



SAFETY DATA SHEET

1. Identification

Product identifier	ALUMINUM ANALYTICAL REFERENCE MATERIALS
Other means of identification	
SDS number	1487
Version #	01
Revision date	February 6, 2014.
Other means of identification	
Synonyms	Standards for Wrought Alloys (High Purity Aluminum, 11xx Alloys, 2xxx Alloys, 3xxx Alloys, 4xxx Alloys, 5xxx Alloys, 6000 Alloys Range Standards, 6xxx Alloys, 7xxx Alloys, 8xxx Alloys) * Standards for Casting Alloys (2xx Alloys, 3xx Alloys, 4xx Alloys, 5xx Alloys, 7xx Alloys, 8xx Alloys) * Standards for Trace Metals (ST Series) * Standards for Calibration and Normalization (SQ-10 through SQ-19) * Standards for Individual Elements (Si Series, Fe Series, Cu Series, Mn Series, Ni Series, Zn Series, Ti Series, Bn Series, Be Series, Ca Series, Cd Series, Co Series, Ga Series, Li Series, Na Series, P Series, Sb Series, Zr Series) * A copy of the Alcoa Spectrochemical Standards product catalog may be obtained at: http://www.alcoa.com/scs .
Recommended use	Analytical test medium
Recommended restrictions	None known.
Manufacturer/Importer/Supplier/Distributor information	
Manufacturer	Arconic Inc. 201 Isabella Street Pittsburgh, PA 15212-5858 USA Health and Safety Tel: 1-412-553-4649 Health and Safety Fax: 1-412-553-4822 Health and Safety Email: SDSInfo@arconic.com
Emergency Information	CHEMTREC: +1-703-527-3887 +1-800-424-9300 (24 Hour Emergency Telephone, multiple languages spoken); Arconic: +1-412-553-4001 (24 Hour Emergency Telephone, only English spoken)
Website	For a current Safety Data Sheet, refer to Arconic websites: www.arconic.com or internally at my.arconic.com EHS Community

2. Hazard(s) identification

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.
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Physical hazards	Not classified.	
Health hazards	Sensitization, respiratory	Category 1
	Sensitization, skin	Category 1
	Carcinogenicity	Category 1A
	Reproductive toxicity (fertility, the unborn child)	Category 1A
	Specific target organ toxicity, repeated exposure	Category 1
Environmental hazards	Not classified.	
OSHA defined hazards	Combustible dust	

Hazard classifications may not be based upon the aluminum, but may be associated with the alloying materials in accordance with the criteria listed US OSHA 2012 Hazard Communication Standard (29 CFR 1910.1200).

Label elements

**Signal word**

Danger

Hazard statement

May cause allergy or asthma symptoms or breathing difficulties if inhaled. May cause an allergic skin reaction. May cause cancer. May damage the unborn child. May damage fertility. Causes damage to organs through prolonged or repeated exposure. May form combustible dust concentrations in air.

Precautionary statement**Prevention**

Do not breathe dust/fume. In case of inadequate ventilation wear respiratory protection. Contaminated work clothing must not be allowed out of the workplace. Wear protective gloves/protective clothing/eye protection/face protection. Obtain special instructions before use. Wash thoroughly after handling.

Response

IF INHALED: If breathing is difficult, remove person to fresh air and keep comfortable for breathing. If experiencing respiratory symptoms: Call a poison center/doctor. IF ON SKIN: Wash with plenty of soap and water. If skin irritation or rash occurs: Get medical advice/attention. Wash contaminated clothing before reuse. If exposed or concerned: Get medical advice/attention.

Storage

Keep dry.

Disposal

Dispose of contents/container in accordance with local/regional/national/international regulations.

Hazard(s) not otherwise classified (HNOC)

None known.

Supplemental information

None.

Specific hazards

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 or fume from processing Can cause irritation of the eyes, skin and upper respiratory tract and metal fume fever.

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	>75
Silicon		7440-21-3	≤17
Iron		7439-89-6	≤11
Zinc		7440-66-6	≤11
Copper		7440-50-8	≤10
Magnesium		7439-95-4	≤8.0
Tin		7440-31-5	≤7.0
Nickel		7440-02-0	≤3.0
Manganese		7439-96-5	≤3.0
Silver		7440-22-4	≤1.0
Lead		7439-92-1	≤1.0
Chromium		7440-47-3	≤0.50
Titanium		7440-32-6	≤0.50
Zirconium		7440-67-7	≤0.35

Chemical name	Common name and synonyms	CAS number	%
Beryllium		7440-41-7	≤0.31
Vanadium		7440-62-2	≤0.30
Cobalt		7440-48-4	≤0.25
Antimony		7440-36-0	≤0.20
Arsenic		7440-38-2	≤0.04
Cadmium		7440-43-9	≤0.03

Additional Information 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 fume from processing or contact with lubricant/residual oil: Wash with soap and water for at least 15 minutes. If skin irritation or rash occurs: Get medical advice/attention.
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.
Ingestion	Not likely, due to the form of the product.
Most important symptoms/effects, acute and delayed	Health effects from mechanical processing (e.g., cutting, grinding): Dust: Can cause irritation of the upper respiratory tract. Chronic overexposures: Can cause reduction in the number of red blood cells (anemia), skin abnormalities (pigmentation changes), respiratory sensitization, scarring of the lungs (pulmonary fibrosis), central nervous system damage, secondary Parkinson's disease and reproductive harm. Contains (Beryllium). May produce an allergic reaction. Contains (Cobalt, Nickel). May produce an allergic reaction.

