



# SAFETY DATA SHEET

## 1. Identification

<b>Product identifier</b>	<b>WROUGHT ALUMINUM PRODUCTS, 6xxx SERIES ALLOYS</b>
<b>Other means of identification</b>	
<b>SDS number</b>	668
<b>Version #</b>	13
<b>Revision date</b>	August 24, 2017.
<b>Other means of identification</b>	
<b>Synonyms</b>	6xxx series alloys, Alclad 6061 * C02U, C03T, C03U, C04J, C04T, C05T, C14N, C16N, C17T, C211, C25T, C333, C34P, C36P, C38P, C39P, C400, C40H, C41P, C420, C43P, C44P, C456, C45A, C45E, C593, C63B, C703, C704, C73H, C74H, C76E, C87H, C95T, C989, CA65, CB90, CE84, CH68, CU74, CZ19, CZ26, C32T, C40T, C58P, C74W, C95U, C83Z, C412F, C411F, C83S, C452F, C16T, C471F, C472F, C485F, C41H, C439F, C61B, * C61B, C532F, C710, C81U, C57H, C22Z, C501F, C593F, C020D, C010D, C79A, C030D, C31P, C37Z, C02T, C040D, C629F, C67Z, C69Z, C76Z, C01U, C51ZM, C94T, C85A, C2A5, C0A2, C0A8, C3A4, C1A9, C669F, C651F, * C682F, C46P, C504F, C871F, C872F, C885F, C03S, C01T, C822F, C20U, C42P, C88U, C336, C050D, C6A1, C156H, C12Z, C166H, C4A1, C183H, C184H, C197H, C196H, C201H, C225H, C226H, C227H, C229H, C167H, C230H, C231H, C45P, C247H, C221H, * C128H, C199H, C312H, C7A1, C256H, C173H, C296H, C300H, C292H, C328H, C327H, C324H, C329H, C398H, C399H, C344H, C362H, C346H, C347H, C350H, C214H, C311H, C317H, C323H, C209H, C321H, C348H, C361H, C325H, C301H, C200H, C0A7, C224H, C65U, C364H, C366H
<b>Recommended use</b>	Various fabricated aluminum parts and products
<b>Recommended Restrictions</b>	Does not include alloys: C217H, C228H, C524F, 6012, 6018, 6026, 6042, 6064, 6064A, 6068, 6262, C6262, C6262V (See SDS Number 390); C213H, C366, C533F, 6012A, 6020, C6020, 6021, 6023, 6028, 6040, 6041, 6262A (See SDS Number 723); C210, C215H, C26N (See SDS Number 973); C7A5, (See SDS Number 1008); C016D, (See SDS Number 807) Commercial or industrial use.
<b>Manufacturer/Importer/Supplier/Distributor information</b>	
<b>Manufacturer</b>	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
<b>Emergency Information</b>	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)
<b>Website</b>	For a current Safety Data Sheet, refer to Arconic websites: <a href="http://www.arconic.com">www.arconic.com</a> or internally at <a href="http://my.arconic.com">my.arconic.com</a> EHS Community.

## 2. Hazard(s) identification

### Classification

This material is hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29CFR 1910.1200.

### Potential health effects

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

<b>Physical hazards</b>	Not classified.	
<b>Health hazards</b>	Sensitization, skin	Category 1
	Carcinogenicity	Category 2
<b>Environmental hazards</b>	Not classified.	

OSHA defined hazards

Combustible dust

Label elements



Signal word

Warning

Hazard statement

May cause an allergic skin reaction. Suspected of causing cancer.  
May form combustible dust concentrations in air.

Precautionary statement

Prevention

Avoid breathing dust/fume. Wear protective gloves and eye/face protection. Contaminated work clothing must not be allowed out of the workplace. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Prevent dust accumulation to minimize explosion hazard.

Response

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. Store in a dry place.

Disposal

Reuse or recycle material whenever possible.  
Dispose of contents/container in accordance with local/regional/national/international regulations.

Specific hazards

- 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.

Non-combustible as supplied. Small chips, fine turnings, dust, fines or particulate from processing may be readily ignitable.

Explosion/fire hazards may be present when (See Sections 5, 7 and 10 for additional information):

- Dust, fines or particulate are dispersed in air.
- 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).

Hazard(s) not otherwise classified (HNOC)

None known.

Supplemental information

None.

### 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	≥90
Magnesium		7439-95-4	≤4.1
Zinc		7440-66-6	≤4.0
Silicon		7440-21-3	≤1.9
Manganese		7439-96-5	≤1.5
Copper		7440-50-8	≤1.4
Iron		7439-89-6	≤1.2
Chromium		7440-47-3	≤0.5
†Lead		7439-92-1	0 - 0.05
‡Nickel		7440-02-0	0 - 0.2

Additional Information

† - Present as impurity. While Lead is not intentionally added to this mixture, it could potentially enter through the recycle stream.

