SAFETY DATA SHEET

1. Identification

Product identifier **WROUGHT ALUMINUM PRODUCTS, 6xxx SERIES ALLOYS**

Other means of identification

SDS number 668

Version # 10

Revision date November 9, 2015.

Other means of identification

Synonyms 6xxx series alloys * C010D, C01D, C01T, C01U, C020D, C02B, C02P, C02T, C02U, C030D, C03B, C03J, C03P, C03S, C03T, C03U, C040D, C04A, C04H, C04J, C04P, C04T, C04Z, C050D, C05H, C05J, C05P, C05T, C05Z, C07C, C07E, C07H, C07J, C07S, C07Z, C08C, C08M, C09C, C09M, C09S, C0A7, C10C, C10M, C11J, C11M, C11P, C12B, C12C, C12T, C12Z, C13B, C13J, C13M, C14J, C14N, C15H, C16H, C16N, C16T, C17H, C17J, C17M, C17T, C18H, C18J, C18M, C19C, C19H, C19J, C20J, C20U, C210, C211, C21J, C21K, C22J, C22Z, C23C, C23D, C23J, C24D, C24H, C24J, C25T, C26A, C26M, C27M, C27S, C28M, C29A, C29J, C29M, C2A4, C30M, C31P, C327, C32A, C32S, C32T, C333, C336, C33A * C33E, C33Z, C34B, C34E, C34P, C36B, C36M, C36P, C37M, C37Z, C38B, C38C, C38D, C38M, C38P, C38Z, C39B, C39D, C39P, C39Z, C400, C40B, C40D, C40H, C40T, C40Z, C411F, C412F, C413F, C414F, C417F, C418F, C41A, C41B, C41D, C41H, C41P, C41Z, C420, C428F, C429F, C42A, C42D, C42P, C439F, C43A, C43B, C43D, C43P, C444, C44B, C44D, C44K, C44P, C44S, C44Z, C450, C451F, C452F, C456, C459F, C45A, C45E, C45H, C45M, C45P, C45S, C461, C462F, C468F, C46A, C46D, C46M, C46P, C46S, C471F, C472F, C478F, C482F, C485F, C487F, C48K, C48S, C48Z, C490F, C492F, C498F, C49J, C49M, C501F, C503F, C504F, C50C, C50M, C512, C514F, C51A, C51M, C51Z, C524F, C525F, C52J, C52K, * C52M, C52S, C531F, C532F, C534F, C537F, C538F, C539F, C53H, C53K, C53M, C53S, C54D, C54M, C54P, C54S, C54Z, C552F, C553, C555F, C55C, C55D, C55R, C55S, C55U, C55Z, C569F, C56C, C56M, C56S, C56Z, C570F, C576F, C57A, C57B, C57H, C57R, C57S, C57Z, C580F, C583F, C584F, C58C, C58K, C58M, C58P, C58R, C58S, C58Z, C593, C593F, C59C, C59D, C59R, C59S, C601F, C605F, C607F, C619F, C61B, C625F, C629F, C62A, C630F, C631F, C63B, C64A, C66A, C67R, C69A, C69R, C703, C704, C70C, C70D, C70K, C70M, C70S, C710, C71C, C71R, C71S, C724, C725, C726, C728, C72C, C72R, C72S, C72Z, C731, C732, C733, C734, C736, C737, C738, C739, C73H, C73K, C73M, C740, C741, C742, C743, C744, C745, C746, C747, C748, C749, C74A, C74H, C74M, C74S, C74W, C751, C752, C753, C754, C755, C756, C757, C758, C759, C75A, C75C, C75D, C75K, C75S, C75Z, C760, C761, C762, C763, C764, C765, C766, C767, C768, C769, C76D, C76E, C76M, C770, C771, C779, C77D, C77M, C78M, C79A, C79D, C79J, C79M, C7A1, C7A5, C80D, C80J, * C80M, C81U, C82K, C82M, C83M, C83S, C83Z, C84K, C84M, C85A, C85M, C85S, C86A, C86K, C86M, C86P, C86S, C87A, C87D, C87H, C87K, C87M, C87S, C88D, C88K, C88M, C88R, C88U, C89K, C89M, C89S, C90A, C90B, C90K, C90M, C90S, C91K, C91S, C92C, C92P, C92S, C93A, C93K, C93N, C93S, C94C, C94N, C94P, C94T, C95B, C95E, C95J, C95K, C95N, C95S, C95T, C95U, C95Z, C96B, C96K, C96S, C96Z, C97K, C97P, C989, C98N, C98P, C99P, CA65, CB90, CE84, CE93, CH68, CU74, CZ19, CZ26

Recommended use Various fabricated aluminum parts and products

Recommended Restrictions Does not include alloys: 6012, 6018, 6042, 6064, 6064A, 6068, 6262 (See SDS Number 390); 6012A, 6020, 6021, 6023, 6028, 6040, 6041, 6262A (See SDS Number 723)

Recommended restrictions For industrial use only.

