SAFETY DATA SHEET

1. Identification

Product identifier **ALUMINUM EXTRUSIONS, ANODIZED ALUMINUM PRODUCTS**

Other means of identification

SDS number 509

Version # 09

Revision date July 17, 2018.

Other means of identification

Synonyms Aluminum Alloys 6xxx Series

Recommended use Fabricated aluminum parts and products

Recommended restrictions None known.

Manufacturer/Importer/Supplier/Distributor information

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Alcoa, TN 37701
Health and Safety Email: SDSInfo@arconic.com
Health and Safety Tel: 1-865-977-2140

Emergency Information CHEMTREC: +1-703-527-3887 +1-800-424-9300 (24 Hour Emergency Telephone, multiple languages spoken); Arconic: +1-563-459-2201 (24 Hour Emergency Telephone, only English spoken)

Website For a current Safety Data Sheet, refer to Arconic websites: www.arconic.com or internally at https://arconic.sharepoint.com/sites/arconnect EHS Community.

2. Hazard(s) identification

Classification

When used as intended, this product is an article.

Physical hazards Not classified.

Health hazards Not classified.

Environmental hazards Not classified.

OSHA defined hazards Combustible dust

Label elements

Hazard symbol None.

Signal word Warning

Hazard statement The mixture does not meet the criteria for classification.
May form combustible dust concentrations in air.

Precautionary statement

Prevention Prevent dust accumulation to minimize explosion hazard.
Wear protective gloves and eye/face protection.

Response Wash hands after handling.

Storage Store in accordance with local/regional/national/international regulations. Store in a dry place.

Disposal Reuse or recycle material whenever possible. Dispose of waste and residues in accordance with local authority requirements.

Hazard(s) not otherwise classified (HNOC) None known.

Supplemental information

Chronic overexposures: Can cause scarring of the lungs, central nervous system damage, Secondary Parkinson's disease, reproductive harm in males, respiratory sensitization, asthma, the accumulation of fluid in the lungs, lung damage and lung cancer. Contact with residual oil/oil coating: Prolonged or repeated skin contact may cause irritation and allergic contact dermatitis.

• Molten metal in contact with water/moisture or certain metal oxides (e.g., rust, copper oxide). Avoid dust formation. Avoid contact with sharp edges or heated metal. Wear appropriate personal protective equipment.
CHEMTREC: +1-703-527-3887 OR +1-800-424-9300 (24 Hour Emergency Telephone, multiple languages spoken); Arconic: +1-563-459-2201 (24 Hour Emergency Telephone, only English spoken)

Specific hazards

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).
Finely divided metals (e.g., powders or wire) may have enough surface oxide to produce thermite reactions/explosions.
• 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.

Contact with residual oil/oil coating: Prolonged or repeated skin contact may cause sensitization and allergic contact dermatitis.

3. Composition/information on ingredients

Composition comments

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

Mixtures

Chemical name	Common name and synonyms	CAS number	%
Aluminum		7429-90-5	88.6 - 99
Zinc		7440-66-6	0.01 - 7
Manganese		7439-96-5	0.01 - 2
Magnesium		7439-95-4	0.01 - 2
Chromium		7440-47-3	0.01 - 0.4

Additional Information

*Designates that a specific chemical identity and/or percentage of composition has been withheld as a trade secret. Exact composition will vary. Unless additional information is available, processor should assume that all potential ingredients are present.
Additional compounds which may be formed during processing are listed in Section 8.

4. First-aid measures

Eye contact

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

Skin contact

Dust and fumes from processing: Wash with plenty of soap and water. 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. If breathing is difficult, provide oxygen. Loosen any tight clothing on neck or chest. Consult a physician.

Ingestion

Not relevant, due to the form of the product.

Most important symptoms/effects, acute and delayed

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

Contact with residual oil/oil coating: Prolonged skin contact may cause skin irritation and/or dermatitis.
See Section 11 of the SDS for additional information on health hazards.

Medical conditions aggravated by exposure

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

Indication of immediate medical attention and special treatment needed

Provide general supportive measures and treat symptomatically.