† - Alloys: 6033, 6061A, 6065, 6082A. 6351A.

‡ - Present as impurity. While Nickel is not intentionally added to this mixture, it could potentially enter through the recycle stream.

Additional compounds which may be formed during processing are listed in Section 8.

## 4. First-aid measures

<b>Eye contact</b>	Dust and fumes from processing: Rinse eyes with plenty of water or saline for at least 15 minutes. Consult a physician.
<b>Skin contact</b>	Dust and fume from processing or contact with lubricant/residual oil: Wash off with soap and water. Get medical attention if irritation develops or persists.
<b>Inhalation</b>	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.
<b>Ingestion</b>	Not relevant, due to the form of the product.
<b>Most important symptoms/effects, acute and delayed</b>	Dust and fumes from processing: Irritating to eyes, respiratory system and skin. Contains nickel. May produce an allergic reaction.  Additional health effects from elevated temperature processing (e.g., welding, melting): Heating above the melting point releases metallic oxides which may cause metal fume fever by inhalation. The symptoms are shivering, fever, malaise and muscular pain.  Contact with residual oil/oil coating: Prolonged or repeated skin contact may cause sensitization and allergic contact dermatitis. See Section 11 of the SDS for additional information on health hazards.
<b>Medical conditions aggravated by exposure</b>	Asthma, chronic lung disease, and skin rashes.
<b>Indication of immediate medical attention and special treatment needed</b>	Provide general supportive measures and treat symptomatically.
<b>General information</b>	Dust and fume from processing: If you feel unwell, seek medical advice (show the label where possible).

## 5. Fire-fighting measures

<b>Suitable extinguishing media</b>	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, fines or particulate.
<b>Unsuitable extinguishing media</b>	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.
<b>Specific hazards arising from the chemical</b>	May be a potential hazard under the following conditions: <ul style="list-style-type: none"><li>• Dust, fines or particulate 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.</li><li>• Chips, dust, fines or particulate in contact with water can generate flammable/explosive hydrogen gas. These gases could present an explosion hazard in confined or poorly ventilated spaces.</li><li>• Dust, fines or particulate 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.</li><li>• 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., dust, fines or particulate, 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.</li></ul>
<b>Hazardous combustion products</b>	No hazardous decomposition products are known.
<b>Special protective equipment and precautions for firefighters</b>	Firefighters should wear NIOSH approved, positive pressure, self-contained breathing apparatus and full protective clothing when appropriate.
<b>Fire fighting equipment/instructions</b>	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.
<b>General fire hazards</b>	This product does not present fire or explosion hazards as shipped. Small chips, fine turnings, and dust from processing may be readily ignitable.
<b>Explosion data</b>	
<b>Sensitivity to mechanical impact</b>	Not sensitive.

**Sensitivity to static discharge**

Product as shipped: Not sensitive.

Dust from processing 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 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. 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**

Keep unnecessary personnel away.

**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**

No special environmental precautions required.

## 7. Handling and storage

**Handling**

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

**Storage**

Store in a dry place.

**Requirements for Processes Which Generate Dusts or Fines**

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

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

Local ventilation and vacuum systems must be designed to handle 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.

Dust collection systems must be dedicated to aluminum dust only and should be clearly labeled as such. 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.

Avoid all ignition sources. Good housekeeping practices must be maintained. Do not use compressed air to remove settled material from floors, beams or equipment. Do not allow chips, dust, fines or particulate to contact water, particularly in enclosed areas.

Dust, fines or particulate accumulation on the floor, ledges and beams can present a risk of ignition, flame propagation and secondary explosions. Regularly clean building structures, equipment and machinery to avoid accumulation of dust, fines or particulate that could become airborne.

## Requirements for Remelting of Scrap Material or Ingot

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

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

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

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

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

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

## Dross Handling

Small amounts of beryllium (<0.0001% or <1 ppm) can be present in aluminum alloys either from naturally occurring beryllium in aluminum ore or as a alloying element in the aluminum recycling stream. This beryllium does not present an health hazard during processing (grinding, cutting or welding) of aluminum products. However, 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](http://www.arconic.com) or by calling +412-553-4649.

