trutta): 125 mg/l 48 hours

Ecotoxicity	Not expected to be harmful to aquatic organisms.
Environmental effects	Ecological injuries are not known or expected under normal use.
Aquatic toxicity	Not expected to be harmful to aquatic organisms.
Persistence and degradability	The product contains inorganic compounds which are not biodegradable.
Bioaccumulation / Accumulation	Will not bio-accumulate.
Partition coefficient	Not applicable

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.
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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. D007: Waste Chromium
Waste from residues / unused products	Dispose of in accordance with local regulations.
Contaminated packaging	Dispose of in accordance with local regulations.

14. Transport Information

General Shipping Information

Basic shipping requirements:

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

General Shipping Notes

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

Disclaimer

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

15. Regulatory Information

Inventory status

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

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

Inventory information

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

US federal regulations

In reference to Title VI of the Clean Air Act of 1990, this material does not contain nor was it manufactured using ozone-depleting chemicals.
All electrical equipment must be suitable for use in hazardous atmospheres involving aluminum powder in accordance with 29 CFR 1910.307. The National Electrical Code, NFPA 70, contains guidelines for determining the type and design of equipment and installation which will meet this requirement.

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

Hydrogen chloride (CAS 7647-01-0)	0.0 KG_W
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DEA Essential Chemical Code Number

Hydrogen chloride (CAS 7647-01-0)	6545
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Drug Enforcement Administration (DEA). List 1 & 2 Exempt Chemical Mixtures (21 CFR 1310.12(c))

Hydrogen chloride (CAS 7647-01-0)	20 %WV
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DEA Exempt Chemical Mixtures Code Number

Hydrogen chloride (CAS 7647-01-0)	6545
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US EPCRA (SARA Title III) Section 302 - Extremely Hazardous Spill: Reportable quantity

Hydrogen chloride (CAS 7647-01-0)	5000 LBS
Hydrogen fluoride (CAS 7664-39-3)	100 LBS
Ozone (CAS 10028-15-6)	100 LBS

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

Hydrogen chloride (CAS 7647-01-0)	500 LBS
Hydrogen fluoride (CAS 7664-39-3)	100 LBS
Ozone (CAS 10028-15-6)	100 LBS

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

Aluminum (CAS 7429-90-5)	1.0 %
Aluminum oxide (non-fibrous) (CAS 1344-28-1)	1.0 %
Chromium (CAS 7440-47-3)	1.0 %
Chromium (III) compounds (CAS CAS No. Not availabl)	1.0 % N090
Chromium (VI) compounds (CAS 18540-29-9)	0.1 % N090
Chromium (VI) compounds, certain water insoluble forms (CAS CAS No. Not availabl)	0.1 % N090
Hydrogen chloride (CAS 7647-01-0)	1.0 %
Hydrogen fluoride (CAS 7664-39-3)	1.0 %
Manganese (CAS 7439-96-5)	1.0 %
Manganese compounds, inorganic (CAS CAS No. Not availabl)	1.0 % N450
Ozone (CAS 10028-15-6)	1.0 %

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

Aluminum (CAS 7429-90-5)	Listed.
Aluminum oxide (non-fibrous) (CAS 1344-28-1)	Listed.
Chromium (CAS 7440-47-3)	Listed.
Chromium (II) compounds (CAS CAS No. Not availabl)	Listed. N090
Chromium (VI) compounds, certain water insoluble forms (CAS CAS No. Not availabl)	Listed. N090
Hydrogen chloride (CAS 7647-01-0)	Listed.
Hydrogen fluoride (CAS 7664-39-3)	Listed.
Manganese (CAS 7439-96-5)	Listed.
Manganese compounds, inorganic (CAS CAS No. Not availabl)	Listed. N450
Ozone (CAS 10028-15-6)	Listed.

US TSCA Section 12(b) Export Notification: Export Notification requirement/De minimis concentration

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

State regulations

California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins.

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

Chromium (VI) compounds (CAS 18540-29-9)	Listed: February 27, 1987 Carcinogenic.
Chromium (VI) compounds, certain water insoluble forms (CAS CAS No. Not availabl)	Listed: February 27, 1987 Carcinogenic.

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

Chromium (VI) compounds (CAS 18540-29-9)	Listed: December 19, 2008 Developmental toxin.
Chromium (VI) compounds, certain water insoluble forms (CAS CAS No. Not availabl)	Listed: December 19, 2008 Developmental toxin.

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

Chromium (VI) compounds (CAS 18540-29-9)	Listed: December 19, 2008 Female reproductive toxin.
Chromium (VI) compounds, certain water insoluble forms (CAS CAS No. Not availabl)	Listed: December 19, 2008 Female reproductive toxin.

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

Chromium (VI) compounds (CAS 18540-29-9)	Listed: December 19, 2008 Male reproductive toxin.
Chromium (VI) compounds, certain water insoluble forms (CAS CAS No. Not availabl)	Listed: December 19, 2008 Male reproductive toxin.

US - New Jersey RTK - Substances: Listed substance

Aluminum (CAS 7429-90-5)	Listed.
Aluminum oxide (non-fibrous) (CAS 1344-28-1)	Listed.