General information

Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire-fighting measures

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.
Specific hazards arising from the chemical	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.
Hazardous combustion products	Residual oil: Carbon monoxide and carbon dioxide.
Special protective equipment and precautions for firefighters	Firefighters should wear NIOSH approved, positive pressure, self-contained breathing apparatus and full protective clothing when appropriate.
Fire fighting equipment/instructions	Use Class D extinguishing agents on fines, dust or molten metal. Use gentle surface application of Class D extinguishing agent or dry inert granular material (e.g., sand) to cover and ring the burning material. Apply extinguishing media carefully to avoid creating airborne dust.
General fire hazards	This product does not present fire or explosion hazards as shipped. Small chips, fine turnings, and dust from processing may be readily ignitable.

Explosion data

Sensitivity to mechanical impact	Not sensitive.
Sensitivity to static discharge	Dust from processing Take precautionary measures against static discharges.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Avoid contact with sharp edges or heated metal. Use personal protection recommended in Section 8 of the SDS.

Personal precautions, protective equipment and emergency procedures

For emergency responders	Avoid contact with sharp edges or heated metal. Use personal protection recommended in Section 8 of the SDS.
Evacuation procedures	None necessary.
Methods and materials for containment and cleaning up	Pick up mechanically. Collect scrap for recycling. If molten: Use dry sand to contain the flow of material. All tooling (e.g., shovels or hand tools) and containers which come in contact with molten metal must be preheated or specially coated, rust free and approved for such use. Allow the spill to cool before remelting as scrap.
Environmental precautions	No special environmental precautions required.

7. Handling and storage

Handling	Avoid generating dust. Avoid contact with sharp edges or heated metal. Hot and cold aluminum are not visually different. Hot aluminum does not necessarily glow red. Use personal protection recommended in Section 8 of the SDS.
Storage	Keep material dry.

Requirements for Processes Which Generate Dusts or Fines

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

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

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

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

Avoid all ignition sources. Good housekeeping practices must be maintained. Do not use compressed air to remove settled material from floors, beams or equipment.

Requirements for Remelting of Scrap Material or Ingot

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

All tooling, 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.

8. Exposure controls/personal protection

Occupational exposure limits

U.S. - OSHA

Components	Type	Value	
Chromium (CAS 7440-47-3)	TWA	1 mg/m3	
Additional components	**Type**	**Value**	**Form**
Aluminum oxide (non-fibrous) (CAS 1344-28-1)	TWA	5 mg/m3	Respirable fraction.
		15 mg/m3	Total dust.
Manganese compounds, inorganic	Ceiling	5 mg/m3	(as Mn) Fume
Nitric oxide (CAS 10102-43-9)	TWA	30 mg/m3	
		25 ppm	
Oil mist, mineral (CAS 8012-95-1)	TWA	5 mg/m3	Mist.
Ozone (CAS 10028-15-6)	TWA	0.2 mg/m3	
		0.1 ppm	

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

Additional components	Type	Value
Chromium (VI) compounds, certain water insoluble forms	TWA	0.005 mg/m3
Chromium (VI) compounds, water soluble forms	TWA	0.005 mg/m3
Chromium (VI) compounds (CAS 18540-29-9)	TWA	0.005 mg/m3

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

Components	Type	Value	Form
Aluminum (CAS 7429-90-5)	PEL	5 mg/m3	Respirable fraction.
		15 mg/m3	Total dust.
Manganese (CAS 7439-96-5)	Ceiling	5 mg/m3	Fume.

Additional components	Type	Value	Form
Chromium (III) compounds	PEL	0.5 mg/m3	
Chromium (VI) compounds, water soluble forms	PEL	1 mg/m3	
Chromium (VI) compounds (CAS 18540-29-9)	PEL	1 mg/m3	
Magnesium oxide (CAS 1309-48-4)	PEL	15 mg/m3	Total particulate.
Nitrogen dioxide (CAS 10102-44-0)	Ceiling	9 mg/m3	
		5 ppm	
Oil mist, mineral (CAS 8012-95-1)	PEL	5 mg/m3	Mist.
Zinc oxide (CAS 1314-13-2)	PEL	5 mg/m3	Respirable fraction.
		5 mg/m3	Fume.
		15 mg/m3	Total dust.

