



Arconic Inc.
201 Isabella Street
Pittsburgh, PA 15212-5858

SAFETY DATA SHEET NOTIFICATION

See Other Side

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SAFETY DATA SHEET NOTIFICATION

AIRCORPS AVIATION

PO BOX 847

ATTN: ACCOUNTS PAYABLE

BEMIDJI MN 56619

SCANNED



Arconic Inc.
201 Isabella Street
Pittsburgh, PA 15212-5858



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SAFETY DATA SHEET NOTIFICATION

02/12/2019

Arconic Sales Order: 1001053223
Purchase Order: P19511-Revised

SDS No: 1056
Latest Revision Date: 04/27/2017

The Safety Data Sheet for the product(s) you have purchased from Arconic Inc. contains health, safety and environmental information that will enable your company to use our products in a safe and environmentally sound manner. We are providing an SDS with this particular order because:

- 1 This is the first time you have ordered product(s) covered by this SDS, or
- 2 This SDS has been revised since a copy was last sent to you, or
- 3 Annual notification is required for product(s) which may contain chemicals subject to reporting under Section 313 of SARA III and 40 CFR 372 (U.S. customers only)

The most current version of all Arconic SDSs can be found at www.arconic.com.

If you repackage or otherwise distribute this product to industrial customers, this SDS or a similar one should be provided to them.

Unless otherwise indicated, this notification is being sent to the billing address specified on the Sales Order. If there is a specific address to which SDSs should be sent, please complete the following and email, FAX or mail to:

Email: SDSInfo@arconic.com
FAX: N/A

Nancy Truver
201 Isabella Street
Pittsburgh, PA 15212-5858 USA

() * Email address: _____
() * Fax number: _____
() * Mailing address: _____

* - Check preferred method of communication

Signature: _____

(please print name)

Date: _____

James Perriello
Arconic EHS Services



SAFETY DATA SHEET

1. Identification

Product identifier	ALUMINUM ALLOYS WITH LOW BERYLLIUM
Other means of identification	
SDS number	1056
Version #	13
Revision date	August 27, 2018.
Other means of identification	
Synonyms	Alloys C555, C74T, C75T, C76T, C89T
Recommended use	Wrought aluminum products
Manufacturer/Importer/Supplier/Distributor information	Arconic Inc. 201 Isabella Street Pittsburgh, PA 15212-5858 USA Health and Safety Email: SDSInfo@arconic.com Health and Safety Tel: 1-412-553-4649 Health and Safety Fax: 1-412-553-4822
Emergency Information	CHEMTREC: +1-703-527-3887 or +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 https://arconnect.arconic.com EHS Community.

2. Hazard(s) identification

Classification

This product is considered hazardous under 29 CFR 1910.1200 (Hazard Communication). The classification and hazards associated with this product may change depending on the form.

Potential health effects

The following statements summarize the health effects generally expected in cases of overexposures. User specific situations should be assessed by a qualified individual. Additional health information can be found in Section 11.

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

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	May form combustible dust concentrations in air.
Precautionary statement	
Prevention	Avoid breathing dust/fume. Do not eat, drink or smoke when using this product. Use personal protective equipment as required. Wash thoroughly after handling. Prevent dust accumulation to minimize explosion hazard.
Response	Not applicable.
Storage	Keep dry. Store in a dry place.
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

Dust and fume from processing: Can cause irritation of the eyes, skin and upper respiratory tract. Contains beryllium. May produce an allergic reaction. May cause sensitization by inhalation and skin contact. The presence of airborne beryllium has been detected during the welding of aluminum alloys with beryllium content as low as 0.002% by weight.

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.

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, 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 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).

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	>86
Zinc		7440-66-6	<11.0
Magnesium		7439-95-4	<5.6
Copper		7440-50-8	<5.0
Iron		7439-89-6	<0.6
Chromium		7440-47-3	<0.3
Silicon		7440-21-3	<0.5
Manganese		7439-96-5	<1.0
Zirconium		7440-67-7	<0.2
Nickel		7440-02-0	<0.06
Lead		7439-92-1	<0.04
Beryllium		7440-41-7	<0.002

Additional Information

*Designates that a specific chemical identity and/or percentage of composition has been withheld as a trade secret. 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. Get medical attention if irritation develops or persists.