Additional health effects from elevated temperature processing (e.g., welding, melting): Dust and fumes from processing: Can cause irritation of the respiratory tract. Acute overexposures: Can cause metal fume fever (nausea, fever, shortness of breath and malaise), the accumulation of fluid in the lungs (pulmonary edema) and reduced ability of the blood to carry oxygen (anemia). Can cause benign lung disease (siderosis), respiratory sensitization, and lung cancer.

Medical conditions aggravated by exposure Asthma, chronic lung disease, Secondary Parkinson's disease and skin rashes.

Indication of immediate medical attention and special treatment needed In case of shortness of breath, give oxygen. Symptoms may be delayed.

General information IF exposed or concerned: Get medical advice/attention.

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. Apply extinguishing media carefully to avoid creating airborne dust.
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: <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. Thermite reactions can also occur with oxides of lead, copper, iron, bismuth and certain other metals.
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 gentle surface application of Class D extinguishing agent or dry inert granular material (e.g., sand) to cover and ring the burning material. If impossible to extinguish, protect surroundings and allow fire to burn itself out. Apply extinguishing media carefully to avoid creating airborne dust.
General fire hazards	Non-combustible as supplied. Small chips, fine turnings, and dust from processing may be readily ignitable.
Explosion data	
Sensitivity to mechanical impact	Not applicable.
Sensitivity to static discharge	Take precautionary measures against static discharges when there is a risk of dust explosion.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Avoid generating dust. Avoid contact with skin and eyes. Avoid contact with sharp edges or heated metal. Molten, heated and cold aluminum look alike; do not touch unless you know it is cold. For personal protection, see section 8 of the SDS.
Personal precautions, protective equipment and emergency procedures	
For emergency responders	Avoid generating dust. Avoid contact with skin and eyes. Avoid contact with sharp edges or heated metal. Molten, heated and cold aluminum look alike; do not touch unless you know it is cold. Use personal protection recommended in Section 8 of the SDS.
Evacuation procedures	None necessary.
Methods and materials for containment and cleaning up	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	Reuse or recycle material whenever possible.

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. Handling and processing operations should be conducted in accordance with 'best practices' (e.g. NFPA-654). When using, do not eat, drink or smoke. Wash hands thoroughly after handling. Use personal protection recommended in Section 8 of the SDS.
Storage	Keep material dry.
Requirements for Processes Which Generate Dusts or Fines	<p>If processing of this product generates dust or if extremely fine particulate is generated, obtain and follow the safety procedures and equipment guides contained in Aluminum Association Bulletin F-1 and National Fire Protection Association (NFPA) brochures listed in Section 16.</p> <p>Use non-sparking handling equipment, tools and natural bristle brush. Cover and reseal partially empty containers. Provide grounding and bonding where necessary to prevent accumulation of static charges during metal dust handling and transfer operations (See Section 15).</p> <p>Local ventilation and vacuum systems must be designed to handle explosive dusts. Dry vacuums and electrostatic precipitators must not be used, unless specifically approved for use with flammable/explosive dusts. Dust collection systems must be dedicated to aluminum dust only and should be clearly labeled as such. Do not co-mingle fines of aluminum with fines of iron, iron oxide (rust) or other metal oxides.</p> <p>Do not allow chips, fines or dust to contact water, particularly in enclosed areas.</p> <p>Avoid all ignition sources. Dust accumulation on the floor, ledges and beams can present a risk of ignition, flame propagation and secondary explosions. Good housekeeping practices must be maintained. Do not use compressed air to remove settled material from floors, beams or equipment.</p>

Requirements for Remelting of Scrap Material or Ingot

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

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

During melting operations, the following minimum guidelines should be observed:

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

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

Dross Handling

Beryllium may concentrate in the dross formed when aluminum scrap is remelted. Therefore, the potential for exposures to beryllium when handling dross must be considered. Control of airborne dust levels would be critical in reducing or eliminating this potential. For more information on the hazards associated with handling dross that contains beryllium, refer to Arconic SDS No. 1013, Aluminum Dross with Low Beryllium. Copies of this SDS are available on www.arconic.com or by calling +1-412-553-4649.