US. OSHA Table Z-2 (29 CFR 1910.1000)

Additional components	Type	Value
Chromium (VI) compounds, water soluble forms	Ceiling	0.1 mg/m3
Chromium (VI) compounds (CAS 18540-29-9)	Ceiling	0.1 mg/m3

US. OSHA Table Z-3 (29 CFR 1910.1000)

Components	Type	Value	Form
Aluminum (CAS 7429-90-5)	TWA	5 mg/m3	Respirable fraction.
		15 mg/m3	Total dust.

Additional components	Type	Value	Form
Aluminum oxide (non-fibrous) (CAS 1344-28-1)	TWA	5 mg/m3	Respirable fraction.
		15 mg/m3	Total dust.
Magnesium oxide (CAS 1309-48-4)	TWA	5 mg/m3	Respirable fraction.
		15 mg/m3	Total dust.
		50 mppcf	Total dust.
		15 mppcf	Respirable fraction.

ACGIH

Additional components	Type	Value	Form
Aluminum oxide (non-fibrous) (CAS 1344-28-1)	TWA	1 mg/m3	Respirable fraction, as Al

ACGIH

Additional components	Type	Value	Form
Ozone (CAS 10028-15-6)	TWA	0.2 ppm	(Heavy, moderate or light workloads (≤2 hours))

US. ACGIH Threshold Limit Values

Components	Type	Value	Form
Aluminum (CAS 7429-90-5)	TWA	1 mg/m3	Respirable fraction.
Chromium (CAS 7440-47-3)	TWA	0.5 mg/m3	Inhalable fraction.
Manganese (CAS 7439-96-5)	TWA	0.1 mg/m3	Inhalable fraction.
		0.02 mg/m3	Respirable fraction.

Additional components	Type	Value	Form
Chromium (III) compounds	TWA	0.003 mg/m3	Inhalable fraction.
Chromium (VI) compounds, certain water insoluble forms	TWA	0.01 mg/m3	(as Cr)
Chromium (VI) compounds, water soluble forms	STEL	0.0005 mg/m3	Inhalable fraction.
Chromium (VI) compounds (CAS 18540-29-9)	TWA	0.01 mg/m3	(As Cr)
Magnesium oxide (CAS 1309-48-4)	TWA	10 mg/m3	Inhalable fraction.
Manganese compounds, inorganic	TWA	0.1 mg/m3	Inhalable fraction.
		0.02 mg/m3	Respirable fraction.
Nitric oxide (CAS 10102-43-9)	TWA	25 ppm	
Nitrogen dioxide (CAS 10102-44-0)	TWA	0.2 ppm	
Oil mist, mineral (CAS 8012-95-1)	TWA	5 mg/m3	Inhalable fraction.
Zinc oxide (CAS 1314-13-2)	STEL	10 mg/m3	Respirable fraction.
	TWA	2 mg/m3	Respirable fraction.

Exposure guidelines

US ACGIH Threshold Limit Values: Skin designation

Chromium (VI) compounds (CAS 18540-29-9)	Can be absorbed through the skin.
Chromium (VI) compounds, water soluble forms (CAS S~CR6~C)	Can be absorbed through the skin.

General

The need for personal protective equipment should be based upon a hazard assessment and recommendations from health / safety professionals.

If the product is coated with oil, wear oil-resistant gloves to avoid skin contact. Minimize breathing oil vapors and mist. Remove oil contaminated clothing; launder or dry-clean before reuse. Remove oil contaminated shoes and thoroughly clean and dry before reuse. Cleanse skin thoroughly after contact, before breaks and meals, and at the end of the work period. Oil coating is readily removed from skin with waterless hand cleaners followed by a thorough washing with soap and water.