Chromium (CAS 7440-47-3)	Listed.
Chromium (II) compounds (CAS CAS No. Not availabl)	Listed.
Chromium (VI) compounds, certain water insoluble forms (CAS CAS No. Not availabl)	Listed.
Hydrogen chloride (CAS 7647-01-0)	Listed.
Hydrogen fluoride (CAS 7664-39-3)	Listed.
Iron oxide (CAS 1309-37-1)	Listed.
Magnesium (CAS 7439-95-4)	Listed.
Magnesium oxide (CAS 1309-48-4)	Listed.
Manganese (CAS 7439-96-5)	Listed.
Manganese compounds, inorganic (CAS CAS No. Not availabl)	Listed.
Ozone (CAS 10028-15-6)	Listed.
Silica, amorphous (CAS 69012-64-2)	Listed.
Silicon (CAS 7440-21-3)	Listed.

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

Chromium (CAS 7440-47-3)	LISTED
Manganese (CAS 7439-96-5)	LISTED

US - Pennsylvania RTK - Hazardous Substances: Listed substance

Aluminum (CAS 7429-90-5)	Listed.
Aluminum oxide (non-fibrous) (CAS 1344-28-1)	Listed.
Chromium (CAS 7440-47-3)	Listed.
Chromium (VI) compounds, certain water insoluble forms (CAS CAS No. Not availabl)	Listed.
Hydrogen chloride (CAS 7647-01-0)	Listed.
Hydrogen fluoride (CAS 7664-39-3)	Listed.
Iron oxide (CAS 1309-37-1)	Listed.
Magnesium (CAS 7439-95-4)	Listed.
Magnesium oxide (CAS 1309-48-4)	Listed.
Manganese (CAS 7439-96-5)	Listed.
Ozone (CAS 10028-15-6)	Listed.
Silica, amorphous (CAS 69012-64-2)	Listed.
Silicon (CAS 7440-21-3)	Listed.

US - Pennsylvania RTK - Hazardous Substances: Special hazard

Chromium (CAS 7440-47-3)	Special hazard.
Chromium (VI) compounds (CAS 18540-29-9)	Special hazard.
Chromium (VI) compounds, certain water insoluble forms (CAS CAS No. Not availabl)	Special hazard.

CERCLA (Superfund) reportable quantity

Chromium: 5000

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories	Immediate Hazard - Yes, If particulates/fumes generated during processing. Delayed Hazard - Yes, If particulates/fumes generated during processing. Fire Hazard - No Pressure Hazard - No Reactivity Hazard - Yes, If molten
Section 302 extremely hazardous substance	No
Section 311 hazardous chemical	No

16. Other Information

Disclaimer	The information in the sheet was written based on the best knowledge and experience currently available.
This data sheet contains changes from the previous version in section(s):	This document has undergone significant changes and should be reviewed in its entirety.

MSDS Status

October 12, 2012: Change(s) in Section: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 and 15.

June 16, 2009: New format.

Origination date: August 19, 2005

Preparer: Jim Perriello, +1-865-977-2051

MSDS System Number: 170975

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 484, Standard for Combustible Metals (NFPA phone: 800-344-3555)
- NFPA 654, Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids
- NFPA 70, Standard for National Electrical Code (Electrical Equipment, Grounding and Bonding)
- NFPA 77, Standard for Static Electricity
- Guide to Occupational Exposure Values 2012, Compiled by the American Conference of Governmental Industrial Hygienists (ACGIH).
- NIOSH Pocket Guide to Chemical Hazards, U.S. Department of Health and Human Services, September 2005.
- expub, Expert Publishing, LLC., www.expub.com,
- Ariel, 3E Company, www.3Ecompany.com

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
EWG	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 ***

ALUMINIUM SHEET COIL AND FOIL - BARE AND COATED

EMERGENCY OVERVIEW:

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, 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 upper respiratory tract. Health effects from mechanical processing (e.g., cutting, grinding): Chronic overexposures: Can cause scarring of the lungs, central nervous system damage, secondary Parkinson's disease and reproductive harm in males.

Additional health effects from elevated temperature processing (e.g., welding, melting): Acute overexposures: Can cause metal fume fever (nausea, fever, chills, shortness of breath and malaise) and the accumulation of fluid in the lungs.

Combustion of the coatings can generate Hydrogen chloride and Hydrogen fluoride. Acute overexposures: Can cause severe irritation of the respiratory tract and the accumulation of fluid in the lungs. Effects can be delayed up to 24 hours.

FIRST AID:

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

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

If molten material gets on skin, cool rapidly with cold water. Get medical treatment for thermal burn.

INHALATION: Dust and fumes from processing: Remove to fresh air. Check for clear airway, breathing, and presence of pulse. If breathing is difficult, provide oxygen. Loosen any tight clothing on neck or chest. Provide cardiopulmonary resuscitation for persons without pulse or respirations. Consult a physician.

IN CASE OF FIRE:

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

DO NOT USE halogenated extinguishing agents on small chips/fines. DO NOT USE water in fighting fires around molten metal. These fire extinguishing agents will react with the burning material.

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.

STORAGE:

Store in a dry place. Protect from water run-on including precipitation.

IN CASE OF SPILL:

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. Protect from water run-on including precipitation.

See SDS 1352.

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