Manufacturer/Importer/Supplier/Distributor information

Manufacturer

Alcoa 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: accmsds@alcoa.com

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

Website For a current Safety Data Sheet, refer to Alcoa websites: www.alcoa.com or internally at my.alcoa.com 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.

Physical hazards	Not classified.	
Health hazards	Sensitization, skin	Category 1
	Carcinogenicity	Category 2
	Reproductive toxicity	Category 1A
Environmental hazards	Not classified.	
Authority defined hazards	Combustible dust	

Label elements

Signal word Danger

Hazard statement May cause an allergic skin reaction. Suspected of causing cancer. May damage fertility or the unborn child. May form combustible dust concentrations in air.

Precautionary statement

Prevention Wear protective gloves/protective clothing/eye protection/face protection. Contaminated work clothing must not be allowed out of the workplace. Do not handle until all safety precautions have been read and understood.

Response If exposed or concerned: Get medical advice/attention.

Storage 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 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.
- Chips, dust, fines or particulate are in contact with water.
- Dust and fines are in contact with certain metal oxides (e.g., rust, copper oxide).
- Molten metal in contact with water/moisture or certain metal oxides (e.g., rust, copper oxide).

Dust and fume from processing: Irritating to eyes, respiratory system and skin.

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

Chemical name	Common name and synonyms	CAS number	%
Iron		7439-89-6	<1.2
Chromium		7440-47-3	<0.5
Lead†		7439-92-1	0 - 0.4
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.
‡ - 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

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

Not relevant, due to the form of the product.

Most important symptoms/effects, acute and delayed

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.

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

Dust and fume from processing: If you feel unwell, seek medical advice (show the label where possible).

5. Fire-fighting measures

Suitable extinguishing media

Use Class D extinguishing agents on dust, fines, particulate or molten metal.
Use coarse water spray on chips and turnings.
Apply extinguishing media carefully to avoid creating airborne dust, fines or particulate.

Unsuitable extinguishing media

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

Specific hazards arising from the chemical

May be a potential hazard under the following conditions:
• Dust, 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.
• 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.

• 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.
• 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.

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	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.
General fire hazards	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 data

Sensitivity to mechanical impact	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 (<0.0002% or <2 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 Alcoa SDS No. 1013, Aluminum Dross with Low Beryllium. Copies of this SDS are available on www.alcoa.com or by calling +412-553-4649.

8. Exposure controls/personal protection

Exposure guidelines

The following constituents are the only constituents of the product which have a PEL, TLV or other recommended exposure limit. At this time, the other constituents have no known exposure limits.

Occupational exposure limits

U.S. - OSHA

Components	Type	Value	Form
Aluminum (CAS 7429-90-5)	TWA	5 mg/m3	Respirable fraction
		15 mg/m3	Total dust
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.
Manganese (CAS 7439-96-5)	Ceiling	5 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.
Chromium (II) compounds	TWA	0.5 mg/m3	(as Cr)
Chromium (III) compounds	TWA	0.5 mg/m3	(as Cr)

U.S. - OSHA

Compounds Formed During Processing	Type	Value	Form
Chromium (VI) compounds, certain water insoluble forms	TWA	0.0025 mg/m3	Action Level as Cr(VI))
Chromium (VI) compounds (CAS 18540-29-9)	TWA	0.0025 mg/m3	Action Level as Cr(VI)
Iron oxide (CAS 1309-37-1)	TWA	10 mg/m3	Fume.
Lead compounds, inorganic	TWA	0.05 mg/m3	(as Pb)
		0.03 mg/m3	Action Level (as Pb)
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	
		25 ppm	
Oil mist, mineral (CAS 8012-95-1)	TWA	5 mg/m3	Mist.
Ozone (CAS 10028-15-6)	TWA	0.2 mg/m3	
		0.1 ppm	
Zinc oxide (CAS 1314-13-2)	TWA	5 mg/m3	Respirable fraction.
		5 mg/m3	Fume.
		5 mg/m3	
		15 mg/m3	Total dust.
	TWA (fume)	5 mg/m3	Fume.
	TWA (total dust)	15 mg/m3	Total dust.