## 8. Exposure controls/personal protection

### Occupational exposure limits

#### U.S. - OSHA Components

Type	Value	Form
±Nickel (CAS 7440-02-0)	1 mg/m3	
Aluminum (CAS 7429-90-5)	5 mg/m3	Respirable fraction
	15 mg/m3	Total dust
Chromium (CAS 7440-47-3)	1 mg/m3	
Copper (CAS 7440-50-8)	1 mg/m3	Dust and mist.
	0.1 mg/m3	Fume.
Silicon (CAS 7440-21-3)	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)	5 mg/m3	Respirable fraction.
	15 mg/m3	Total dust.
Chromium (VI) compounds, certain water insoluble forms	0.0025 mg/m3	Action Level as Cr(VI))
Iron oxide (CAS 1309-37-1)	10 mg/m3	Fume.
Lead compounds, inorganic	0.05 mg/m3	(as Pb)
	0.03 mg/m3	Action Level (as Pb)

**U.S. - OSHA****Compounds Formed During Processing**

	Type	Value	Form
Manganese compounds, inorganic	Ceiling	5 mg/m <sup>3</sup>	(as Mn) Fume
Nickel compounds, insoluble	TWA	1 mg/m <sup>3</sup>	(as Ni)
Nitric oxide (CAS 10102-43-9)	TWA	30 mg/m <sup>3</sup>	
Ozone (CAS 10028-15-6)	TWA	25 ppm 0.2 mg/m <sup>3</sup>	
Silica, amorphous (CAS 112926-00-8)	TWA	0.1 ppm 20 mppcf	80 mg/m <sup>3</sup> / %SiO <sub>2</sub>
Zinc oxide (CAS 1314-13-2)	TWA	5 mg/m <sup>3</sup>	Fume.
		5 mg/m <sup>3</sup>	Respirable fraction.
		5 mg/m <sup>3</sup>	
		15 mg/m <sup>3</sup>	Total dust.
	TWA (fume)	5 mg/m <sup>3</sup>	Fume.
	TWA (total dust)	15 mg/m <sup>3</sup>	Total dust.

**Residuals**

	Type	Value	Form
Oil mist, mineral (CAS 8012-95-1)	TWA	5 mg/m <sup>3</sup>	Mist.

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

Components	Type	Value	Form
†Lead (CAS 7439-92-1)	TWA	0.05 mg/m <sup>3</sup>	

**Compounds Formed During Processing**

	Type	Value	Form
Chromium (VI) compounds, certain water insoluble forms	TWA	0.005 mg/m <sup>3</sup>	as Cr(VI)
Chromium (VI) compounds (CAS 18540-29-9)	TWA	0.005 mg/m <sup>3</sup>	

**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/m <sup>3</sup>	Respirable fraction.
Manganese (CAS 7439-96-5)	Ceiling	5 mg/m <sup>3</sup>	Fume.

**Compounds Formed During Processing**

	Type	Value	Form
Chromium (II) compounds	PEL	0.5 mg/m <sup>3</sup>	
Chromium (III) compounds	PEL	0.5 mg/m <sup>3</sup>	
Chromium (VI) compounds (CAS 18540-29-9)	PEL	1 mg/m <sup>3</sup>	
Magnesium oxide (CAS 1309-48-4)	PEL	15 mg/m <sup>3</sup>	Total particulate.
Manganese oxide (CAS 1344-43-0)	Ceiling	5 mg/m <sup>3</sup>	
Nitrogen dioxide (CAS 10102-44-0)	Ceiling	9 mg/m <sup>3</sup>	
Zinc oxide (CAS 1314-13-2)	PEL	5 ppm 5 mg/m <sup>3</sup>	Respirable fraction.
		5 mg/m <sup>3</sup> 15 mg/m <sup>3</sup>	Fume. Total dust.

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

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

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

<b>Compounds Formed During Processing</b>	<b>Type</b>	<b>Value</b>	
Chromium (VI) compounds (CAS 18540-29-9)	Ceiling	0.1 mg/m3	

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

<b>Components</b>	<b>Type</b>	<b>Value</b>	<b>Form</b>
Aluminum (CAS 7429-90-5)	TWA	5 mg/m3 15 mg/m3 50 mppcf 15 mppcf	Respirable fraction. Total dust. Total dust. Respirable fraction.

<b>Compounds Formed During Processing</b>	<b>Type</b>	<b>Value</b>	<b>Form</b>
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Aluminum oxide (non-fibrous) (CAS 1344-28-1)	TWA	5 mg/m3	Respirable fraction.
Iron oxide (CAS 1309-37-1)	TWA	15 mg/m3 5 mg/m3	Total dust. Respirable fraction.
Magnesium oxide (CAS 1309-48-4)	TWA	15 mg/m3 50 mppcf 15 mppcf 5 mg/m3	Total dust. Total dust. Respirable fraction. Respirable fraction.
		15 mg/m3 50 mppcf 15 mppcf	Total dust. Total dust. Respirable fraction.