8. Exposure controls/personal protection

Occupational exposure limits

U.S. - OSHA Components

Components	Type	Value	Form
Aluminum (CAS 7429-90-5)	TWA	5 mg/m3 15 mg/m3	Respirable fraction Total dust
Chromium (CAS 7440-47-3)	TWA	1 mg/m3	
Cobalt (CAS 7440-48-4)	TWA	0.1 mg/m3	Dust and fume.
Copper (CAS 7440-50-8)	TWA	1 mg/m3 0.1 mg/m3	Dust and mist. Fume.
Lead (CAS 7439-92-1)	TWA	0.03 mg/m3	Action Level as Pb.
Nickel (CAS 7440-02-0)	TWA	1 mg/m3	
Silicon (CAS 7440-21-3)	TWA	5 mg/m3 15 mg/m3	Respirable fraction. Total dust
Silver (CAS 7440-22-4)	TWA	0.01 mg/m3	

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

Components	Type	Value	Form
Arsenic (CAS 7440-38-2)	TWA	0.01 mg/m3	
Cadmium (CAS 7440-43-9)	TWA	0.005 mg/m3	
Lead (CAS 7439-92-1)	TWA	0.05 mg/m3 0.05 mg/m3	(as Pb)

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

Components	Type	Value	Form
Antimony (CAS 7440-36-0)	PEL	0.5 mg/m3	
Manganese (CAS 7439-96-5)	Ceiling	5 mg/m3	Fume.
Tin (CAS 7440-31-5)	PEL	2 mg/m3	

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

Components	Type	Value	Form
Beryllium (CAS 7440-41-7)	Ceiling	0.005 mg/m3	

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

Components	Type	Value	Form
Cadmium (CAS 7440-43-9)	TWA	0.002 mg/m3	
	Ceiling	0.6 mg/m3	Dust.
		0.3 mg/m3	Fume.
	TWA	0.2 mg/m3	Dust.
		0.1 mg/m3	Fume.

ACGIH

Components	Type	Value	Form
Cadmium (CAS 7440-43-9)	TWA	0.01 mg/m3	
Copper (CAS 7440-50-8)	TWA	1 mg/m3	(Dust and Mist)
		0.2 mg/m3	Fume

US ACGIH Threshold Limit Values: Short Term Exposure Limit (STEL): mg/m3

Components	Type	Value
Zirconium (CAS 7440-67-7)	STEL	10 mg/m3

US ACGIH Threshold Limit Values: Time Weighted Average (TWA): mg/m3, non-standard units

Components	Type	Value	Form
Aluminum (CAS 7429-90-5)	TWA	1 mg/m3	Respirable fraction.
Antimony (CAS 7440-36-0)	TWA	0.5 mg/m3	
Arsenic (CAS 7440-38-2)	TWA	0.01 mg/m3	
Beryllium (CAS 7440-41-7)	TWA	0.00005 mg/m3	Inhalable fraction.
Cadmium (CAS 7440-43-9)	TWA	0.01 mg/m3	
		0.002 mg/m3	Respirable fraction.
		0.5 mg/m3	
Chromium (CAS 7440-47-3)	TWA	0.5 mg/m3	
Cobalt (CAS 7440-48-4)	TWA	0.02 mg/m3	
Copper (CAS 7440-50-8)	TWA	1 mg/m3	Dust and mist.
		0.2 mg/m3	Fume.
Lead (CAS 7439-92-1)	TWA	0.05 mg/m3	
Manganese (CAS 7439-96-5)	TWA	0.1 mg/m3	Inhalable fraction.
		0.02 mg/m3	Respirable fraction.
Nickel (CAS 7440-02-0)	TWA	1.5 mg/m3	Inhalable fraction.
Silver (CAS 7440-22-4)	TWA	0.1 mg/m3	Dust and fume.
Tin (CAS 7440-31-5)	TWA	2 mg/m3	
Zirconium (CAS 7440-67-7)	TWA	5 mg/m3	

Arconic

Components	Type	Value	Form
Aluminum (CAS 7429-90-5)	TWA	3 mg/m3	Respirable fraction
		10 mg/m3	Total dust
Beryllium (CAS 7440-41-7)	STEL	1 µg/m3	Peak/ Inhalable
	TWA	0.2 µg/m3	Inhalable
Cobalt (CAS 7440-48-4)	TWA	0.02 mg/m3	Inhalable fraction
Manganese (CAS 7439-96-5)	TWA	0.05 mg/m3	Total dust.
Nickel (CAS 7440-02-0)	TWA	0.02 mg/m3	Respirable fraction.
		1 mg/m3	

General

Sampling to establish lead level exposure is advised where exposure to airborne particulate or fumes is possible. Consult OSHA Lead Standard 29 CFR 1910.1025 for specific health/industrial hygiene precautions and requirements to follow when handling lead compounds. Beryllium can concentrate 10-fold or higher in dross. This can create a potential for over-exposures to beryllium during dross handling, particularly when dust levels are not adequately controlled.

Appropriate exposure assessments should be conducted by a qualified Industrial Hygienist for all tasks involving welding, cutting and grinding. Engineering controls or other measures (e.g., approved respiratory protection) may be necessary to reduce dust and beryllium concentrations depending on the exposure potential.

The presence of airborne beryllium has been detected during the welding of aluminum alloys with beryllium content as low as 0.002% by weight.

In accordance with OSHA 29 CFR 1910.252: Welding or cutting operations involving beryllium-containing base or filler metals shall be done using local exhaust ventilation and airline respirators unless atmospheric tests under the most adverse conditions have established that the workers' exposures is within the acceptable concentrations defined by 29 CFR 1910.1000. In all cases, workers in the immediate vicinity of the welding or cutting operations shall be protected as necessary by local exhaust ventilation or airline respirators.

