



SAFETY DATA SHEET

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Trade name or designation of the mixture WROUGHT ALUMINIUM PRODUCTS, 6xxx SERIES ALLOYS

SDS number 668

Revision date August 24, 2017.

Version number 13

Chemical description Mixture

Synonyms

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

REACH Registration Number Aluminium: Arconic Fusina Rolling s.r.l 01-2119529243-45-XXXX; Arconic Manufacturing (GB) Ltd 01-2119529243-45-XXXX; Arconic-Köfém Light Metal Works of Székesfehérvár LLC 01-2119537203-49-XXXX.
Magnesium: Arconic Fusina Rolling s.r.l 01-2119537203-49-XXXX
Silicon: Arconic Fusina Rolling s.r.l 01-2119529243-45-XXXX.

1.2. Relevant identified uses of the substance or mixture and uses advised against

Identified uses Various fabricated aluminium parts and products

Recommended Restrictions 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.

1.3. Details of the supplier of the safety data sheet

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

Fusina Rolling s.r.l
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30176 Marghera loc.
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Tel: +39 041 2917200
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Arconic-Kőfém Kft.
Beáta Schmidt
Székesfehérvár
Hungary
Tel: 36 22 53 1368

Arconic Manufacturing GB (LTD)
Kitts Green Road
Kitts Green
Birmingham B33 9QR
United Kingdom
Tel: 44 121 252 8000

Hannover Operations
Goettinger Chaussee 12-14
Hannover D-30453
Germany
Fax: +49 511 42075421

1.4 Emergency Information

CHEMTREC: +1-703-527-3887 +1-800-424-9300 (24 Hour Emergency Telephone, multiple languages spoken); Arconic: +1-412-553-4001 (24 Hour Emergency Telephone, only English spoken)
Emergency Action: In the event of a medical enquiry involving this product, please contact your doctor or local hospital accident and emergency department.

Website

For a current Safety Data Sheet, refer to Arconic websites: www.arconic.com or internally at my.arconic.com EHS Community

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification

This substance or mixture does not meet the criteria for classification as dangerous in accordance with Directives 67/548/EEC or 1999/45/EC and/or Regulation (EC) No 1272/2008 including all applicable amendments. However, it contains a substance for which there are Community workplace exposure limits. This Safety Data Sheet is available upon request.

Classification according to Regulation (EC) No 1272/2008 as amended

Environmental hazards

Hazardous to the ozone layer Not applicable

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, and dust from processing may be readily ignitable.
- Explosion/fire hazards may be present when (See Sections 5, 7 and 10 for additional information):
 - Dust or fines are dispersed in air.
 - 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).

2.2. Label elements

Label according to Regulation (EC) No. 1272/2008 as amended

Contains: †Lead, ‡Nickel, Aluminium, Chromium, Copper, Iron, Magnesium, Manganese, Silicon, Zinc
Hazard pictograms None.
Signal word None.
Hazard statements May form combustible dust concentrations in air.

Precautionary statements

Prevention Observe good industrial hygiene practices. Prevent dust accumulation to minimize explosion hazard.

Response Not available.

Storage Keep dry.
P402 Store in a dry place.

Disposal Reuse or recycle material whenever possible.
P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

Supplemental label information None.