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

Components	Type	Value
Lead† (CAS 7439-92-1)	TWA	0.05 mg/m3

Compounds Formed During Processing	Type	Value	Form
Chromium (VI) compounds, certain water insoluble forms	TWA	0.005 mg/m3	as Cr(VI)
Chromium (VI) compounds, water soluble forms	TWA	0.005 mg/m3	
Chromium (VI) compounds (CAS 18540-29-9)	TWA	0.005 mg/m3	as Cr(VI)

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

Compounds Formed During Processing	Type	Value	Form
Magnesium oxide (CAS 1309-48-4)	PEL	15 mg/m3	Total particulate.
Nitrogen dioxide (CAS 10102-44-0)	Ceiling	9 mg/m3	
		5 ppm	
Oil mist, mineral (CAS 8012-95-1)	PEL	5 mg/m3	Mist.
Zinc oxide (CAS 1314-13-2)	PEL	5 mg/m3	Respirable fraction.
		5 mg/m3	Fume.
		15 mg/m3	Total dust.

ACGIH

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

ACGIH

Components	Type	Value	Form
		0.2 mg/m3	Fume
Manganese (CAS 7439-96-5)	TWA (inhalable fraction)	0.2 mg/m3	(inhalable fraction)
	TWA (respirable fraction)	0.02 mg/m3	(respirable fraction)

Compounds Formed During Processing	Type	Value	Form
Aluminum oxide (non-fibrous) (CAS 1344-28-1)	TWA	1 mg/m3	Respirable fraction, as Al
Chromium (VI) compounds, water soluble forms	TWA	0.05 mg/m3	(as Cr)
Chromium (VI) compounds (CAS 18540-29-9)	TWA	0.05 mg/m3	Soluble compounds as Cr
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

Compounds Formed During Processing	Type	Value	Form
Zinc oxide (CAS 1314-13-2)	STEL	10 mg/m3	Respirable fraction.

US ACGIH Threshold Limit Values: Time Weighted Average (TWA): mg/m3 & ppm

Compounds Formed During Processing	Type	Value
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
Aluminum (CAS 7429-90-5)	TWA	1 mg/m3	Respirable fraction.
Chromium (CAS 7440-47-3)	TWA	0.5 mg/m3	
Lead† (CAS 7439-92-1)	TWA	0.05 mg/m3	
Nickel‡ (CAS 7440-02-0)	TWA	1.5 mg/m3	Inhalable 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	Insoluble compounds 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.
Nickel compounds, insoluble	TWA	0.2 mg/m3	Inhalable fraction.
Oil mist, mineral (CAS 8012-95-1)	TWA	5 mg/m3	Inhalable fraction.
Zinc oxide (CAS 1314-13-2)	TWA	2 mg/m3	Respirable fraction.

Alcoa

Components	Type	Value	Form
Aluminum (CAS 7429-90-5)	TWA	3 mg/m3	Respirable fraction

Alcoa Components	Type	Value	Form
		10 mg/m3	Total dust
Manganese (CAS 7439-96-5)	TWA	0.05 mg/m3	Total dust.
		0.02 mg/m3	Respirable fraction.
Nickel‡ (CAS 7440-02-0)	TWA	1 mg/m3	
Compounds Formed During Processing	**Type**	**Value**	**Form**
Aluminum oxide (non-fibrous) (CAS 1344-28-1)	TWA	3 mg/m3	Respirable fraction.
		10 mg/m3	Total dust.
Chromium (VI) compounds (CAS 18540-29-9)	TWA	0.25 µg/m3	
Manganese compounds, inorganic	TWA	0.05 mg/m3	Total dust, as Mn.
		0.02 mg/m3	Respirable fraction, as Mn.
Nickel compounds, insoluble	TWA	0.1 mg/m3	Insoluble
Oil mist, mineral (CAS 8012-95-1)	TWA	0.5 mg/m3	(8 Hour)

General

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.

Skin protection

Hand protection

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

Other

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

Dust, fines or particulate: Wear fire/flame resistant/retardant, non-static clothing.

Respiratory protection

Dust and fumes from processing: Use NIOSH-approved respiratory protection as specified by an Industrial Hygienist or other qualified professional if concentrations exceed the limits listed in Section 8. Suggested respiratory protection: N95, N100 for Lead.