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

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

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

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

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

Minimize breathing oil vapors and mist. Remove oil contaminated clothing; launder or dry-clea

Appropriate engineering controls

If dust and fumes are generated through processing: Use with adequate explosion-proof ventilation designed to handle particulates to meet the limits listed in Section 8, Exposure Guidelines.

Individual protection measures, such as personal protective equipment

Eye/face protection

Wear a face shield when working with molten material. Wear safety glasses with side shields (or goggles).

Skin protection

Hand protection

Wear impervious gloves to avoid repeated or prolonged skin contact with residual oils and to avoid any skin injury. When handling hot material, use heat resistant gloves.

Other

Dust and fumes from processing: Avoid contact with the skin. Wear impervious gloves to avoid direct skin contact. Wear suitable protective clothing. Wear impervious gloves to avoid repeated or prolonged skin contact with residual oils and to avoid any skin injury. When handling hot material, use heat resistant gloves.

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: 95, P100 for Lead.
Thermal hazards	When material is heated, wear gloves to protect against thermal burns. Wear appropriate thermal protective clothing, when necessary.
General hygiene considerations	Handle in accordance with good industrial hygiene and safety practice. Appropriate exposure assessments should be conducted by a qualified Industrial Hygienist for all tasks involving welding, cutting and grinding. Engineering controls or other measures (e.g., approved respiratory protection) may be necessary to reduce dust and beryllium concentrations depending on the exposure potential.
Control parameters	<p>Sampling to establish lead level exposure is advised where exposure to airborne particulate or fumes is possible. Consult OSHA Lead Standard 29 CFR 1910.1025 for specific health/industrial hygiene precautions and requirements to follow when handling lead compounds. Wash hands and face before breaks and immediately after handling the product. When using, do not eat, drink or smoke.</p> <p>Arconic recommends an Occupational Exposure Limit for Beryllium of 0.2 ug/m3 TWA and 1.0 ug/m3 STEL. Appropriate exposure assessments should be conducted by a qualified Industrial Hygienist for all tasks (i.e., handling beryllium laden dust). Engineering controls or other measures (e.g., approved respiratory protection) may be necessary to reduce dust and beryllium concentrations depending on the exposure potential.</p> <p>Sampling to establish lead level exposure is advised where exposure to airborne particulate or fumes is possible. Consult OSHA Lead Standard 29 CFR 1910.1025 for specific health/industrial hygiene precautions and requirements to follow when handling lead compounds. Follow standard monitoring procedures.</p>
Environmental exposure controls	None known.

9. Physical and chemical properties

Form	.
Color	Silver colored.
Odor	Odorless
Odor threshold	Not determined
pH	Not applicable
Density	2.70 - 2.80 g/cm3 (0.098 - 0.101 lb/in3)
Melting point/freezing point	1000 - 1150 °F (537.78 - 621.11 °C) (537.8 - 621.1 °C)
Initial boiling point and boiling range	Not determined
Flash point	Not applicable
Evaporation rate	Not available.
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	> 300 Non-spherical particles Very strong explosion.
Vapor pressure	Not applicable
Vapor density	Not applicable
Relative density	Not determined
Solubility(ies)	Insoluble
Partition coefficient (n-octanol/water)	Not applicable. 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.

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:

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

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 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 reactions can occur with oxides of lead, copper, iron, bismuth and certain other metals.

- Iron powder and water: Explosive reaction forming hydrogen gas when heated above 1470°F (800°C).

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 (milling, cutting, grinding).

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

Copper dust/mists: Can cause irritation of the eyes, mucous membranes, skin, and respiratory tract. Chronic overexposures: Can cause reduction in the number of red blood cells (anemia), skin abnormalities (pigmentation changes) and hair discoloration.

Copper fume: Can cause irritation of the eyes, mucous membranes, and respiratory tract. Acute overexposures: Can cause metal fume fever (nausea, fever, chills, shortness of breath and malaise).

Nickel dust and fume: Can cause irritation of eyes, skin and respiratory tract. Eye contact: Can cause inflammation of the eyes and eyelids (conjunctivitis). Skin contact: Can cause sensitization and allergic contact dermatitis. Chronic overexposures: Can cause perforation of the nasal septum, inflammation of the nasal passages (sinusitis), respiratory sensitization, asthma and scarring of the lungs (pulmonary fibrosis). Nickel alloys IARC/NTP: Reviewed and not recommended for listing by NTP. Listed as possibly carcinogenic to humans by IARC (Group 2B).

Tin (dust or fume): Chronic overexposures: Can cause benign lung disease (stannosis).

Silver: Can cause irritation of eyes, mucous membranes and skin. Chronic overexposures: Can cause irreversible blue-gray discoloration of mucous membranes, eyes and skin (argyria).

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

Titanium: 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.