2.3. Other hazards None known.

SECTION 3: Composition/information on ingredients**3.2. Mixtures**

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

General information

Chemical name	%	CAS-No. / EC No.	REACH Registration No.	INDEX No.	Notes
Aluminium	≥90	7429-90-5 231-072-3	01-2119529243-45-XXXX	013-002-00-1	
Classification:	Flam. Sol. 1;H228, Pyr. Sol. 1;H250, Water-React. 2;H261				T
Magnesium	≤4,1	7439-95-4 231-104-6	01-2119537203-49-XXXX	012-002-00-9	
Classification:	Flam. Sol. 1;H228, Pyr. Sol. 1;H250, Self-heat. 1;H251, Water-React. 1;H260				T
Zinc	≤4,0	7440-66-6 231-175-3	-	030-001-01-9	
Classification:	Pyr. Sol. 1;H250, Water-React. 1;H260, Aquatic Acute 1;H400, Aquatic Chronic 1;H410				T
Silicon	≤1,9	7440-21-3 231-130-8	01-2119480401-47-XXXX 01-2119480401-47-XXXX	-	
Classification:	-				
Manganese	≤1,5	7439-96-5 231-105-1	-	-	#
Classification:	-				
Copper	≤1,4	7440-50-8 231-159-6	-	029-019-01-X	
Classification:	Eye Irrit. 2;H319				
Iron	≤1,2	7439-89-6 231-096-4	-	-	
Classification:	-				
Chromium	≤0,5	7440-47-3 231-157-5	05-2115401109-60-0000	-	#
Classification:	-				
†Lead	0 - 0,05	7439-92-1 231-100-4	-	082-014-00-7	#
Classification:	Carc. 2;H351, Repr. 1A;H360, STOT RE 1;H372, STOT RE 2;H373, Aquatic Acute 1;H400, Aquatic Chronic 1;H410				1,A
‡Nickel	0 - 0,2	7440-02-0 231-111-4	-	028-002-01-4	
Classification:	Skin Sens. 1;H317, Carc. 2;H351, STOT RE 1;H372				7,S

List of abbreviations and symbols that may be used above

- † - 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.

SECTION 4: First aid measures

General information	Dust and fume from processing: If you feel unwell, seek medical advice (show the label where possible).
4.1. Description of first aid measures	
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.
Skin contact	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.
Eye contact	Dust and fumes from processing: Rinse eyes with plenty of water or saline for at least 15 minutes. Consult a physician.
Ingestion	Not relevant, due to the form of the product.
4.2. Most important symptoms and effects, both 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 sensitisation and allergic contact dermatitis. See Section 11 for additional information on health hazards.
Medical conditions aggravated by exposure	Asthma, chronic lung disease and skin rashes.
4.3. Indication of any immediate medical attention and special treatment needed	Provide general supportive measures and treat symptomatically.

SECTION 5: Firefighting measures

General fire hazards	This product does not present fire or explosion hazards as shipped. Small chips, fine turnings, and dust from processing may be readily ignitable.
5.1. Extinguishing media	
Suitable extinguishing media	Use Class D extinguishing agents on fines, dust or molten metal. Use coarse water spray on chips and turnings. Apply extinguishing media carefully to avoid creating airborne dust, fines or particulate.
Unsuitable extinguishing media	DO NOT USE halogenated extinguishing agents on small chips/fines. DO NOT USE water in fighting fires around molten metal. These fire extinguishing agents will react with the burning material.
5.2. Special hazards arising from the substance or mixture	May be a potential hazard under the following conditions: • Dust clouds may be explosive. Even a minor dust cloud can explode violently. Dust accumulation on the floor, ledges and beams can present a risk of ignition, flame propagation and secondary explosions. • Chips, fines and dust in contact with water can generate flammable/explosive hydrogen gas. These gases could present an explosion hazard in confined or poorly ventilated spaces. • Dust and fines in contact with certain metal oxides (e.g., rust, copper oxide). A thermite reaction, with considerable heat generation, can be initiated by a weak ignition source. • Molten metal in contact with water/moisture or certain metal oxides (e.g., rust, copper oxide). Moisture entrapped by molten metal can be explosive. Contact of molten aluminium with certain metal oxides can initiate a thermite reaction. Finely divided metals (e.g. powders or wire) may have enough surface oxide to produce thermite reactions/explosions. Thermite reactions can also occur with oxides of lead, copper, iron, bismuth and certain other metals.
Hazardous combustion products	No hazardous decomposition products are known.
5.3. Advice for firefighters	
Special protective equipment for firefighters	Firefighters should wear CE approved, positive pressure, self-contained breathing apparatus and full protective clothing when appropriate.
Special fire fighting procedures	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.