Appropriate engineering controls

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

Individual protection measures, such as personal protective equipment

Eye/face protection

Wear safety glasses with side shields.

Skin protection

Hand protection

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

Other

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).

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. Suitable respiratory protective device recommended: P95.
Thermal hazards	Contact with molten material can cause thermal burns. Wear appropriate thermal protective clothing, when necessary. Flame retardant protective clothing is recommended. When material is heated, wear gloves to protect against thermal burns.
General hygiene considerations	Handle in accordance with good industrial hygiene and safety practice.
Control parameters	Follow standard monitoring procedures.
Environmental exposure controls	No special environmental precautions required.

9. Physical and chemical properties

Form	Massive, solid metal.
Color	Silver colored.
Odor	Odorless
Odor threshold	Not applicable
pH	Not applicable
Density	2.69 - 2.70 g/cm3 (0.097 - 0.098 lb/in3)
Melting point/freezing point	1025 - 1210 °F (551.67 - 654.44 °C)
Initial boiling point and boiling range	Not determined
Flash point	Not applicable
Evaporation rate	Not applicable
Flammability (solid, gas)	Not applicable.
Upper/lower flammability or explosive limits	
Flammability limit - upper (%)	Not applicable
Flammability limit - lower (%)	Not applicable
Explosive properties	Dust clouds may be explosive under certain conditions.
Dust explosion properties	
St class	Very strong explosion.
Vapor pressure	Not applicable
Vapor density	Not applicable
Relative density	Not available.
Solubility(ies)	Insoluble
Partition coefficient (n-octanol/water)	Not applicable.
Auto-ignition temperature	Not applicable
Decomposition temperature	Not applicable
Viscosity	Not applicable

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Stable under normal conditions of use, storage, and transportation as shipped.
Possibility of hazardous reactions	Hazardous polymerization does not occur.
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.

Incompatible materials	Chips, fines, dust and molten metal are considerably more reactive with the following: • 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 powder and water: Explosive reaction forming hydrogen gas when heated above 1470°F (800°C). • 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. 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.
Hazardous decomposition products	No hazardous decomposition products are known.

11. Toxicological information

Health effects associated with ingredients

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

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.

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

Health effects associated with compounds formed during processing

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

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

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

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

Manganese compounds: 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.

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).

If the product is heated well above ambient temperatures or machined, oil vapor or mist may be generated.
Oil vapor or mist: Can cause irritation of respiratory tract. Acute overexposures: Can cause bronchitis, headache, central nervous system effects (nausea, dizziness and loss of coordination) and drowsiness (narcosis).

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

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

Plasma arc cutting of aluminum can generate oxides of nitrogen.
Oxides of nitrogen (NO and NO2): Can cause irritation of eyes, skin and respiratory tract. Acute overexposures: Can cause reduced ability of the blood to carry oxygen (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).

Information on likely routes of exposure

Eye contact	Dust and fumes from processing: Can cause irritation.
Skin contact	Dust and fumes from processing: Can cause irritation.
Inhalation	Acute overexposure: Can cause metal fume fever (nausea, fever, chills, shortness of breath and malaise), reduced ability of the blood to carry oxygen (methemoglobin) and the accumulation of fluid in the lungs (pulmonary edema). Health effects from mechanical processing (e.g., cutting, grinding): Dust: Can cause irritation of the upper respiratory tract. Additional health effects from elevated temperature processing (e.g., welding, melting): Fumes: Can cause irritation of the respiratory tract. Chronic overexposures: Can cause respiratory sensitization, scarring of the lungs (pulmonary fibrosis), secondary Parkinson's disease, reproductive harm in males and lung cancer.
Ingestion	Not relevant, due to the form of the product.
Symptoms related to the physical, chemical and toxicological characteristics	Health effects from mechanical processing (e.g., cutting, grinding): Dust and fumes from processing: Can cause irritation of the eyes, skin and respiratory tract. Additional health effects from elevated temperature processing (e.g., welding, melting): Acute overexposure: Can cause metal fume fever (nausea, fever, chills, shortness of breath and malaise), reduced ability of the blood to carry oxygen (methemoglobin), and the accumulation of fluid in the lungs (pulmonary fibrosis). Chronic overexposures: Can cause scarring of the lungs (pulmonary fibrosis), respiratory sensitization, secondary Parkinson's disease, reproductive harm in males and lung cancer. Contact with residual oil/oil coating: Prolonged skin contact may cause skin irritation and/or dermatitis.