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

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

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

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

Antimony compounds: Can cause irritation of eyes, skin and mucous membranes. Chronic overexposures: Can cause dermatitis, weight loss, hair loss, perforation of the nasal septum, chemical pneumonia, liver damage and kidney damage. Ingestion Can cause abdominal cramps, diarrhea, dizziness, abnormal heart rhythm (arrhythmia) and death.

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

Health effects associated with compounds formed during processing

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

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

Copper fume: Can cause irritation of the eyes, mucous membranes, and respiratory tract. Acute overexposures: Can cause metal fume fever (nausea, fever, chills, shortness of breath and malaise).

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).

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).

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.

Nickel compounds: Associated with lung cancer, cancer of the vocal cords and nasal cancer. IARC/NTP: Listed as "known to be a human carcinogen" by the NTP. Listed as carcinogenic to humans by IARC (Group 1).

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).

Tin compounds, inorganic (dust or fume): Can cause irritation of eyes, skin and respiratory tract.

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

Titanium dioxide: Can cause irritation of eyes and respiratory tract. Chronic overexposures: Can cause chronic bronchitis. IARC/NTP: Listed as possibly carcinogenic to humans by IARC (Group 2B).

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

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

Vanadium pentoxide: Can cause irritation of eyes, skin and respiratory tract. Skin contact (prolonged or repeated): Can cause sensitization and dermatitis. Acute overexposures: Can cause inflammation of the eyes and eyelids (conjunctivitis), bronchitis and fluid in the lungs (pulmonary edema). Effects can be delayed up to 3 days. Chronic overexposures: Can cause kidney damage, blindness, asthma and emphysema. IARC/NTP: Listed as possibly carcinogenic to humans by IARC (Group 2B).

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

Zirconium compounds: Skin contact (prolonged or repeated): Can cause lumps on the skin (granulomas).

Welding, plasma arc cutting, and arc spray metalizing can generate ozone.

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.

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.

Oxides of nitrogen (NO and NO₂): Can cause irritation of eyes, skin and respiratory tract. Acute overexposures: Can cause reduced ability of the blood to carry oxygen (methemoglobin). Can cause cough, shortness of breath, accumulation of fluid in the lungs (pulmonary edema) and death. Effects can be delayed up to 2-3 weeks.

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

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).

Information on likely routes of exposure

Eye contact	Product as shipped: Not applicable. Dust and fumes from processing: Can cause mechanical irritation.
Skin contact	Product as shipped: Contact with residual oil/oil coating: Prolonged or repeated skin contact may cause dermatitis. Dust and fumes from processing: Can cause irritation. Contains beryllium. May produce an allergic reaction. Contains (Cobalt, Nickel). May produce an allergic reaction.
Inhalation	Product as shipped: Not applicable. Dust and fumes from processing: May cause irritation to the respiratory system. Prolonged inhalation may be harmful. Chronic overexposures: May cause sensitization by inhalation. May cause damage to organs by inhalation. May damage fertility or the unborn child by inhalation. May cause lung damage. May cause cancer by inhalation.
Ingestion	Not likely, due to the form of the product.
Symptoms related to the physical, chemical and toxicological characteristics	Dust and fumes from processing: Irritating to eyes, respiratory system and skin. Health effects from mechanical processing (e.g., cutting, grinding): Dust from mechanical processing: Can cause irritation of the upper respiratory tract. Can cause reduction in the number of red blood cells (anemia), skin abnormalities (pigmentation changes), scarring of the lungs (pulmonary fibrosis), respiratory sensitization, central nervous system damage, nervous system damage, secondary Parkinson's disease and reproductive harm. Health effects from elevated temperature processing (e.g., welding, melting): Dust and fumes from processing: Can cause irritation of the respiratory tract. Acute exposure Dust and fumes from processing: Can cause metal fume fever (nausea, fever, chills, shortness of breath and malaise), the accumulation of fluid in the lungs (pulmonary edema) and reduced ability of the blood to carry oxygen (anemia). Chronic exposure Dust and fumes from processing: Can cause benign lung disease (siderosis), and lung cancer.

Information on toxicological effects

Components	Species	Test Results
Aluminum (CAS 7429-90-5)		
<u>Acute</u>		
Oral		
LD50	Rat	> 10000 mg/kg > 2000 mg/kg
Arsenic (CAS 7440-38-2)		
<u>Acute</u>		
Oral		
LD50	Mouse	145 mg/kg
	Rat	763 mg/kg
Cadmium (CAS 7440-43-9)		
<u>Acute</u>		
Inhalation		
LC50	Rat	0.025 mg/l, 900 Days
Oral		
LD50	Mouse	890 mg/kg
	Rat	225 mg/kg
Nickel (CAS 7440-02-0)		
<u>Acute</u>		
Oral		
LD50	Rat	> 9000 mg/kg
Silver (CAS 7440-22-4)		
<u>Acute</u>		
Dermal		
LD50	Rat	> 2000 mg/kg