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.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

For non-emergency personnel

Avoid generating dust. Avoid contact with sharp edges or heated metal. Molten, heated and cold aluminium look alike; do not touch unless you know it is cold. Use personal protection recommended in Section 8 of the SDS.

For emergency responders

Avoid generating dust. Avoid contact with sharp edges or heated metal. Molten, heated and cold aluminium 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.

6.2. Environmental precautions

No special environmental precautions required.

6.3. Methods and material 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.

6.4. Reference to other sections

For personal protection, see section 8. For waste disposal, see section 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

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

7.2. Conditions for safe storage, including any incompatibilities

Store in a dry place.

7.3. Specific end use(s)

Fabricated aluminium parts and products

Requirements for Remelting of Scrap Material and/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 aluminium 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 aluminium can contact these metal oxides resulting in a thermite explosion.

Requirements for Processes which Generate Dusts or Fines

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

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

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

Dust collection systems must be dedicated to aluminium dust only and should be clearly labeled as such. Do not co-mingle dust, fines or particulate of aluminium 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.

Dross Handling

Small amounts of beryllium (<0.0001% or <1 ppm) can be present in aluminium alloys either from naturally occurring beryllium in aluminium ore or as a alloying element in the aluminium recycling stream. This beryllium does not present a health hazard during processing (grinding, cutting or welding) of aluminium products. However, beryllium may concentrate in the dross formed when aluminium 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, Aluminium Dross with Low Beryllium. Copies of this SDS are available on www.arconic.com or by calling +412-553-4649.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Occupational exposure limits

UK. EH40 Workplace Exposure Limits (WELs)

Components	Type	Value	Form
†Lead (CAS 7439-92-1)	TWA	0,15 mg/m ³	
‡Nickel (CAS 7440-02-0)	TWA	0,5 mg/m ³	
Aluminium (CAS 7429-90-5)	TWA	4 mg/m ³	Respirable dust.
		10 mg/m ³	Inhalable dust.
Chromium (CAS 7440-47-3)	TWA	0,5 mg/m ³	
Copper (CAS 7440-50-8)	STEL	2 mg/m ³	Inhalable dusts and mists.
	TWA	1 mg/m ³	Inhalable dusts and mists.
		0,2 mg/m ³	Fume.
		0,5 mg/m ³	
Manganese (CAS 7439-96-5)	TWA	0,5 mg/m ³	
Silicon (CAS 7440-21-3)	TWA	4 mg/m ³	Respirable dust.
		10 mg/m ³	Inhalable dust.
Compounds Formed During Processing	Type	Value	Form
Aluminium oxide (non-fibrous) (CAS 1344-28-1)	TWA	4 mg/m ³	Respirable dust.
Chromium (II) compounds	TWA	0,5 mg/m ³	
Chromium (III) compounds	TWA	0,5 mg/m ³	
Chromium (VI) compounds, certain water insoluble forms	TWA	0,05 mg/m ³	
Chromium (VI) compounds (CAS 18540-29-9)	TWA	0,05 mg/m ³	
Iron oxide (CAS 1309-37-1)	STEL	10 mg/m ³	Fume.
	TWA	5 mg/m ³	Fume.
		4 mg/m ³	Respirable.

UK. EH40 Workplace Exposure Limits (WELs)

Compounds Formed During Processing	Type	Value	Form
Lead compounds, inorganic	TWA	10 mg/m3	Inhalable
Magnesium oxide (CAS 1309-48-4)	TWA	0,15 mg/m3 4 mg/m3	Respirable dust and/or fume. Inhalable dust.
Manganese compounds, inorganic	TWA	10 mg/m3 0,5 mg/m3	
Manganese oxide (CAS 1344-43-0)	TWA	0,5 mg/m3	
Ozone (CAS 10028-15-6)	STEL	0,4 mg/m3	
Silica, amorphous (CAS 112926-00-8)	TWA	0,2 ppm 6 mg/m3	Inhalable dust.
Welding fumes	TWA	2,4 mg/m3 4 mg/m3 10 mg/m3	Respirable dust. Respirable dust. Inhalable dust.