Information on toxicological effects

Components	Species	Test Results
Aluminum (CAS 7429-90-5)		
Acute		
Oral		
LD50	Rat	> 10000 mg/kg
		> 2000 mg/kg

Acute toxicity Product as shipped: Not classified. Based on available data, the classification criteria are not met.

Skin corrosion/irritation Not classified. Non-corrosive. Based on available data, the classification criteria are not met.

Serious eye damage/eye irritation Based on available data, the classification criteria are not met.

Respiratory or skin sensitization Product as shipped: Not classified. Based on available data, the classification criteria are not met.

ACGIH sensitization

HEXAVALENT CHROMIUM WATER SOLUBLE INORGANIC COMPOUNDS, INCLUDING CHROMITE ORE PROCESSING, AS CR (VI), INHALABLE FRACTION (CAS 18540-29-9)	Dermal sensitization
	Respiratory sensitization
HEXAVALENT CHROMIUM WATER SOLUBLE INORGANIC COMPOUNDS, INCLUDING CHROMITE ORE PROCESSING, AS CR (VI), INHALABLE FRACTION (CAS S~CR6~C)	Dermal sensitization
	Respiratory sensitization

Respiratory sensitization Based on available data, the classification criteria are not met.

Skin sensitization Product as shipped: Not classified. Based on available data, the classification criteria are not met.

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

Germ cell mutagenicity Based on available data, the classification criteria are not met.

Pre-existing conditions aggravated by exposure Dust and fume from processing: Asthma, chronic lung disease, Secondary Parkinson's disease and skin rashes.

Carcinogenicity Product as shipped: Not classified. Based on available data, the classification criteria are not met.

Health effects from elevated temperature processing (e.g., welding, melting): Can present a cancer hazard (hexavalent chromium compounds).

IARC Monographs. Overall Evaluation of Carcinogenicity

Chromium (CAS 7440-47-3)	3 Not classifiable as to carcinogenicity to humans.
Chromium (III) compounds (CAS S~CR3~I)	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 S~CR6~L)	1 Carcinogenic to humans.
Chromium (VI) compounds, water soluble forms (CAS S~CR6~C)	1 Carcinogenic to humans.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1052)

Chromium (VI) compounds (CAS 18540-29-9)	Cancer
Chromium (VI) compounds, certain water insoluble forms (CAS S~CR6~L)	Cancer
Chromium (VI) compounds, water soluble forms (CAS S~CR6~C)	Cancer

US. National Toxicology Program (NTP) Report on Carcinogens

Chromium (VI) compounds (CAS 18540-29-9)	Known To Be Human Carcinogen.
Chromium (VI) compounds, certain water insoluble forms (CAS S~CR6~L)	Known To Be Human Carcinogen.
Chromium (VI) compounds, water soluble forms (CAS S~CR6~C)	Known To Be Human Carcinogen.
Oil mist, mineral (CAS 8012-95-1)	Known To Be Human Carcinogen.

Reproductive toxicity Based on available data, the classification criteria are not met.

Routes of exposure Dust and fume from processing: Inhalation. Skin contact. Eye contact.

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

Specific target organ toxicity - repeated exposure Product as shipped: Not classified. Based on available data, the classification criteria are not met.

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

12. Ecological information

Ecotoxicity No data available for this product.