Components	Species	Test Results
Oral LD50	Rat	> 5000 mg/kg
Zinc (CAS 7440-66-6)		
Acute Oral LD50	Rat	630 mg/kg
Acute toxicity		
Skin corrosion/irritation	Non-corrosive. Dust and fumes from processing: May be irritating to the skin.	
Serious eye damage/eye irritation	Dust and fume from processing: Direct contact with eyes may cause temporary irritation.	
Respiratory or skin sensitization	Dust and fumes from processing: Contains (Cobalt, Nickel). May produce an allergic reaction. Contains (Beryllium). May produce an allergic reaction. May cause sensitization by inhalation and skin contact.	
ACGIH Sensitization		
Beryllium (CAS 7440-41-7)	Respiratory sensitization	
Respiratory sensitization	Product as shipped: Not a respiratory sensitizer. Dust and fumes from processing: Contains (Beryllium). May produce an allergic reaction. Contains (Cobalt, Nickel). May produce an allergic reaction. May cause sensitization by inhalation.	
Skin sensitization	Product as shipped: Contact with residual oil/oil coating: Prolonged skin contact may cause skin irritation and/or dermatitis.	
Germ cell mutagenicity	Dust and fumes from processing: Direct contact may irritate. May cause an allergic skin reaction. Classification not possible.	
Pre-existing conditions aggravated by exposure	Asthma, chronic lung disease, Secondary Parkinson's disease and skin rashes.	
Carcinogenicity	Product as shipped: Does not present any cancer hazards.	
	Health effects from mechanical processing (e.g., cutting, grinding): Can present a cancer hazard (Beryllium, Cadmium, Cobalt, Nickel, Lead).	
	Dust and fumes from welding or elevated temperature processing: Can present a cancer hazard (Beryllium compounds, Cobalt compounds, Hexavalent chromium compounds, Lead compounds, Nickel compounds, Oil mist, mineral,).	
ACGIH Carcinogens		
Aluminum (CAS 7429-90-5)	A4 Not classifiable as a human carcinogen.	
Arsenic (CAS 7440-38-2)	A1 Confirmed human carcinogen.	
Beryllium (CAS 7440-41-7)	A1 Confirmed human carcinogen.	
Cadmium (CAS 7440-43-9)	A2 Suspected human carcinogen.	
Chromium (CAS 7440-47-3)	A4 Not classifiable as a human carcinogen.	
Cobalt (CAS 7440-48-4)	A3 Confirmed animal carcinogen with unknown relevance to humans.	
Lead (CAS 7439-92-1)	A3 Confirmed animal carcinogen with unknown relevance to humans.	
Manganese (CAS 7439-96-5)	A4 Not classifiable as a human carcinogen.	
Nickel (CAS 7440-02-0)	A5 Not suspected as a human carcinogen.	
Zirconium (CAS 7440-67-7)	A4 Not classifiable as a human carcinogen.	
IARC Monographs. Overall Evaluation of Carcinogenicity		
Arsenic (CAS 7440-38-2)	1 Carcinogenic to humans.	
Beryllium (CAS 7440-41-7)	1 Carcinogenic to humans.	
Cadmium (CAS 7440-43-9)	1 Carcinogenic to humans.	
Chromium (CAS 7440-47-3)	3 Not classifiable as to carcinogenicity to humans.	
Lead (CAS 7439-92-1)	2B Possibly carcinogenic to humans.	
Nickel (CAS 7440-02-0)	1 Carcinogenic to humans.	
US OSHA Hazard Categories (10)		
Not regulated.		
US OSHA Hazard Categories (9)		
Not regulated.		
US. National Toxicology Program (NTP) Report on Carcinogens		
Arsenic (CAS 7440-38-2)	Known To Be Human Carcinogen.	

Beryllium (CAS 7440-41-7)
 Cadmium (CAS 7440-43-9)
 Nickel (CAS 7440-02-0)

Known To Be Human Carcinogen.
 Known To Be Human Carcinogen.
 Known To Be Human Carcinogen.
 Reasonably Anticipated to be a Human Carcinogen.

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

Arsenic (CAS 7440-38-2) Cancer
 Cadmium (CAS 7440-43-9) Cancer

Reproductive toxicity Product as shipped: Does not present any reproductive hazards.
 Health effects from mechanical processing (e.g., cutting, grinding): Can present a reproductive hazard (Manganese, Lead').
 Additional health effects from elevated temperature processing (e.g., welding, melting): Can present a reproductive hazard (Manganese compounds, Lead compounds).

Routes of exposure Inhalation. Skin contact. Eye contact.

Specific target organ toxicity - single exposure Product as shipped: Not applicable.
 Dust and fumes from processing: May cause irritation to the respiratory system. Causes damage to organs (metal fume fever) by inhalation. Causes damage to organs (lungs) by inhalation.

Specific target organ toxicity - repeated exposure Product as shipped: Not applicable.
 Dust and fumes from processing:

Aspiration hazard Not applicable.

Chronic effects Chronic overexposures: Prolonged exposure may cause chronic effects.

12. Ecological information

Ecotoxicity Not expected to be harmful to aquatic organisms.