Inhalation

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

Ingestion

Dust and fumes from processing: If swallowed, dilute by drinking water. Recommend quantities up to 30 mL (~1 oz.) in children and 250 mL (~9 oz.) in adults. Never give anything by mouth to a victim who is unconscious or is having convulsions. Do NOT induce vomiting. Consult a physician.

Most important symptoms/effects, acute and delayed

Dust and fumes from processing: Can cause irritation of the eyes, skin and upper respiratory tract. Contains beryllium. May produce an allergic reaction. May cause sensitization of susceptible persons by skin contact or by inhalation of dust.

Health effects from mechanical processing (e.g., cutting, grinding): Dust from processing: Chronic overexposures: Can cause reduction in the number of red blood cells (anemia), skin abnormalities, (pigmentation changes), scarring of the lungs (pulmonary fibrosis), respiratory sensitization, and asthma.

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 edema). Chronic overexposures: Can cause benign lung disease, scarring of the lungs (pulmonary fibrosis), respiratory sensitization, central nervous system damage, secondary Parkinson's disease, reproductive harm and lung cancer.

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

Asthma, chronic lung disease, and skin rashes.

Indication of immediate medical attention and special treatment needed

Provide general supportive measures and treat symptomatically.

General information

If exposed or concerned: Get medical advice/attention. 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 water in fighting fires around molten metal.
DO NOT USE halogenated extinguishing agents on small chips/fines.
These fire extinguishing agents will react with the burning material.

Specific hazards arising from the chemical

Explosion/fire hazards may be present when:

- 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.

Hazardous combustion products

No hazardous decomposition products are known.

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

Apply extinguishing media carefully to avoid creating airborne dust. Use gentle surface application of Class D extinguishing agent or dry inert granular material (e.g., sand) to cover and ring the burning material. Do not disturb the material until completely cool. If impossible to extinguish, protect surroundings and allow fire to burn itself out.

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

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 inhalation of fumes from molten product. 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.

Personal precautions, protective equipment and emergency procedures

For emergency responders

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

Evacuation procedures

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

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. Protect against water. Recover spills for reuse.

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. Avoid contact with molten material. Dust accumulation on the floor, ledges and beams can present a risk of ignition, flame propagation and secondary explosions. Do not use compressed air to remove settled material from floors, beams or equipment.

Use personal protection recommended in Section 8 of the SDS.

Storage

Store in a dry place.

Requirements for Processes Which Generate Dusts or Fines

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.

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

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).

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

Requirements for Remelting of Scrap Material or Ingot

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

All tooling and containers which come in contact with molten metal must be preheated or specially coated and approved for such use. Molds and ladles must be preheated or oiled prior to casting. Any surfaces that may contact molten metal (i.e., concrete) should be specially coated.

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

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

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

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

8. Exposure controls/personal protection

Occupational exposure limits

U.S. - OSHA Components

Components	Type	Value	Form
Chromium (CAS 7440-47-3)	TWA	1 mg/m3	
Copper (CAS 7440-50-8)	TWA	1 mg/m3	Dust and mist.
		0.1 mg/m3	Fume.
Nickel (CAS 7440-02-0)	TWA	1 mg/m3	
Silicon (CAS 7440-21-3)	TWA	5 mg/m3	Respirable fraction.
		15 mg/m3	Total dust
Compounds Formed During Processing	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
Nickel compounds, insoluble	TWA	1 mg/m3	(as Ni)
Nitric oxide (CAS 10102-43-9)	TWA	30 mg/m3	
Ozone (CAS 10028-15-6)	TWA	25 ppm 0.2 mg/m3	
Silica, amorphous (CAS 112926-00-8)	TWA	0.1 ppm 20 mppcf	80 mg/m3 / %SiO2
Impurities	Type	Value	Form
Lead compounds, inorganic	TWA	0.05 mg/m3 0.03 mg/m3	(as Pb) Action Level (as Pb)

U.S. - OSHA**Residuals**

	Type	Value	Form
Oil mist, mineral (CAS 8012-95-1)	TWA	5 mg/m3	Mist.