Thermal hazards

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.

General hygiene considerations

Wash hands and face before breaks and immediately after handling the product.

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	Solid.
Color	Silver colored.
Odor	Odorless
Odor threshold	Not applicable.
pH	Not applicable.
Density	2.69 - 2.74 g/cm3
Melting point/freezing point	1029.92 - 1209.92 °F (554.4 - 654.4 °C) / Melting point
Initial boiling point and boiling range	Not determined
Flash point	Not applicable
Evaporation rate	Not applicable
Flammability (solid, gas)	Not applicable.
Upper/lower flammability or explosive limits	
Flammability limit - upper (%)	Not applicable
Flammability limit - lower (%)	Not applicable
Explosive properties	Dust clouds may be explosive under certain conditions.
Dust explosion properties	
St class	Very strong explosion.
Vapor pressure	Not applicable.
Vapor density	Not applicable.
Relative density	Not determined
Solubility(ies)	Insoluble
Specific gravity	Not applicable
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 as shipped.
Possibility of hazardous reactions	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 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.

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 NO2): Can cause irritation of eyes, skin and respiratory tract. Acute overexposures: Can cause reduced ability of the blood to carry oxygen (methemaglobin). Can cause cough, shortness of breath, accumulation of fluid in the lungs (pulmonary edema) and death. Effects can be delayed up to 2-3 weeks.
Nitrogen dioxide (NO2): Chronic overexposures: Can cause scarring of the lungs (pulmonary fibrosis).

Information on likely routes of exposure

Eye contact	Dust and fumes from processing: Can cause irritation.
Skin contact	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.
Inhalation	Dust: Can cause irritation of the upper respiratory tract. Chronic exposure: Can cause reduction in the number of red blood cells (anemia), skin abnormalities (pigmentation changes), central nervous system damage, secondary Parkinson's disease and reproductive harm. Additional health effects from elevated temperature processing (e.g., welding, melting): Dusta 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 (methemaglobin) and the accumulation of fluid in the lungs (pulmonary edema). Chronic exposure: Can cause respiratory sensitization and lung disease.
Ingestion	Not likely, due to the form of the product.
Symptoms related to the physical, chemical and toxicological characteristics	Dust and fumes from processing: Product dust may be irritating to eyes, skin and respiratory system. Contains nickel, which can cause lung or nasal cancer. Long-term breathing of this material may cause chronic lung disease. May cause allergic respiratory and skin reactions. May cause sensitization by inhalation and skin contact. Chronic exposure to breathing low levels of manganese dust or fume over a long period of time can result in “manganism,” a disease of the central nervous system similar to Parkinson’s Disease, gait impairment, muscle spasms and behavioral changes. Lead may damage kidney function, the blood forming system and the reproductive system. Additional health effects from elevated temperature processing (e.g., if heated to decomposition): 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 skin contact may cause skin irritation and/or dermatitis.

Information on toxicological effects

Components	Species	Test Results
Aluminum (CAS 7429-90-5)		
Acute		
Inhalation		
LC50	Rat	> 2.3 mg/l
		7.6 mg/l
Oral		
LD50	Rat	> 2000 mg/kg
Nickel‡ (CAS 7440-02-0)		
Acute		
Oral		
LD50	Rat	> 9000 mg/kg
Zinc (CAS 7440-66-6)		
Acute		
Oral		
LD50	Rat	630 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 Dust and fume from processing: Can cause mechanical irritation.

Respiratory or skin sensitization

Respiratory sensitization Product as shipped: May cause sensitization by inhalation. Based on available data, the classification criteria are not met.

Dust and fumes from processing: Contains nickel. May produce an allergic reaction.

Skin sensitization 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.

Germ cell mutagenicity Classification not possible. Due to lack of data the classification is not possible.

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

Carcinogenicity Product as shipped: Does not present any cancer hazards.
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).

ACGIH Carcinogens

Aluminum (CAS 7429-90-5)	Not classifiable as a human carcinogen. A4
Chromium (CAS 7440-47-3)	Not classifiable as a human carcinogen. A4
Lead† (CAS 7439-92-1)	A3 Confirmed animal carcinogen with unknown relevance to humans.
Nickel‡ (CAS 7440-02-0)	Not suspected as a human carcinogen. A5
Oil mist, mineral (CAS 8012-95-1)	A2 Suspected human carcinogen.
	Not classifiable as a human carcinogen. A4

IARC Monographs. Overall Evaluation of Carcinogenicity

Chromium (CAS 7440-47-3)	3 Not classifiable as to carcinogenicity to humans.
Lead† (CAS 7439-92-1)	2B Possibly carcinogenic to humans.
Nickel‡ (CAS 7440-02-0)	1 Carcinogenic to humans.