**United Kingdom
Components**

Components	Type	Value	Form
Aluminium (CAS 7429-90-5)	STEL	30 mg/m3	(total dust)
	TWA	10 mg/m3	(inhalable dust)

**EU. Directive 98/24/EC: on the protection of workers from the risks related to chemical agents at work, Annex I List of
Binding Occupational Exposure Limit Values**

Components	Type	Value
†Lead (CAS 7439-92-1)	TWA	0,15 mg/m3
Compounds Formed During Processing	Type	Value

Lead compounds, inorganic	TWA	0,15 mg/m3
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EU. Indicative Exposure Limit Values in Directives 91/322/EEC, 2000/39/EC, 2006/15/EC, 2009/161/EU

Components	Type	Value	Form
Chromium (CAS 7440-47-3)	TWA	2 mg/m3	
Manganese (CAS 7439-96-5)	TWA	0,2 mg/m3	Inhalable fraction.
		0,05 mg/m3	Respirable fraction.
Compounds Formed During Processing	Type	Value	Form
Manganese oxide (CAS 1344-43-0)	TWA	0,2 mg/m3	Inhalable fraction.
		0,05 mg/m3	Respirable fraction.
Nitric oxide (CAS 10102-43-9)	TWA	2,5 mg/m3	
Nitrogen dioxide (CAS 10102-44-0)	STEL	2 ppm 1,91 mg/m3	
	TWA	1 ppm 0,96 mg/m3 0,5 ppm	
Arconic Components	Type	Value	Form
‡Nickel (CAS 7440-02-0)	TWA	1 mg/m3	
Aluminium (CAS 7429-90-5)	TWA	3 mg/m3 10 mg/m3	Respirable fraction Total dust
Manganese (CAS 7439-96-5)	TWA	0,05 mg/m3	Total dust.
		0,02 mg/m3	Respirable fraction.

Arconic Compounds Formed During Processing	Type	Value	Form
Aluminium oxide (non-fibrous) (CAS 1344-28-1)	TWA	3 mg/m3	Respirable fraction.
Chromium (VI) compounds, certain water insoluble forms	TWA	10 mg/m3 0,25 ug/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
Residuals	Type	Value	Form
Oil mist, mineral (CAS 8012-95-1)	TWA	0,5 mg/m3	(8 Hour)
ACGIH Components	Type	Value	Form
Copper (CAS 7440-50-8)	TWA	1 mg/m3	(dust and mist)
		0,2 mg/m3	Fume
Compounds Formed During Processing	Type	Value	Form
Aluminium 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			
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	Form
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.
Aluminium (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.

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

Compounds Formed During Processing	Type	Value	Form
Lead compounds, inorganic	TWA	0,05 mg/m3	Inhalable fraction.
Magnesium oxide (CAS 1309-48-4)	TWA	10 mg/m3	
Manganese compounds, inorganic	TWA	0,1 mg/m3	
Manganese oxide (CAS 1344-43-0)	TWA	0,02 mg/m3	Respirable fraction.
		0,1 mg/m3	Inhalable fraction.
Nickel compounds, insoluble	TWA	0,02 mg/m3	Respirable fraction.
		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.