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

Components	Type	Value
Beryllium (CAS 7440-41-7)	STEL	0.002 ppm
	TWA	0.0002 mg/m3
Lead (CAS 7439-92-1)	TWA	0.05 mg/m3
Compounds Formed During Processing	Type	Value

Beryllium compounds	STEL	0.002 ppm
	TWA	0.0002 mg/m3
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	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.
Compounds Formed During Processing	Type	Value	Form

Chromium (II) compounds	PEL	0.5 mg/m3	
Chromium (III) compounds	PEL	0.5 mg/m3	
Chromium (VI) compounds, water soluble forms	PEL	1 mg/m3	
Chromium (VI) compounds	PEL	1 mg/m3	
Iron oxide (CAS 1309-37-1)	PEL	10 mg/m3	Fume.
Magnesium oxide (CAS 1309-48-4)	PEL	15 mg/m3	Total particulate.
Nitrogen dioxide (CAS 10102-44-0)	Ceiling	9 mg/m3	
		5 ppm	
Zinc oxide (CAS 1314-13-2)	PEL	5 mg/m3	Respirable fraction.
		5 mg/m3	Fume.
		15 mg/m3	Total dust.

Residuals	Type	Value	Form
Oil mist, mineral (CAS 8012-95-1)	PEL	5 mg/m3	Mist.

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

Components	Type	Value
Beryllium (CAS 7440-41-7)	Ceiling	0.005 mg/m3
	TWA	0.002 mg/m3
Compounds Formed During Processing	Type	Value
Beryllium compounds	Ceiling	0.005 mg/m3
	TWA	0.002 mg/m3
Chromium (VI) compounds, water soluble forms	Ceiling	0.1 mg/m3

US. OSHA Table Z-2 (29 CFR 1910.1000)**Compounds Formed
During Processing**

	Type	Value
Chromium (VI) compounds	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 15 mg/m3	Respirable fraction. Total dust.

**Compounds Formed
During Processing**

	Type	Value	Form
Aluminum oxide (non-fibrous) (CAS 1344-28-1)	TWA	5 mg/m3	Respirable fraction.

Iron oxide (CAS 1309-37-1)	TWA	15 mg/m3	Total dust.
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Magnesium oxide (CAS 1309-48-4)	TWA	5 mg/m3	Respirable fraction.
		15 mg/m3	Total dust.

ACGIH**Components**

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

**Compounds Formed
During Processing**

	Type	Value	Form
Aluminum oxide (non-fibrous) (CAS 1344-28-1)	TWA	1 mg/m3	Respirable fraction, as Al
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.
Beryllium (CAS 7440-41-7)	TWA	0.00005 mg/m3	Inhalable fraction.
Chromium (CAS 7440-47-3)	TWA	0.5 mg/m3	Inhalable fraction.
Copper (CAS 7440-50-8)	TWA	1 mg/m3 0.2 mg/m3	Dust and mist. Fume.

Lead (CAS 7439-92-1)	TWA	0.05 mg/m3	
Manganese (CAS 7439-96-5)	TWA	0.1 mg/m3	Inhalable fraction.

Nickel (CAS 7440-02-0)	TWA	0.02 mg/m3	Respirable fraction.
Zirconium (CAS 7440-67-7)	TWA	1.5 mg/m3	Inhalable fraction.
	STEL	10 mg/m3	
	TWA	5 mg/m3	

**Compounds Formed
During Processing**

	Type	Value	Form
Beryllium compounds	TWA	0.00005 mg/m3	Inhalable fraction.
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	TWA	0.01 mg/m3	(As Cr)
Iron oxide (CAS 1309-37-1)	TWA	5 mg/m3	Respirable fraction.

US. ACGIH Threshold Limit Values

Compounds Formed During Processing	Type	Value	Form
Magnesium oxide (CAS 1309-48-4)	TWA	10 mg/m3	Inhalable fraction.
Manganese compounds, inorganic	TWA	0.1 mg/m3	Inhalable fraction.
Nickel compounds, insoluble	TWA	0.02 mg/m3 0.2 mg/m3	Respirable fraction. Inhalable fraction.
Nitric oxide (CAS 10102-43-9)	TWA	25 ppm	
Nitrogen dioxide (CAS 10102-44-0)	TWA	0.2 ppm	
Zinc oxide (CAS 1314-13-2)	STEL	10 mg/m3	Respirable fraction.
Impurities	Type	Value	
Lead compounds, inorganic	TWA	0.05 mg/m3	
Residuals	Type	Value	Form
Oil mist, mineral (CAS 8012-95-1)	TWA	5 mg/m3	Inhalable fraction.
Arconic Components	Type	Value	Form
Aluminum (CAS 7429-90-5)	TWA	3 mg/m3 10 mg/m3	Respirable fraction Total dust
Beryllium (CAS 7440-41-7)	STEL TWA	1 µg/m3 0.2 µg/m3	Peak/ Inhalable Inhalable
Manganese (CAS 7439-96-5)	TWA	0.05 mg/m3	Total dust.
Nickel (CAS 7440-02-0)	TWA	0.02 mg/m3 1 mg/m3	Respirable fraction.
Compounds Formed During Processing	Type	Value	Form
Aluminum oxide (non-fibrous) (CAS 1344-28-1)	TWA	3 mg/m3	Respirable fraction.
Beryllium compounds	TWA	10 mg/m3 0.2 µg/m3	Total dust. Soluble
Chromium (VI) compounds, certain water insoluble forms	TWA	0.25 ug/m3	
Chromium (VI) compounds	TWA	0.25 µg/m3	
Manganese compounds, inorganic	TWA	0.05 mg/m3	Total dust, as Mn.
Nickel compounds, insoluble	TWA	0.02 mg/m3 0.1 mg/m3	Respirable fraction, as Mn. Insoluble
Residuals	Type	Value	Form
Oil mist, mineral (CAS 8012-95-1)	TWA	0.5 mg/m3	(8 Hour)