**ACGIH**

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

<b>Compounds Formed During Processing</b>	<b>Type</b>	<b>Value</b>	<b>Form</b>
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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: Short Term Exposure Limit (STEL): mg/m3**

<b>Compounds Formed During Processing</b>	<b>Type</b>	<b>Value</b>	<b>Form</b>
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Zinc oxide (CAS 1314-13-2)	STEL	10 mg/m3	Respirable fraction.
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**US ACGIH Threshold Limit Values: Time Weighted Average (TWA): mg/m3 & ppm**

<b>Compounds Formed During Processing</b>	<b>Type</b>	<b>Value</b>	
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Nitric oxide (CAS 10102-43-9)	TWA	25 ppm	
Nitrogen dioxide (CAS 10102-44-0)	TWA	0.2 ppm	

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

Components	Type	Value	Form
†Lead (CAS 7439-92-1)	TWA	0.05 mg/m3	
‡Nickel (CAS 7440-02-0)	TWA	1.5 mg/m3	Inhalable fraction.
Aluminum (CAS 7429-90-5)	TWA	1 mg/m3	Respirable fraction.
Chromium (CAS 7440-47-3)	TWA	0.5 mg/m3	
Copper (CAS 7440-50-8)	TWA	1 mg/m3	Dust and mist.
		0.2 mg/m3	Fume.
Manganese (CAS 7439-96-5)	TWA	0.1 mg/m3	Inhalable fraction.
		0.02 mg/m3	Respirable fraction.
Compounds Formed During Processing	Type	Value	Form
Chromium (III) compounds	TWA	0.5 mg/m3	
Chromium (VI) compounds, certain water insoluble forms	TWA	0.01 mg/m3	(as Cr)
Chromium (VI) compounds (CAS 18540-29-9)	TWA	0.01 mg/m3	(As Cr)
Iron oxide (CAS 1309-37-1)	TWA	5 mg/m3	Respirable fraction.
Lead compounds, inorganic	TWA	0.05 mg/m3	
Magnesium oxide (CAS 1309-48-4)	TWA	10 mg/m3	Inhalable fraction.
Manganese compounds, inorganic	TWA	0.1 mg/m3	Inhalable fraction.
		0.02 mg/m3	Respirable fraction.
Manganese oxide (CAS 1344-43-0)	TWA	0.1 mg/m3	Inhalable fraction.
		0.02 mg/m3	Respirable fraction.
Nickel compounds, insoluble	TWA	0.2 mg/m3	Inhalable fraction.
Zinc oxide (CAS 1314-13-2)	TWA	2 mg/m3	Respirable fraction.
Residuals	Type	Value	Form
Oil mist, mineral (CAS 8012-95-1)	TWA	5 mg/m3	Inhalable fraction.

**General**

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

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**

Fixed vacuum cleaning and dust collection systems used to convey dust, fines or particulate need to discharge to a collection system located outside the building, designed and protected to prevent injury to personnel and damage to nearby equipment and structures.

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 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**

The need for personal protective equipment (gloves) should be based upon a hazard assessment and recommendations from health / safety professionals. Wear impervious gloves to avoid repeated or prolonged skin contact with residual oils and to avoid any skin injury. When material is heated, wear gloves to protect against thermal burns.



<b>Other</b>	The need for personal protective equipment should be based upon a hazard assessment and recommendations from health / safety professionals.
	Dust, fines or particulate: Wear fire/flame resistant/retardant, non-static clothing. Molten metal: Wear fire/flame resistant/retardant clothing.
<b>Respiratory protection</b>	Dust and fumes from processing: Use NIOSH-approved respiratory protection as specified by an Industrial Hygienist or other qualified professional if concentrations exceed the limits listed in Section 8. Suggested respiratory protection: N95, N100 for Lead.
<b>Thermal hazards</b>	Contact with molten material can cause thermal burns. Hot aluminum does not necessarily glow red. When material is heated, wear gloves to protect against thermal burns. Flame retardant protective clothing is recommended. Molten metal: Full Face Shield.
<b>General hygiene considerations</b>	Wash hands and face before breaks and immediately after handling the product.
<b>Control parameters</b>	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.
<b>Environmental exposure controls</b>	No special environmental precautions required.