Product	Species	Test Results
Aluminum Analytical Reference Materials		
Aquatic		
Crustacea	EC50 Daphnia	0.4599 mg/l, 48 hours estimated
Fish	LC50 Fish	3.929 mg/l, 96 hours estimated
Components	Species	Test Results
Antimony (CAS 7440-36-0)		
Aquatic		
Fish	LC50 Sheepshead minnow (Cyprinodon variegatus)	6.2 - 8.3 mg/l, 96 hours
Arsenic (CAS 7440-38-2)		
Aquatic		
Fish	LC50 Fathead minnow (Pimephales promelas)	9.9 mg/l, 96 hours
Cadmium (CAS 7440-43-9)		
Aquatic		
Crustacea	EC50 Water flea (Daphnia magna)	0.0491 mg/l, 48 hours
Fish	LC50 Rainbow trout, donaldson trout (Oncorhynchus mykiss)	0.0024 - 0.0029 mg/l, 96 hours
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
Copper (CAS 7440-50-8)		
Aquatic		
Crustacea	EC50 Water flea (Daphnia magna)	0.036 mg/l, 48 hours
Fish	LC50 Fathead minnow (Pimephales promelas)	0.0319 - 0.0544 mg/l, 96 hours
Iron (CAS 7439-89-6)		
Aquatic		
Crustacea	LC50 Cockle (Cerastoderma edule)	100 - 330 mg/l, 48 hours

Components		Species	Test Results
Lead (CAS 7439-92-1)	Fish	Common shrimp, sand shrimp (Crangon crangon)	33 - 100 mg/l, 48 hours
		Channel catfish (Ictalurus punctatus)	> 500 mg/l, 96 hours
	Aquatic		
	Crustacea	Water flea (Ceriodaphnia reticulata)	0.53 mg/l, 48 hours
		Water flea (Daphnia magna)	3.6 - 5.3 mg/l, 48 hours
		Water flea (Daphnia pulex)	5.1 mg/l, 48 hours
		Water flea (Simocephalus vetulus)	3.6 - 5.5 mg/l, 48 hours
	Fish	Rainbow trout,donaldson trout (Oncorhynchus mykiss)	542 mg/l, 96 hours
			471 mg/l, 96 hours
			1.17 mg/l, 96 hours
			0.2 mg/l, 336 hours
		0.17 - 15.61 mg/l, 28 days	
Manganese (CAS 7439-96-5)			
Aquatic			
Crustacea	EC50	Water flea (Daphnia magna)	40 mg/l, 48 hours
Nickel (CAS 7440-02-0)			
Aquatic			
Crustacea	EC50	Water flea (Daphnia magna)	1 mg/l, 48 hours
Fish	LC50	Fathead minnow (Pimephales promelas)	2.923 mg/l, 96 hours
Silver (CAS 7440-22-4)			
Aquatic			
Crustacea	EC50	Water flea (Daphnia magna)	0.0002 mg/l, 48 hours
Fish	LC50	Fathead minnow (Pimephales promelas)	0.0023 - 0.0033 mg/l, 96 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. Keep scrap separate from other metal scrap.
Local disposal regulations	Dispose in accordance with all applicable 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.
US RCRA Hazardous Waste P List: Reference	
Beryllium (CAS 7440-41-7)	P015
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 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

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.
This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

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

Not regulated.

CERCLA Hazardous Substance List (40 CFR 302.4)

Antimony (CAS 7440-36-0)	Listed.
Arsenic (CAS 7440-38-2)	Listed.
Beryllium (CAS 7440-41-7)	Listed.
Cadmium (CAS 7440-43-9)	Listed.
Chromium (CAS 7440-47-3)	Listed.
Cobalt (CAS 7440-48-4)	Listed.
Copper (CAS 7440-50-8)	Listed.
Manganese (CAS 7439-96-5)	Listed.
Nickel (CAS 7440-02-0)	Listed.
Silver (CAS 7440-22-4)	Listed.
Zinc (CAS 7440-66-6)	Listed.

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

Arsenic (CAS 7440-38-2)	Cancer
Cadmium (CAS 7440-43-9)	Cancer
Lead (CAS 7439-92-1)	Reproductive toxicity
Arsenic (CAS 7440-38-2)	Liver
Cadmium (CAS 7440-43-9)	Lung
Lead (CAS 7439-92-1)	Central nervous system
Arsenic (CAS 7440-38-2)	Skin
Cadmium (CAS 7440-43-9)	Kidney
Lead (CAS 7439-92-1)	Kidney
Arsenic (CAS 7440-38-2)	Respiratory irritation
Cadmium (CAS 7440-43-9)	Acute toxicity
Lead (CAS 7439-92-1)	Blood
Arsenic (CAS 7440-38-2)	Nervous system
Lead (CAS 7439-92-1)	Acute toxicity
Arsenic (CAS 7440-38-2)	Acute toxicity

US OSHA Hazard Categories (9)

Not regulated.

US OSHA Hazard Categories (10)

Not regulated.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Section 311/312 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 - No	If molten

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical Yes

SARA 313 (TRI reporting)

Chemical name	CAS number	% by wt.
Aluminum	7429-90-5	>75
Zinc	7440-66-6	≤11
Copper	7440-50-8	≤10
Nickel	7440-02-0	≤3.0
Manganese	7439-96-5	≤3.0
Silver	7440-22-4	≤1.0
Lead	7439-92-1	≤1.0
Beryllium	7440-41-7	≤0.31
Cobalt	7440-48-4	≤0.25

US state regulations**US. California Proposition 65**

WARNING: This product contains a chemical known to the State of California to cause cancer and birth defects or other reproductive harm.