Biological limit values
ACGIH Biological Exposure Indices

Components	Value	Determinant	Specimen	Sampling Time
Lead (CAS 7439-92-1)	200 µg/l	Lead	Blood	*
Compounds Formed During Processing	Value	Determinant	Specimen	Sampling Time
Chromium (VI) compounds, 25 µg/l water soluble forms		Total chromium	Urine	*

ACGIH Biological Exposure Indices

Compounds Formed During Processing	Value	Determinant	Specimen	Sampling Time
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	10 µg/l	Total chromium	Urine	*
Chromium (VI) compounds	25 µg/l	Total chromium	Urine	*
	10 µg/l	Total chromium	Urine	*

* - For sampling details, please see the source document.

Exposure guidelines**US ACGIH Threshold Limit Values: Skin designation**

Chromium (VI) compounds (CAS CASNo. Not available)	Can be absorbed through the skin.
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Chromium (VI) compounds, water soluble forms (CAS CASNo. Not available)	Can be absorbed through the skin.
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General

Beryllium can concentrate 10-fold or higher in dross. This can create a potential for over-exposures to beryllium during dross handling, particularly when dust levels are not adequately controlled.

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

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

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

Good industrial hygiene practices, including reducing beryllium exposures to the greatest extent possible, are recommended. Beryllium work areas should be established where employees are exposed to beryllium levels above the occupational exposure limits recommended by 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-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 designed to handle particulates to meet the limits listed in Section 8, Exposure Guidelines. Local ventilation and vacuum systems must be designed to handle combustible/explosive dust, fines or particulate. Dry vacuums and electrostatic precipitators must not be used, unless specifically approved for use with combustible/explosive dusts, fines or particulate and must be dedicated to aluminum dust only and should be clearly labeled as such. Vacuum cleaner hoses must be conductive and nozzles or fitting made of conductive, non-sparking material. Do not co-mingle dust, fines or particulate of aluminum with dust, fines or particulate of steel, iron, iron oxide (rust) or other metal oxides.

Individual protection measures, such as personal protective equipment

Eye/face protection

Wear safety glasses with side shields. Wear a face shield when working with molten material. Molten metal: Tinted safety glasses or face shield.

Skin protection	
Hand protection	Wear appropriate gloves to avoid any skin injury. If the product is coated with oil, wear oil-resistant gloves to avoid skin contact. The need for personal protective equipment (gloves) should be based upon a hazard assessment and recommendations from health / safety professionals. The most suitable glove must be chosen in consultation with the gloves supplier, who can inform about the breakthrough time of the glove material. When handling hot material, use heat resistant gloves.
Other	The need for personal protective equipment should be based upon a hazard assessment: and recommendations from health / safety professionals. 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.
	Molten metal: Wear fire/flamm resistant/retardant clothing. Wear heat resistant gloves. Neck shroud
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: P95, P100 for Lead.
Thermal hazards	Contact with molten material can cause thermal burns. Hot aluminum does not necessarily glow red. Wear appropriate thermal protective clothing, when necessary. When material is heated, wear gloves to protect against thermal burns. Flame retardant protective clothing is recommended. Molten metal: Full Face Shield.
General hygiene considerations	Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and immediately after handling the product. When using, do not eat, drink or smoke. 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	Follow standard monitoring procedures. 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.
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	2.70 - 2.80 g/cm ³ (0.098 - 0.101 lb/in ³)
Melting point/freezing point	1832 - 2102 °F (1000 - 1150 °C)
Initial boiling point and boiling range	Not applicable
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 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:

- 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.