Components		Species	Test Results
Chromium (CAS 7440-47-3)			
Aquatic			
Crustacea	EC50	Water flea (Daphnia magna)	0.01 - 0.7 mg/l, 48 hours
Fish	LC50	Carp (Cyprinus carpio)	14.3 mg/l, 96 hours
Manganese (CAS 7439-96-5)			
Aquatic			
Crustacea	EC50	Water flea (Daphnia magna)	40 mg/l, 48 hours
Zinc (CAS 7440-66-6)			
Aquatic			
Crustacea	EC50	Water flea (Daphnia magna)	2.8 mg/l, 48 hours
Fish	LC50	Rainbow trout,donaldson trout (Oncorhynchus mykiss)	0.56 mg/l, 96 hours

Persistence and degradability The product contains inorganic compounds which are not biodegradable.

Bioaccumulative potential The product is not bioaccumulating.

Mobility in soil Not considered mobile.

Mobility in general Not considered mobile.

Other adverse effects None known.

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 chromium in a waste disposal scenario.

Waste from residues / unused products If reuse or recycling is not possible, disposal must be made according to local or governmental regulations.

Contaminated packaging Dispose of in accordance with local regulations.

14. Transport information

General Shipping Information

Basic Shipping Information

ID number -

Proper shipping name Not regulated

Hazard class -

Packing group -

General Shipping Notes

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

Disclaimer

This section of the SDS provides basic classification information for transport, and where relevant, it also provides information with respect to specific modal regulations, environmental hazards (e.g., marine pollutant), and special precautions to the user. Otherwise it is to be presumed that the information is not available or not relevant.

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.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

CERCLA Hazardous Substance List (40 CFR 302.4)

Chromium (CAS 7440-47-3)	Listed.
Manganese (CAS 7439-96-5)	Listed.
Zinc (CAS 7440-66-6)	Listed.

SARA 304 Emergency release notification

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1052)

Chromium (VI) compounds (CAS 18540-29-9)	Cancer
Chromium (VI) compounds, certain water insoluble forms (CAS S~CR6~L)	Cancer
Chromium (VI) compounds, water soluble forms (CAS S~CR6~C)	Cancer
Chromium (VI) compounds (CAS 18540-29-9)	Eye irritation
Chromium (VI) compounds, certain water insoluble forms (CAS S~CR6~L)	Eye irritation
Chromium (VI) compounds, water soluble forms (CAS S~CR6~C)	Eye irritation
Chromium (VI) compounds (CAS 18540-29-9)	Skin sensitization
Chromium (VI) compounds, certain water insoluble forms (CAS S~CR6~L)	Skin sensitization
Chromium (VI) compounds, water soluble forms (CAS S~CR6~C)	Skin sensitization

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Section 311/312 hazard categories

Immediate Hazard - No
Delayed Hazard - No
Fire Hazard - No
Pressure Hazard - No
Reactivity Hazard - Yes — If molten

SARA 302 Extremely hazardous substance

Chemical name	CAS number	Reportable quantity (pounds)	Threshold planning quantity (pounds)	Threshold planning quantity, lower value (pounds)	Threshold planning quantity, upper value (pounds)
Ozone	10028-15-6	100	100		
Nitrogen dioxide	10102-44-0	10	100		
Nitric oxide	10102-43-9	10	100		

SARA 311/312 Hazardous chemical Yes

SARA 313 (TRI reporting)

Chemical name	CAS number	% by wt.
Aluminum	7429-90-5	88.6 - 99
Manganese	7439-96-5	0.01 - 2
Zinc	7440-66-6	0.01 - 7

US state regulations

California Proposition 65

WARNING: California Safe Drinking Water and Toxic Enforcement Act of 2016 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins. For more information go to www.P65Warnings.ca.gov.

US. California. Candidate Chemicals List. Safer Consumer Products Regulations (Cal. Code Regs, tit. 22, 69502.3, subd. (a))

Aluminum (CAS 7429-90-5)
Chromium (CAS 7440-47-3)
Manganese (CAS 7439-96-5)
Zinc (CAS 7440-66-6)

US state regulations California Safe Drinking Water and Toxic Enforcement Act of 2016 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins.

International Inventories

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

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

Disclaimer The user of this SDS should verify the substance specific concentration information as it relates to regulatory reporting. Listed concentrations may cover a range of formulations and process batch variations.