## 9. Physical and chemical properties

<b>Form</b>	Massive, solid metal.
<b>Color</b>	Silver colored.
<b>Odor</b>	Odorless
<b>Odor threshold</b>	Not applicable.
<b>pH</b>	Not applicable.
<b>Density</b>	2.69 - 2.74 g/cm <sup>3</sup>
<b>Melting point/freezing point</b>	1029.92 - 1209.92 °F (554.4 - 654.4 °C) / Melting point
<b>Initial boiling point and boiling range</b>	Not determined
<b>Flash point</b>	Not applicable
<b>Evaporation rate</b>	Not applicable
<b>Flammability (solid, gas)</b>	Not applicable.
<b>Upper/lower flammability or explosive limits</b>	
<b>Flammability limit - upper (%)</b>	Not applicable
<b>Flammability limit - lower (%)</b>	Not applicable
<b>Explosive properties</b>	Dust clouds may be explosive under certain conditions.
<b>Dust explosion properties</b>	
<b>St class</b>	Very strong explosion.
<b>Vapor pressure</b>	Not applicable.
<b>Vapor density</b>	Not applicable.
<b>Relative density</b>	Not determined
<b>Solubility(ies)</b>	Insoluble
<b>Partition coefficient (n-octanol/water)</b>	Not applicable. Not applicable
<b>Auto-ignition temperature</b>	Not applicable
<b>Decomposition temperature</b>	Not applicable
<b>Viscosity</b>	Not applicable.

## 10. Stability and reactivity

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

## Conditions to avoid

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.

Chips, dust, fines or particulate, 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.

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  $\mu\text{m}$  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.

## Incompatible materials

Chips, dust, fines or particulate, 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., dust, fines or particulate).
- Halogenated compounds: Many halogenated hydrocarbons, including halogenated fire extinguishing agents, can react violently with chips, dust, fines or particulate, or molten aluminum.
- Iron oxide (rust) and other metal oxides (e.g., copper and lead oxides): A violent thermite reaction generating considerable heat can occur. Reaction with aluminum fines and dusts requires only very weak ignition sources for initiation. Molten aluminum can react violently with iron oxide without external ignition source.
- Iron powder and water: Explosive reaction forming hydrogen gas when heated above 1470°F (800°C).

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.

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).

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

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

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.

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

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).

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).

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.

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).

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).

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

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).

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).

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 NO<sub>2</sub>): 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 (NO<sub>2</sub>): Chronic overexposures: Can cause scarring of the lungs (pulmonary fibrosis).