Explosions can occur with coils of foil that have been submerged or partially submerged in water for an extended period of time. Water can penetrate between the layers of foil, react with the aluminum surface and generate heat and hydrogen gas. When the coils are removed from the cooling effects of the water, rapid temperature increases can occur causing steam explosions which result in the rupture of the coils and discharge of debris.

Coils of foil may be a potential hazard under the following conditions:

- Coil has been annealed (annealing removes residual oil that could prevent penetration of water)
- Foil is very thin gauge (5-9 µm thickness which increases surface area)
- Coil has been immersed for an extended period of time (several hours or more)
- Wetted coil has recently been removed from the cooling effects of the water

In such situations, the coils should be isolated (30 meters from any personnel) for at least 72 hours as soon as possible after removal from the water. Coils making crackling sounds or emitting steam should not be approached or transported in commerce. Wetted coils should not be charged into a furnace for remelting until completely dry:

Grinding, sanding, buffing and polishing operations may generate potentially explosive aluminum dust, fines or particulate that must not be co-mingled with dust, fines or particulate of steel, iron, iron oxide (rust) or other metal oxides. Vacuum and dust collection systems utilized for processing aluminum must be placarded as follows:

WARNING – Aluminum Metal Only – Fire or Explosion Can Result with Other Metals.

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).

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.

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.

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

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

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).

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

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

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

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).

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).

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).

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.

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.

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).

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

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

If the product is heated well above ambient temperatures or machined, oil vapor or mist may be generated.

Oil vapor or mist: Can cause irritation of respiratory tract. Acute overexposures: Can cause bronchitis, headache, central nervous system effects (nausea, dizziness and loss of coordination) and drowsiness (narcosis).

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

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

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

Plasma arc cutting of aluminum can generate oxides of nitrogen.

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

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

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. Prolonged or repeated skin contact may cause dermatitis.

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

Inhalation

Dust and fumes from processing: Can cause irritation of the eyes, skin and upper respiratory tract. Dust from mechanical processing: Chronic overexposures: Can cause reduction in the number of red blood cells (anemia), skin abnormalities (pigmentation changes), scarring of the lungs (pulmonary fibrosis), respiratory sensitization, and asthma.

Additional health effects from elevated temperature processing (e.g., welding, melting): Acute overexposure: Can cause metal fume fever (nausea, fever, chills, shortness of breath malaise), reduced ability of the blood to carry oxygen (methemoglobin) the accumulation of fluid in the lungs (pulmonary edema). Chronic overexposures: Can cause benign lung disease scarring of the lungs (pulmonary fibrosis), respiratory sensitization, central nervous system damage, secondary Parkinson's disease, reproductive harm and lung cancer.

Ingestion

Not relevant, due to the form of the product.

Symptoms related to the physical, chemical and toxicological characteristics

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

Health effects from mechanical processing (e.g., cutting, grinding): Dust from processing: Chronic overexposures: Can cause reduction in the number of red blood cells (anemia), skin abnormalities (pigmentation changes), scarring of the lungs (pulmonary fibrosis) respiratory sensitization and asthma.

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 edema). Chronic overexposures: Can cause benign lung disease, scarring of the lungs (pulmonary fibrosis), respiratory sensitization, central nervous system damage, secondary Parkinson's disease, reproductive harm 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)		
<u>Acute</u>		
Oral		
LD50	Rat	> 10000 mg/kg > 2000 mg/kg
Nickel (CAS 7440-02-0)		
<u>Acute</u>		
Oral		
LD50	Rat	> 9000 mg/kg
Acute toxicity	Not classified. Based on available data, the classification criteria are not met.	
Skin corrosion/irritation	Non-corrosive.	
Serious eye damage/eye irritation	Can cause irritation.	
Respiratory or skin sensitization	Dust and fume from processing: Contains beryllium. May produce an allergic reaction. Contains nickel. May produce an allergic reaction.	
ACGIH sensitization		
BERYLLIUM AND COMPOUNDS, SOLUBLE AND INSOLUBLE COMPOUNDS, AS BE, INHALABLE FRACTION (CAS 7440-41-7)	Respiratory sensitization	
BERYLLIUM AND COMPOUNDS, SOLUBLE AND INSOLUBLE COMPOUNDS, AS BE, INHALABLE FRACTION (CAS CASNo. Not available)	Respiratory sensitization	
HEXAVALENT CHROMIUM WATER SOLUBLE INORGANIC COMPOUNDS, INCLUDING CHROMITE ORE PROCESSING, AS CR (VI), INHALABLE FRACTION (CAS CASNo. Not available)	Dermal sensitization	
	Dermal sensitization	
	Respiratory sensitization	
	Respiratory sensitization	
Respiratory sensitization	Dust and fume from processing: Contains beryllium. May produce an allergic reaction. May cause sensitization by inhalation.	