Biological limit values
EU. Directive 98/24/EC: on the protection of workers from the risks related to chemical agents at work, Annex II Binding Biological Limit Values and Health Surveillance Measures

Components	Value	Determinant	Specimen
†Lead (CAS 7439-92-1)	70 µg/100 ml	Lead	Blood

UK. EH40 Biological Monitoring Guidance Values (BMGVs)

Components	Value	Determinant	Specimen	Sampling time
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Chromium (CAS 7440-47-3)	10 µmol/mol	Chromium	Creatinine in urine	*
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Compounds Formed During Processing	Value	Determinant	Specimen	Sampling time
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Chromium (VI) compounds, certain water insoluble forms	10 µmol/mol	Chromium	Creatinine in urine	*
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Chromium (VI) compounds (CAS 18540-29-9)	10 µmol/mol	Chromium	Creatinine in urine	*
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* - For sampling details, please see the source document.

ACGIH Biological Exposure Indices

Components	Value	Determinant	Specimen	Sampling time
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†Lead (CAS 7439-92-1)	300 µg/l	Lead	Blood	*
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Compounds Formed During Processing	Value	Determinant	Specimen	Sampling time
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Chromium (VI) compounds (CAS 18540-29-9)	25 µg/l	Total chromium	Urine	*
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	10 µg/l	Total chromium	Urine	*
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Lead compounds, inorganic	300 µg/l	Lead	Blood	*
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* - For sampling details, please see the source document.

Derived No Effect Level (DNEL) Aluminium (7429-90-5) Inhalation: 3,72 mg/m3
Aluminium oxide (non-fibrous) (1344-28-1) Inhalation: 15,63 mg/m3
Aluminium oxide (non-fibrous) (1344-28-1) Oral: 3,29 mg Al/kg bw/day

Derived minimum effect level (DMEL) Not established

Predicted no effect concentrations (PNECs) Aluminum (7429-90-5) Water: 74,9-17800 µg/L
Aluminium oxide (non-fibrous) (1344-28-1) Soil: Not assigned
Aluminium oxide (non-fibrous) (1344-28-1) Water: Aquatic toxicity is unlikely due to low solubility.

Recommended monitoring procedures Follow standard monitoring procedures.

8.2. Exposure controls

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 fume are generated during 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

General information	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.
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.
- Other	The need for personal protective equipment should be based upon a hazard assessment and recommendations from health / safety professionals. Wear fire/ flame resistant/retardant clothing. Molten metal: Wear fire/ flame resistant/retardant clothing.
Respiratory protection	Dust and fume from processing: Use CE-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: P2, P3 for Lead.
Thermal hazards	Contact with molten material can cause thermal burns. Hot aluminium 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.
Hygiene measures	Wash hands and face before breaks and immediately after handling the product.
Environmental exposure controls	No special environmental precautions required.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance	Metallic.
Physical state	Solid.
Form	Massive, solid metal.
Colour	Silver-colored.
Odour	Odourless
Odour threshold	Not applicable.
pH	Not applicable.
Melting point/freezing point	554,4 - 654,4 °C (1029,92 - 1209,92 °F) / Melting point
Initial boiling point and boiling range	Not determined
Flash point	Not applicable
Evaporation rate	Not applicable
Flammability (solid, gas)	Not available.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	Not applicable
Flammability limit - upper (%)	Not applicable
Explosive limit - lower (%)	Not applicable
Explosive limit - upper (%)	Not applicable
Vapour pressure	Not applicable.
Vapour density	Not applicable.
Relative density	Not determined

Solubility(ies)	
Solubility (water)	Insoluble
Solubility (other)	Not available.
Partition coefficient (n-octanol/water)	Not applicable. Not applicable
Auto-ignition temperature	Not applicable
Decomposition temperature	Not applicable
Viscosity	Not applicable.
Explosive properties	Dust clouds may be explosive under certain conditions.
Oxidising properties	Not applicable.
9.2. Other information	
Density	2,69 - 2,74 g/cm3
Dust explosion properties	
Kst	> 300 Nonspherical, Nodular or Irregular Powders
St class	Very strong explosion.
Explosivity	Not applicable
VOC	Not applicable.