US. National Toxicology Program (NTP) Report on Carcinogens

Lead† (CAS 7439-92-1)	Reasonably Anticipated to be a Human Carcinogen.
Nickel‡ (CAS 7440-02-0)	Known To Be Human Carcinogen.
	Reasonably Anticipated to be a Human Carcinogen.
Oil mist, mineral (CAS 8012-95-1)	Known To Be Human Carcinogen.

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: Causes damage to organs through prolonged or repeated exposure by inhalation.
Aspiration hazard	Not applicable.
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
Chromium (CAS 7440-47-3)			
Aquatic			
Crustacea	EC50	Water flea (Daphnia magna)	0.01 - 0.7 mg/l, 48 hours
Fish	LC50	Carp (Cyprinus carpio)	14.3 mg/l, 96 hours
Copper (CAS 7440-50-8)			
Aquatic			
Crustacea	EC50	Water flea (Daphnia magna)	0.036 mg/l, 48 hours
Fish	LC50	Fathead minnow (Pimephales promelas)	0.0319 - 0.0544 mg/l, 96 hours
Iron (CAS 7439-89-6)			
Aquatic			
Crustacea	LC50	Cockle (Cerastoderma edule)	100 - 330 mg/l, 48 hours
		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)	2.923 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

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

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

13. Disposal considerations

Disposal instructions	Reuse or recycle material whenever possible. If reuse or recycling is not possible, disposal must be made according to local or governmental regulations.
Waste codes	RCRA Status: 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. D007: Waste Chromium D008: Waste Lead
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 provides basic classification information and, where relevant, information with respect to specific modal regulations, environmental hazards and special precautions. Otherwise, it is presumed that the information is not available/not relevant

15. Regulatory information

US federal regulations

In reference to Title VI of the Clean Air Act of 1990, this material does not contain nor was it manufactured using ozone-depleting chemicals.

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

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

Not regulated.

CERCLA Hazardous Substance List (40 CFR 302.4)

Chromium (CAS 7440-47-3)	Listed.
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.

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

Lead† (CAS 7439-92-1)	Reproductive toxicity Central nervous system Kidney Blood 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 - 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

SARA 311/312 Hazardous chemical Yes

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.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

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
Lead†	7439-92-1	0 - 0.4
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: May 7, 2004

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

Country(s) or region	Inventory name	On inventory (yes/no)*
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

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

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

SDS Status

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

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

SDS System Number: 115823

Revision date

November 9, 2015.

Version #

10

Revision Information

Product and Company Identification: Alternate Trade Names
Hazard(s) identification: GHS Symbols
Composition / Information on Ingredients: Disclosure Overrides
Stability and reactivity: Conditions to avoid
Toxicological information: Symptoms related to the physical, chemical and toxicological characteristics
Regulatory Information: Risk Phrases - Labeling
Regulatory information: Disclaimer
Other information, including date of preparation or last revision: SDS Status
Other information, including date of preparation or last revision: Other information 1
HazReg Data: North America
GHS: Classification

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 2015, Compiled by the American Conference of Governmental Industrial Hygienists (ACGIH).
- NIOSH Pocket Guide to Chemical Hazards, U.S. Department of Health and Human Services, September 2005.
- expub, Expert Publishing, LLC., www.expub.com,
- Ariel, 3E Company, www.3Ecompany.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 ***

Hazard statement

May cause an allergic skin reaction. Suspected of causing cancer. May damage fertility or the unborn child. May form combustible dust concentrations in air.

Precautionary statement

Prevention

Wear protective gloves/protective clothing/eye protection/face protection. Contaminated work clothing must not be allowed out of the workplace. Do not handle until all safety precautions have been read and understood.

Response

If exposed or concerned: Get medical advice/attention.

Storage

Store in a dry place.

Disposal

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

Danger

Supplemental information

May form combustible dust concentrations in air.

Contains nickel. May produce an allergic reaction.

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.
- Chips, dust or fines are in contact with water.
- Dust and fines from processing 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).

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

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 Alcoa SDS Number 0668.