Skin sensitization	Contact with residual oil/oil coating: Prolonged skin contact may cause skin irritation and/or dermatitis.
Germ cell mutagenicity	Not classified. Product as shipped: No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic. Based on available data, the classification criteria are not met.
Neurological effects	Not classified. 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, and skin rashes.
Carcinogenicity	Product as shipped: Not classified. Dust from mechanical processing: Can present a cancer hazard (Nickel, Beryllium). Dust and fumes from welding or elevated temperature processing: Can present a cancer hazard (Hexavalent chromium compounds, Nickel compounds, Beryllium compounds, Welding fume).

IARC Monographs. Overall Evaluation of Carcinogenicity

Beryllium (CAS 7440-41-7)	1 Carcinogenic to humans.
Beryllium compounds (CAS CASNo. Not available)	1 Carcinogenic to humans.
Chromium (CAS 7440-47-3)	3 Not classifiable as to carcinogenicity to humans.
Chromium (III) compounds (CAS CASNo. Not available)	3 Not classifiable as to carcinogenicity to humans.
Chromium (VI) compounds (CAS CASNo. Not available)	1 Carcinogenic to humans.
Chromium (VI) compounds, certain water insoluble forms (CAS CASNo. Not available)	1 Carcinogenic to humans.
Chromium (VI) compounds, water soluble forms (CAS CASNo. Not available)	1 Carcinogenic to humans.
Iron oxide (CAS 1309-37-1)	3 Not classifiable as to carcinogenicity to humans.
Lead (CAS 7439-92-1)	2B Possibly carcinogenic to humans.
Lead compounds, inorganic (CAS CASNo. Not available)	2A Probably carcinogenic to humans.
Nickel (CAS 7440-02-0)	2B Possibly carcinogenic to humans.
Nickel compounds, insoluble (CAS CASNo. Not available)	1 Carcinogenic to humans.
Silica, amorphous (CAS 112926-00-8)	3 Not classifiable as to carcinogenicity to humans.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1052)

Beryllium (CAS 7440-41-7)	Cancer
Beryllium compounds (CAS CASNo. Not available)	Cancer
Chromium (VI) compounds (CAS CASNo. Not available)	Cancer
Chromium (VI) compounds, certain water insoluble forms (CAS CASNo. Not available)	Cancer
Chromium (VI) compounds, water soluble forms (CAS CASNo. Not available)	Cancer

US. National Toxicology Program (NTP) Report on Carcinogens

Beryllium (CAS 7440-41-7)	Known To Be Human Carcinogen.
Beryllium compounds (CAS CASNo. Not available)	Known To Be Human Carcinogen.
Chromium (VI) compounds (CAS CASNo. Not available)	Known To Be Human Carcinogen.
Chromium (VI) compounds, certain water insoluble forms (CAS CASNo. Not available)	Known To Be Human Carcinogen.
Chromium (VI) compounds, water soluble forms (CAS CASNo. Not available)	Known To Be Human Carcinogen.
Lead (CAS 7439-92-1)	Reasonably Anticipated to be a Human Carcinogen.
Lead compounds, inorganic (CAS CASNo. Not available)	Reasonably Anticipated to be a Human Carcinogen.
Nickel (CAS 7440-02-0)	Reasonably Anticipated to be a Human Carcinogen.
Oil mist, mineral (CAS 8012-95-1)	Known To Be Human Carcinogen.

Reproductive toxicity	Not classified. Does not present any reproductive hazards. Based on available data, the classification criteria are not met.
Routes of exposure	Inhalation. Skin contact. Eye contact.
Specific target organ toxicity - single exposure	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. Dust and fume from processing: May cause damage to organs through prolonged or repeated exposure.
Aspiration hazard	Not an aspiration hazard.