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

Arsenic (CAS 7440-38-2)	Listed: February 27, 1987
Beryllium (CAS 7440-41-7)	Listed: October 1, 1987
Cadmium (CAS 7440-43-9)	Listed: October 1, 1987
Cobalt (CAS 7440-48-4)	Listed: July 1, 1992
Lead (CAS 7439-92-1)	Listed: October 1, 1992
Nickel (CAS 7440-02-0)	Listed: May 7, 2004

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

Cadmium (CAS 7440-43-9)	Listed: May 1, 1997
Lead (CAS 7439-92-1)	Listed: February 27, 1987

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

Lead (CAS 7439-92-1)	Listed: February 27, 1987
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US - California Proposition 65 - CRT: Listed date/Male reproductive toxin

Cadmium (CAS 7440-43-9)	Listed: May 1, 1997
Lead (CAS 7439-92-1)	Listed: February 27, 1987

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)	No
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

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

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).

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

SDS Status	February 6, 2014: New SDS. Hazardous Materials Control Committee +1-412-553-4649
Revision date	February 6, 2014.
Version #	01
Further information	Refer to NFPA 654, Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids, for safe handling.
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, • NFPA 68, Standard on Explosion Protection by Deflagration Venting, • NFPA 69, Standard on Explosion Prevention Systems
- Guide to Occupational Exposure Values 2015, 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

Key/Legend:

ACGIH	American Conference of Governmental Industrial Hygienists
AICS	Australian Inventory of Chemical Substances
CAS	Chemical Abstract Services
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CPR	Cardio-pulmonary Resuscitation
DOT	Department of Transportation
DSL	Domestic Substances List (Canada)
EC	Effective Concentration
ED	Effective Dose
EINECS	European Inventory of Existing Commercial Chemical Substances
ENCS	Japan - Existing and New Chemical Substances
EWC	European Waste Catalogue
EPA	Environmental Protective Agency
IARC	International Agency for Research on Cancer
LC	Lethal Concentration
LD	Lethal Dose
MAK	Maximum Workplace Concentration (Germany) "maximale Arbeitsplatz-Konzentration"
NDSL	Non-Domestic Substances List (Canada)
NIOSH	National Institute for Occupational Safety and Health
NTP	National Toxicology Program
OEL	Occupational Exposure Limit
OSHA	Occupational Safety and Health Administration
PIN	Product Identification Number
PMCC	Pensky Marten Closed Cup
RCRA	Resource Conservation and Recovery Act
SARA	Superfund Amendments and Reauthorization Act
SIMDUT	Système d'Information sur les Matières Dangereuses Utilisées au Travail
STEL	Short Term Exposure Limit
TCLP	Toxic Chemicals Leachate Program
TDG	Transportation of Dangerous Goods
TLV	Threshold Limit Value
TSCA	Toxic Substances Control Act
TWA	Time Weighted Average
WHMIS	Workplace Hazardous Materials Information System
m	meter, cm centimeter, mm millimeter, in inch,
g	gram, kg kilogram, lb pound, µg microgram,
ppm	parts per million, ft feet

*** End of SDS ***

ALUMINUM ANALYTICAL REFERENCE MATERIALS

Hazard statement

May cause an allergic skin reaction. May cause allergy or asthma symptoms or breathing difficulties if inhaled. May cause cancer. May damage the unborn child. May damage fertility. Causes damage to organs through prolonged or repeated exposure. May form combustible dust concentrations in air.

Precautionary statement

Prevention

Do not breathe dust/fume. In case of inadequate ventilation wear respiratory protection. Contaminated work clothing must not be allowed out of the workplace. Wear protective gloves/protective clothing/eye protection/face protection. Obtain special instructions before use. Wash thoroughly after handling.

Response

If inhaled: If breathing is difficult, remove person to fresh air and keep comfortable for breathing.

If experiencing respiratory symptoms: Call a poison center/doctor.

IF ON SKIN: Wash with plenty of soap and water. If skin irritation or rash occurs: Get medical advice/attention. Wash contaminated clothing before reuse. If exposed or concerned: Get medical advice/attention.

Storage

Keep dry.

Disposal

Dispose of contents/container in accordance with local/regional/national/international regulations.

All electrical equipment must be suitable for use in hazardous atmospheres involving aluminum powder in accordance with 29 CFR 1910.307. The National Electrical Code, NFPA 70, contains guidelines for determining the type and design of equipment and installation which will meet this requirement.



Danger

Supplemental information

FIRE FIGHTING MEASURES: This product does not present fire or explosion hazards as shipped. Small chips, fine turnings and dust from processing may be readily ignitable. Dust or fines dispersed in the air can be explosive.

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: 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. Pick up mechanically.

See Arconic SDS Number 1487.