#### Information on likely routes of exposure

<b>Eye contact</b>	Dust and fumes from processing: Can cause irritation.
<b>Skin contact</b>	Contact with residual oil/oil coating: Can cause irritation. Prolonged or repeated skin contact may cause dermatitis. Dust and fumes from processing: Can cause irritation. Contains (Nickel). May produce an allergic reaction.
<b>Inhalation</b>	Health effects from mechanical processing (e.g., cutting, grinding): Dust: Can cause irritation of the upper respiratory tract. Chronic exposure: Can cause reduction in the number of red blood cells (anemia) and skin abnormalities (pigmentation changes).  Additional health effects from elevated temperature processing (e.g., welding, melting): Dusts and fumes: Can cause irritation of the respiratory tract. Acute exposure: Can cause metal fume fever (nausea, chills, fever, 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 exposure: Can cause respiratory sensitization central nervous system damage, secondary Parkinson's disease, reproductive harm, scarring of the lungs (pulmonary fibrosis) and lung disease.
<b>Ingestion</b>	Not likely, due to the form of the product.
<b>Symptoms related to the physical, chemical and toxicological characteristics</b>	Dust from mechanical processing: Can cause irritation of the upper respiratory tract. Chronic overexposures: Can cause reduction in the number of red blood cells (anemia), and skin abnormalities (pigmentation changes). Contains nickel, which can cause lung or nasal cancer. Long-term breathing of this material may cause chronic lung disease. May cause an allergic skin reaction. May cause sensitization of susceptible persons by skin contact. Lead may damage kidney function, the blood forming system and the reproductive system. Additional health effects from elevated temperature processing (e.g., welding, melting): Dust and fumes from processing: Can cause of the respiratory tract irritation. Acute overexposure: Can cause metal fume fever (nausea, chills, fever, 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 central nervous system damage, secondary Parkinson's disease, reproductive harm, respiratory sensitization 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
‡Nickel (CAS 7440-02-0)		
<b>Acute</b>		
<b>Oral</b>		
LD50	Rat	> 9000 mg/kg
Aluminum (CAS 7429-90-5)		
<b>Acute</b>		
<b>Oral</b>		
LD50	Rat	> 10000 mg/kg > 2000 mg/kg
Zinc (CAS 7440-66-6)		
<b>Acute</b>		
<b>Oral</b>		
LD50	Rat	630 mg/kg
<b>Acute toxicity</b>	Not classified. Based on available data, the classification criteria are not met.	
<b>Skin corrosion/irritation</b>	Not classified. Based on available data, the classification criteria are not met. Non-corrosive.	
<b>Serious eye damage/eye irritation</b>	Dust and fume from processing: Can cause mechanical irritation.	
<b>Respiratory or skin sensitization</b>		
<b>Respiratory sensitization</b>	Not classified. Based on available data, the classification criteria are not met.	
<b>Skin sensitization</b>	Dust and fume from processing: Direct contact may irritate. Contains nickel. May produce an allergic reaction. Contact with residual oil/oil coating: Prolonged or repeated exposure may cause: Mild dermatitis, allergic skin rash.	
<b>Germ cell mutagenicity</b>	Classification not possible. Due to lack of data the classification is not possible.	
<b>Pre-existing conditions aggravated by exposure</b>	Asthma, chronic lung disease, Secondary Parkinson's disease and skin rashes.	
<b>Carcinogenicity</b>	Product as shipped: Does not present any cancer hazards. Dust from mechanical processing: Can present a cancer hazard (Nickel, Lead).  Dust and fumes from welding or elevated temperature processing: Can present a cancer hazard (Hexavalent chromium compounds, Nickel compounds, Lead compounds, Welding fumes).	
<b>ACGIH Carcinogens</b>		
†Lead (CAS 7439-92-1)	A3 Confirmed animal carcinogen with unknown relevance to humans.	
‡Nickel (CAS 7440-02-0)	A5 Not suspected as a human carcinogen.	
Aluminum (CAS 7429-90-5)	A4 Not classifiable as a human carcinogen.	
Aluminum oxide (non-fibrous) (CAS 1344-28-1)	A4 Not classifiable as a human carcinogen.	
Chromium (CAS 7440-47-3)	A4 Not classifiable as a human carcinogen.	
Chromium (III) compounds (CAS S~CR3~I)	A4 Not classifiable as a human carcinogen.	
Chromium (VI) compounds (CAS 18540-29-9)	A1 Confirmed human carcinogen.	
Chromium (VI) compounds, certain water insoluble forms (CAS S~CR6~L)	A1 Confirmed human carcinogen.	
Iron oxide (CAS 1309-37-1)	A4 Not classifiable as a human carcinogen.	
Lead compounds, inorganic (CAS S~PB~I)	A3 Confirmed animal carcinogen with unknown relevance to humans.	
Magnesium oxide (CAS 1309-48-4)	A4 Not classifiable as a human carcinogen.	
Manganese (CAS 7439-96-5)	A4 Not classifiable as a human carcinogen.	
Manganese oxide (CAS 1344-43-0)	A4 Not classifiable as a human carcinogen.	
Nickel compounds, insoluble (CAS S~NI~L)	A1 Confirmed human carcinogen.	
Nitrogen dioxide (CAS 10102-44-0)	A4 Not classifiable as a human carcinogen.	
Oil mist, mineral (CAS 8012-95-1)	A2 Suspected human carcinogen.	
Ozone (CAS 10028-15-6)	A4 Not classifiable as a human carcinogen.	
<b>IARC Monographs. Overall Evaluation of Carcinogenicity</b>		
†Lead (CAS 7439-92-1)	2B Possibly carcinogenic to humans.	
‡Nickel (CAS 7440-02-0)	2B Possibly carcinogenic to humans.	

Chromium (CAS 7440-47-3)	3 Not classifiable as to carcinogenicity to humans.
Chromium (III) compounds (CAS S~CR3~I)	3 Not classifiable as to carcinogenicity to humans.
Chromium (VI) compounds (CAS 18540-29-9)	1 Carcinogenic to humans.
Chromium (VI) compounds, certain water insoluble forms (CAS S~CR6~L)	1 Carcinogenic to humans.
Iron oxide (CAS 1309-37-1)	3 Not classifiable as to carcinogenicity to humans.
Lead compounds, inorganic (CAS S~PB~I)	2A Probably carcinogenic to humans.
Nickel compounds, insoluble (CAS S~NI~L)	1 Carcinogenic to humans.
Silica, amorphous (CAS 112926-00-8)	3 Not classifiable as to carcinogenicity to humans.

**US OSHA Hazard Categories (10)**

Not regulated.

**US OSHA Hazard Categories (9)**

Not regulated.

**US. National Toxicology Program (NTP) Report on Carcinogens**

†Lead (CAS 7439-92-1)	Reasonably Anticipated to be a Human Carcinogen.
‡Nickel (CAS 7440-02-0)	Reasonably Anticipated to be a Human Carcinogen.
Chromium (VI) compounds (CAS 18540-29-9)	Known To Be Human Carcinogen.
Chromium (VI) compounds, certain water insoluble forms (CAS S~CR6~L)	Known To Be Human Carcinogen.
Lead compounds, inorganic (CAS S~PB~I)	Reasonably Anticipated to be a Human Carcinogen.
Oil mist, mineral (CAS 8012-95-1)	Known To Be Human Carcinogen.