12. Ecological information

Ecotoxicity	No data is available on the product itself.
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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
Copper (CAS 7440-50-8)			
Aquatic			
Algae	LC50	Green algae (Scenedesmus dimorphus)	0.08 mg/l, 1 days 0.06 mg/l, 9 days
Crustacea	EC50	Water flea (Daphnia magna)	0.04 mg/l, 48 hours
Fish	LC50	Channel catfish (Ictalurus punctatus)	0.04 - 0.1 mg/l, 96 hours
Iron (CAS 7439-89-6)			
Aquatic			
Crustacea	LC50	Cockle (Cerastoderma edule)	100 - 330 mg/l, 48 hours
		Common shrimp, sand shrimp (Crangon crangon)	33 - 100 mg/l, 48 hours
Fish	LC50	Channel catfish (Ictalurus punctatus)	> 500 mg/l, 96 hours
Lead (CAS 7439-92-1)			
Aquatic			
Fish	LC50	Rainbow trout, donaldson trout (Oncorhynchus mykiss)	1.17 mg/l, 96 hours
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)	2.92 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 No data available on bioaccumulation.

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.

Waste codes 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 and lead in a waste disposal scenario.

Waste from residues / unused products Dispose of in accordance with local regulations.

Contaminated packaging Dispose of in accordance with local regulations.

14. Transport information

General Shipping Information

Basic Shipping 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)

Beryllium (CAS 7440-41-7)	Listed.
Chromium (CAS 7440-47-3)	Listed.
Copper (CAS 7440-50-8)	Listed.
Lead (CAS 7439-92-1)	Listed.
Manganese (CAS 7439-96-5)	Listed.
Nickel (CAS 7440-02-0)	Listed.
Zinc (CAS 7440-66-6)	Listed.

SARA 304 Emergency release notification

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1052)

Beryllium (CAS 7440-41-7)	Cancer
Beryllium compounds (CAS CASNo. Not available)	Cancer
Chromium (VI) compounds (CAS CASNo. Not available)	Cancer
Chromium (VI) compounds, certain water insoluble forms (CAS CASNo. Not available)	Cancer
Chromium (VI) compounds, water soluble forms (CAS CASNo. Not available)	Cancer
Lead (CAS 7439-92-1)	Reproductive toxicity
Lead compounds, inorganic (CAS CASNo. Not available)	Reproductive toxicity
Beryllium (CAS 7440-41-7)	lung effects (CBD and acute beryllium disease)
Beryllium compounds (CAS CASNo. Not available)	lung effects (CBD and acute beryllium disease)
Chromium (VI) compounds (CAS CASNo. Not available)	Eye irritation
Chromium (VI) compounds, certain water insoluble forms (CAS CASNo. Not available)	Eye irritation
Chromium (VI) compounds, water soluble forms (CAS CASNo. Not available)	Eye irritation
Lead (CAS 7439-92-1)	Central nervous system
Lead compounds, inorganic (CAS CASNo. Not available)	Central nervous system
Beryllium (CAS 7440-41-7)	beryllium sensitization
Beryllium compounds (CAS CASNo. Not available)	beryllium sensitization
Chromium (VI) compounds (CAS CASNo. Not available)	Skin sensitization
Chromium (VI) compounds, certain water insoluble forms (CAS CASNo. Not available)	Skin sensitization
Chromium (VI) compounds, water soluble forms (CAS CASNo. Not available)	Skin sensitization
Lead (CAS 7439-92-1)	Kidney
Lead compounds, inorganic (CAS CASNo. Not available)	Kidney
Beryllium (CAS 7440-41-7)	Skin sensitization
Beryllium compounds (CAS CASNo. Not available)	Skin sensitization

Lead (CAS 7439-92-1)	Blood
Lead compounds, inorganic (CAS CASNo. Not available)	Blood
Beryllium (CAS 7440-41-7)	skin, eye, and respiratory tract irritation
Beryllium compounds (CAS CASNo. Not available)	skin, eye, and respiratory tract irritation
Lead (CAS 7439-92-1)	Acute toxicity
Lead compounds, inorganic (CAS CASNo. Not available)	Acute toxicity

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 - Yes	
	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)
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Nothing listed

SARA 311/312 Hazardous chemical Yes

SARA 313 (TRI reporting)

Chemical name	CAS number	% by wt.
Aluminum	7429-90-5	>86
Copper	7440-50-8	<5.0
Manganese	7439-96-5	<1.0
Zinc	7440-66-6	<11.0