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

SDS Status
July 17, 2018: Change(s) in Section: 1, 2, 3, 5, 6, 15 and 16.
July 19, 2017: Change(s) in Section: 15 and 16.
June 29, 2017: Change(s) in Section: 1, 2, 3, 5, 8, 11, 12, 15 and 16.
May 27, 2015: New format.
February 24, 2012: New format.
January 6, 2009: New format.
October 12, 2005: Reviewed on a periodic basis in accordance with Alcoa policy. Change(s) in Section: 1, 3, 4, 5, 7, 8, 11 and 15.
July 25, 2002: New format.

Origination date: July 10, 1989

Hazardous Materials Control Committee
+1-865-977-2140

Revision date July 17, 2018.

Version # 09

Revision information
Identification: Recommended restrictions
Composition / Information on Ingredients: Ingredients
Physical & Chemical Properties: Multiple Properties
HazReg Data: North America

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

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

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 Cardio-
CPR	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 Environmental
EPA	Protective Agency International Agency for
IARC	Research on Cancer Lethal Concentration
LC LD	Lethal Dose
MAK	Maximum Workplace Concentration (Germany) "maximale Arbeitsplatz-Konzentration"
NDSL	Non-Domestic Substances List (Canada)
NIOSH	National Institute for Occupational Safety and Health
NTP	National Toxicology Program
OEL	Occupational Exposure Limit
OSHA	Occupational Safety and Health Administration
PIN	Product Identification Number
PMCC	Pensky Marten Closed Cup
RCRA	Resource Conservation and Recovery Act
SARA	Superfund Amendments and Reauthorization Act
SIMDUT	Système d'Information sur les Matières Dangereuses Utilisées au Travail
STEL	Short Term Exposure Limit
TCLP	Toxic Chemicals Leachate Program
TDG	Transportation of Dangerous Goods
TLV	Threshold Limit Value
TSCA	Toxic Substances Control Act
TWA	Time Weighted Average
WHMIS	Workplace Hazardous Materials Information System

m meter, cm centimeter, mm millimeter, in inch,
g gram, kg kilogram, lb pound, µg microgram,
ppm parts per million, ft feet

*** End of SDS ***

Warning

Hazard statement

May form combustible dust concentrations in air.

Precautionary statement

Prevention

Prevent dust accumulation to minimize explosion hazard. Wear protective gloves and eye/face protection.

Response

Wash hands after handling.

Storage

Store in accordance with local/regional/national/international regulations. Store in a dry place.

Disposal

Reuse or recycle material whenever possible. Dispose of waste and residues in accordance with local authority requirements.

Supplemental information

Dust and fume from processing: Can cause irritation of the eyes, skin and respiratory tract. Additional health effects from elevated temperature processing (e.g., welding, melting): Acute overexposure: Can cause metal fume fever, reduced ability of the blood to carry oxygen and the accumulation of fluid in the lungs. Chronic overexposures: Can cause scarring of the lungs, central nervous system damage, Secondary Parkinson's disease, reproductive harm in males, respiratory sensitization, asthma, the accumulation of fluid in the lungs, lung damage and lung cancer.

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

Non-combustible as supplied. May form explosible dust-air mixture if dispersed. 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).

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

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

IN CASE OF SPILL: Avoid dust formation. Avoid contact with sharp edges or heated metal. Wear appropriate personal protective equipment. Pick up mechanically. Collect scrap for recycling. If molten: Use dry sand to contain the flow of material. All tooling (e.g., shovels or hand tools) and containers which come in contact with molten metal must be preheated or specially coated, rust free and approved for such use. Allow the spill to cool before remelting as scrap.

See Arconic SDS Number 509.

CHEMTREC: +1-703-527-3887 OR +1-800-424-9300 (24 Hour Emergency Telephone, multiple languages spoken); Arconic: +1-563-459-2201 (24 Hour Emergency Telephone, only English spoken)

California Proposition 65

WARNING: California Safe Drinking Water and Toxic Enforcement Act of 2016 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins. For more information go to www.P65Warnings.ca.gov.