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

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

**Reproductive toxicity**

Product as shipped: Does not present any reproductive hazards.  
 Dust from mechanical processing: Can present a reproductive hazard (Lead).  
 Additional health effects from elevated temperature processing (e.g., welding, melting): Dust and fume from processing: Can present a reproductive hazard (Lead compounds, Manganese compounds).

**Routes of exposure**

Eye contact. Skin contact. Inhalation.

**Specific target organ toxicity - single exposure**

Not classified. Based on available data, the classification criteria are not met.

**Specific target organ toxicity - repeated exposure**

Dust and fume from processing: Chronic overexposures: Causes damage to organs through prolonged or repeated exposure by inhalation.

**Aspiration hazard**

Not applicable. Not an aspiration hazard.

**Chronic effects**

Dust and fumes from processing: Chronic overexposures: Contains nickel, which can cause lung or nasal cancer. Long-term breathing of this material may cause chronic lung disease. Risk of sensitization or allergic reactions among sensitive individuals. Lead may damage kidney function, the blood forming system and the reproductive system. Lead is accumulated in the body and may cause damage to the brain and nervous system after prolonged exposure.

**Further information**

None known.

**12. Ecological information**

**Ecotoxicity**

This material is not expected to be harmful to aquatic life.

Components	Species	Test Results
†Lead (CAS 7439-92-1)		
<b>Aquatic</b>		
Fish	LC50 Rainbow trout, donaldson trout (Oncorhynchus mykiss)	1.17 mg/l, 96 hours
‡Nickel (CAS 7440-02-0)		
<b>Aquatic</b>		
Crustacea	EC50 Water flea (Daphnia magna)	1 mg/l, 48 hours
Fish	LC50 Fathead minnow (Pimephales promelas)	2.923 mg/l, 96 hours
Chromium (CAS 7440-47-3)		
<b>Aquatic</b>		
Crustacea	EC50 Water flea (Daphnia magna)	0.01 - 0.7 mg/l, 48 hours

Components	Species	Test Results	
Fish	LC50	Carp (Cyprinus carpio)	14.3 mg/l, 96 hours
Copper (CAS 7440-50-8)			
<b>Aquatic</b>			
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)			
<b>Aquatic</b>			
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
Manganese (CAS 7439-96-5)			
<b>Aquatic</b>			
Crustacea	EC50	Water flea (Daphnia magna)	40 mg/l, 48 hours
Zinc (CAS 7440-66-6)			
<b>Aquatic</b>			
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

\* Estimates for product may be based on additional component data not shown.

<b>Persistence and degradability</b>	The product contains inorganic compounds which are not biodegradable.
<b>Bioaccumulative potential</b>	The product is not bioaccumulating.
<b>Mobility in soil</b>	Not considered mobile.
<b>Mobility in general</b>	Not considered mobile.
<b>Other adverse effects</b>	None known.

### 13. Disposal considerations

<b>Disposal instructions</b>	Reuse or recycle material whenever possible. If reuse or recycling is not possible, disposal must be made according to local or governmental regulations.
<b>Waste codes</b>	RCRA Status: Must be determined at the point of waste generation. If material is disposed as a waste, it must be characterized under RCRA according to 40 CFR, Part 261, or state equivalent in the U.S. TCLP testing is recommended for Chromium and Lead in a waste disposal scenario.
<b>Waste from residues / unused products</b>	Dispose of in accordance with local regulations.
<b>Contaminated packaging</b>	Dispose of in accordance with local regulations.

### 14. Transport information

#### General Shipping Information

##### Basic Shipping Information

<b>ID number</b>	-
<b>Proper shipping name</b>	Not regulated
<b>Hazard class</b>	-
<b>Packing group</b>	-

#### 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 & 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.

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

†Lead (CAS 7439-92-1)	0.1 % One-Time Export Notification only.
Zinc (CAS 7440-66-6)	1.0 % One-Time Export Notification only.

### US CERCLA Hazardous Substances: Reportable quantity

†Lead (CAS 7439-92-1)	10 LBS
‡Nickel (CAS 7440-02-0)	100 LBS
Chromium (CAS 7440-47-3)	5000 LBS
Copper (CAS 7440-50-8)	5000 LBS
Zinc (CAS 7440-66-6)	1000 LBS