SECTION 10: Stability and reactivity

10.1. Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
10.2. Chemical stability	Stable under normal conditions of use, storage, and transportation as shipped.
10.3. Possibility of hazardous reactions	Hazardous polymerisation does not occur.
10.4. 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, fines, dust and molten metal are considerably more reactive with the following:

- Heat: Oxidizes at a rate dependent upon temperature and particle size.
- Water: Slowly generates flammable/explosive hydrogen gas and heat. Generation rate is greatly increased with smaller particles (e.g., fines and dusts). Molten metal can react violently/explosively with water or moisture, particularly when the water is entrapped.

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 aluminium 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.

10.5. Incompatible materials

Chips, fines, dust and molten metal are considerably more reactive with the following:

- Strong oxidizers: Violent reaction with considerable heat generation. Can react explosively with nitrates (e.g., ammonium nitrate and fertilizers containing nitrate) when heated or molten.
- Acids and alkalis: Reacts to generate flammable/explosive hydrogen gas. Generation rate is greatly increased with smaller particles (e.g., fines and dusts).
- Halogenated compounds: Many halogenated hydrocarbons, including halogenated fire extinguishing agents, can react violently with finely divided or molten aluminium.
- Iron oxide (rust) and other metal oxides (e.g., copper and lead oxides): A violent thermite reaction generating considerable heat can occur. Reaction with aluminium fines and dusts requires only very weak ignition sources for initiation. Molten aluminium can react violently with iron oxide without external ignition source.
- Iron powder and water: Explosive reaction forming hydrogen gas when heated above 800°C (1470°F).

Thermite explosions have been reported when aluminium 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 aluminium can contact these metal oxides resulting in a thermite explosion.

10.6. Hazardous decomposition products

No hazardous decomposition products are known.

SECTION 11: Toxicological information

Health effects associated with ingredients

Aluminium 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 (aluminium 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 aluminium welding.

Plasma arc cutting of aluminium can generate oxides of nitrogen.

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

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

General information

The following health effects are not likely to occur unless sawing or cutting generates dust or unless material is heated to melting.

Information on likely routes of exposure

Ingestion

Not likely, due to the form of the product.

Inhalation

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 sensitisation central nervous system damage, secondary Parkinson's disease, reproductive harm, scarring of the lungs (pulmonary fibrosis) and lung disease.

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.

Eye contact

Dust and fumes from processing: Can cause irritation.

Symptoms

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 sensitisation and allergic contact dermatitis. See Section 11 for additional information on health hazards.

11.1. Information on toxicological effects

Toxicological information

The following health effects are not likely to occur unless sawing or cutting generates dust or unless material is heated to melting.

Acute toxicity

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

Components	Species	Test results
‡Nickel (CAS 7440-02-0)		
<u>Acute</u>		
Oral		
LD50	Rat	> 9000 mg/kg
Aluminium (CAS 7429-90-5)		
<u>Acute</u>		
Oral		
LD50	Rat	> 10000 mg/kg
		> 2000 mg/kg
Zinc (CAS 7440-66-6)		
<u>Acute</u>		
Oral		
LD50	Rat	630 mg/kg
Skin corrosion/irritation	Not classified. Based on available data, the classification criteria are not met. Non-corrosive.	
Serious eye damage/eye irritation	Dust and fume from processing: Can cause mechanical irritation.	
Respiratory sensitisation	Not classified. Based on available data, the classification criteria are not met.	
Skin sensitisation	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.	
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		
†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.
Aluminium (CAS 7429-90-5)		A4 Not classifiable as a human carcinogen.
Aluminium 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.
IARC Monographs. Overall Evaluation of Carcinogenicity		
†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.

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).
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.
Teratogenicity	Not classified. Based on available data, the classification criteria are not met.
Aspiration hazard	Not applicable. Not an aspiration hazard.
Mixture versus substance information	Not applicable.
Routes of exposure	Eye contact. Skin contact. Inhalation.
Pre-existing conditions aggravated by exposure	Asthma, chronic lung disease, secondary Parkinson's disease and skin rashes.
Symptoms	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 fume 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 sensitisation and lung cancer. Contact with residual oil/oil coating: Prolonged skin contact may cause skin irritation and/or dermatitis.
Other information	None known.