US state regulations

California Proposition 65

WARNING: This product can expose you to chemicals including Lead, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

California Proposition 65 - CRT: Listed date/Carcinogenic substance

Beryllium (CAS 7440-41-7)	Listed: October 1, 1987
Lead (CAS 7439-92-1)	Listed: October 1, 1992
Nickel (CAS 7440-02-0)	Listed: October 1, 1989

California Proposition 65 - CRT: Listed date/Developmental toxin

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

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

Lead (CAS 7439-92-1)	Listed: February 27, 1987
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US. California. Candidate Chemicals List. Safer Consumer Products Regulations (Cal. Code Regs, tit. 22, 69502.3, subd. (a))

Aluminum (CAS 7429-90-5)
 Beryllium (CAS 7440-41-7)
 Chromium (CAS 7440-47-3)
 Copper (CAS 7440-50-8)
 Iron (CAS 7439-89-6)
 Lead (CAS 7439-92-1)
 Lead compounds, inorganic (CAS CASNo. Not available)
 Manganese (CAS 7439-96-5)
 Nickel (CAS 7440-02-0)
 Zinc (CAS 7440-66-6)

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

Country(s) or region	Inventory name	On inventory (yes/no)*
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
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 August 27, 2018: Change(s) in Section: 15 and 16 (USA Proposition 65 Warning Added).
August 30, 2017: Change(s) in Section: 2, 3, 6, 7, 8, 11, 15 and 16.
April 27, 2017: Change(s) in Section: 1, 2, 4, 6, 7, 8, 9, 11 and 16.
February 10, 2016: Change(s) in Section: 2 and 16.
May 30, 2015: New format.
August 14, 2013: Change(s) in Section: 1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 12, 13, 15 and 16.
June 8, 2012: Change(s) in Section: 1, 2, 4, 5, 6, 7, 8, 10, 11, 12 and 13.
April 29, 2009: Change(s) in Section: 2, 7, 10 and 11.
October 24, 2008: New format.
September 28, 2007: Change(s) in Section: 1, 2, 3 and 8.
December 20, 2006: Reviewed on a periodic basis in accordance with Alcoa policy. Change(s) in Section: 1, 2, 3, 4, 5, 7, 8, 10, 11, 12 and 15.
December 4, 2003: Reviewed on a periodic basis in accordance with Alcoa policy. Change(s) in Section: 1 and 2.
Origination date: September 7, 1999

Hazardous Materials Control Committee
SDS Preparer: +1-412-553-4649.

Revision date August 27, 2018.

Version # 13

Revision information This document has undergone significant changes and should be reviewed in its entirety.

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

- Guide to Occupational Exposure Values 2016, 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 2007.
- expub, Expert Publishing, LLC., www.expub.com
- 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
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 ***

Warning

Hazard statement

May form combustible dust concentrations in air.

Precautionary statement

Prevention

Avoid breathing dust/fume. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Prevent dust accumulation to minimize explosion hazard. Use personal protective equipment as required.

Response

Not applicable.

Storage

Store in a dry place. Keep dry.

Disposal

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

Supplemental information

Dust and fume from processing: Can cause irritation of the eyes, skin and upper respiratory tract. Contains beryllium. May produce an allergic reaction. May cause sensitization by inhalation and skin contact.

Health effects from mechanical processing (e.g., cutting, grinding): Dust from processing: Chronic overexposures: Can cause reduction in the number of red blood cells, skin abnormalities (pigmentation changes), scarring of the lungs (pulmonary fibrosis), respiratory sensitization and asthma.

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 edema). Chronic overexposures: Can cause benign lung disease, scarring of the lungs (pulmonary fibrosis), respiratory sensitization, central nervous system damage, secondary Parkinson's disease, reproductive harm 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. 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.

• Dust and fines 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 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 water in fighting fires around molten metal. **DO NOT USE** halogenated extinguishing agents on small chips/fines. 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. Wear appropriate personal protective equipment.

See Arconic SDS Number 1056.

CHEMTRAC: +1-703-527-3887 or +1-800-424-9300 (24 Hour Emergency Telephone, multiple languages spoken); Arconic: +1-412-553-4001 (24 Hour Emergency Telephone, only English spoken)

California Proposition 65



WARNING:

This product can expose you to chemicals including Lead, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.



ARCONIC