### CERCLA Hazardous Substance List (40 CFR 302.4)

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

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

†Lead (CAS 7439-92-1)	Reproductive toxicity
Chromium (VI) compounds (CAS 18540-29-9)	Cancer
Chromium (VI) compounds, certain water insoluble forms (CAS S~CR6~L)	Cancer
Lead compounds, inorganic (CAS S~PB~I)	Reproductive toxicity
†Lead (CAS 7439-92-1)	Central nervous system
Chromium (VI) compounds (CAS 18540-29-9)	Eye irritation
Chromium (VI) compounds, certain water insoluble forms (CAS S~CR6~L)	Eye irritation
Lead compounds, inorganic (CAS S~PB~I)	Central nervous system
†Lead (CAS 7439-92-1)	Kidney
Chromium (VI) compounds (CAS 18540-29-9)	Skin sensitization
Chromium (VI) compounds, certain water insoluble forms (CAS S~CR6~L)	Skin sensitization
Lead compounds, inorganic (CAS S~PB~I)	Kidney
†Lead (CAS 7439-92-1)	Blood
Lead compounds, inorganic (CAS S~PB~I)	Blood
†Lead (CAS 7439-92-1)	Acute toxicity
Lead compounds, inorganic (CAS S~PB~I)	Acute toxicity

### US OSHA Hazard Categories (9)

Not regulated.

### US OSHA Hazard Categories (10)

Not regulated.

### Superfund Amendments and Reauthorization Act of 1986 (SARA)

<b>Section 311/312 hazard categories</b>	Immediate Hazard - Yes	If particulates/fumes generated during processing
	Delayed Hazard - Yes	If particulates/fumes generated during processing
	Fire Hazard - No	
	Pressure Hazard - No	
	Reactivity Hazard - Yes	If molten

### SARA 302 Extremely hazardous substance

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



SARA 311/312 Hazardous chemical Yes

SARA 313 (TRI reporting)

Chemical name	CAS number	% by wt.
Aluminum	7429-90-5	≥90
Zinc	7440-66-6	≤4.0
Manganese	7439-96-5	≤1.5
Copper	7440-50-8	≤1.4
‡Nickel	7440-02-0	0 - 0.2

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

†Lead (CAS 7439-92-1) Listed: October 1, 1992  
‡Nickel (CAS 7440-02-0) Listed: October 1, 1989

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

†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

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

†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)	Yes
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).

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 24, 2017: Change(s) in Section: 1, 2, 7, 9, 15 and 16.  
March 27, 2017: Change(s) in Section: 1, 2, 3, 8, 11, 15 and 16.  
November 3, 2016: Change(s) in Section: 1, 2, 3. and 16.  
November 9, 2015: Change(s) in Section: 15 and 16.  
March 10, 2015: Change(s) in Section: 2, 3 and 16.  
June 14, 2013: Change(s) in Section: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15 and 16.  
December 1, 2009: New format. October 25, 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  
August 14, 2003: Reviewed on a periodic basis in accordance with Alcoa policy. Change(s) in Section: 1, 2, 3, 8 and 15  
Origination date: March 16, 1990  
Hazardous Materials Control Committee  
+1-412-553-4649

Revision date

August 24, 2017.

<b>Version #</b>	13
<b>Revision information</b>	Product and Company Identification: Product and Company Identification Identification: Website Handling and storage: Dross Handling Physical & Chemical Properties: Multiple Properties Toxicological information: Symptoms related to the physical, chemical and toxicological characteristics GHS: Classification
<b>Further information</b>	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.
<b>Disclaimer</b>	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 2005.
- 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 cause an allergic skin reaction. Suspected of causing cancer. May form combustible dust concentrations in air.

### Precautionary statement

#### Prevention

Avoid breathing dust/fume. Wear protective gloves and eye/face protection. Contaminated work clothing must not be allowed out of the workplace. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Prevent dust accumulation to minimize explosion hazard.

#### Response

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. Store in a dry place.

#### Disposal

Reuse or recycle material whenever possible. Dispose of contents/container in accordance with local/regional/national/international regulations.

### Supplemental information

Dust and fumes from processing: Health effects from mechanical processing (e.g., cutting, grinding): Dust: Can cause irritation of the eyes, skin and respiratory tract. Chronic overexposures: Can cause reduction in the number of red blood cells and skin abnormalities. Additional health effects from elevated temperature processing (e.g., welding, melting): Dust and fume from processing: Acute overexposure: Can cause metal fume fever (nausea, fever, chills, shortness of breath and malaise), reduced ability of the blood to carry oxygen and the accumulation of fluid in the lungs. Chronic overexposures: Can cause scarring of the lungs, central nervous system damage, secondary Parkinson's disease, respiratory sensitization, reproductive harm and lung cancer.

Contains nickel. May produce an allergic reaction.

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

This product does not present fire or explosion hazards as shipped. Small chips, fine turnings, dust, fines or particulate 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:** Avoid dust formation. Collect scrap for recycling. If molten: Use dry sand to contain the flow of material. All tooling (e.g., shovels or hand tools) and containers which come in contact with molten metal must be preheated or specially coated, rust free and approved for such use. Allow the spill to cool before remelting as scrap.

See Arconic SDS Number 668.