SECTION 12: Ecological information

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

Components	Species		Test results
†Lead (CAS 7439-92-1)			
Aquatic			
Fish	LC50	Rainbow trout,donaldson trout (Oncorhynchus mykiss)	1,17 mg/l, 96 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
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

Components		Species	Test results
Manganese (CAS 7439-96-5)			
Aquatic			
Crustacea	EC50	Water flea (Daphnia magna)	40 mg/l, 48 hours
Zinc (CAS 7440-66-6)			
Aquatic			
Crustacea	EC50	Water flea (Daphnia magna)	2,8 mg/l, 48 hours
Fish	LC50	Rainbow trout,donaldson trout (Oncorhynchus mykiss)	0,56 mg/l, 96 hours

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

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

12.3. Bioaccumulative potential The product is not bioaccumulating.

Partition coefficient n-octanol/water (log Kow) Not applicable.

Bioconcentration factor (BCF) Not available.

12.4. Mobility in soil Not considered mobile.

Mobility in general Not considered mobile.

12.5. Results of PBT Not applicable.

and vPvB assessment Not available.

12.6. Other adverse effects None known.

12.7. Additional information None known.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Disposal methods/information Reuse or recycle material whenever possible. If reuse or recycling is not possible, disposal must be made according to local or governmental regulations.

EU waste code Waste codes should be assigned by the user based on the application for which the product was used. The Waste code should be assigned in discussion between the user, the producer and the waste disposal company.

The following Waste Codes are only suggestions:
120104 - non-ferrous metal dust and particles
100399 - wastes not otherwise specified

Residual waste Dispose of in accordance with local regulations.

Contaminated packaging Dispose of in accordance with local regulations.

SECTION 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 & special precautions. Otherwise, it is presumed that the information is not available/not relevant.

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

EU regulations

Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer, Annex I, as amended
Not listed.

Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer, Annex II, as amended
Not listed.

Regulation (EC) No. 850/2004 on persistent organic pollutants, Annex I
Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 1 as amended

Lead compounds, inorganic (CAS S~PB~I)

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 2 as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 3 as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex V as amended

Not listed.

Regulation (EC) No. 166/2006 Annex II Pollutant Release and Transfer Registry, as amended

Chromium (II) compounds (CAS S~CR2~C)

Chromium (III) compounds (CAS S~CR3~I)

Chromium (VI) compounds (CAS 18540-29-9)

Nickel compounds, insoluble (CAS S~NI~L)

Lead compounds, inorganic (CAS S~PB~I)

Zinc oxide (CAS 1314-13-2)

Regulation (EC) No. 1907/2006, REACH Article 59(10) Candidate List as currently published by ECHA

Not listed.

Authorisations

Regulation (EC) No. 1907/2006, REACH Annex XIV Substances subject to authorization, as amended

Not listed.

Restrictions on use

None known.

Regulation (EC) No. 1907/2006 Annex XVII Substances subject to restriction on marketing and use

†Lead (CAS 7439-92-1)

‡Nickel (CAS 7440-02-0)

Aluminium (CAS 7429-90-5)

Chromium (VI) compounds, certain water insoluble forms (CAS S~CR6~L)

Lead compounds, inorganic (CAS S~PB~I)

Magnesium (CAS 7439-95-4)

Nickel compounds, insoluble (CAS S~NI~L)

Zinc (CAS 7440-66-6)

Regulation (EC) No. 1907/2006, REACH Annex XVII Substances subject to restriction on marketing and use as amended

Chromium (VI) compounds (CAS 18540-29-9)

†Lead (CAS 7439-92-1)

Lead compounds, inorganic (CAS S~PB~I)

Directive 2004/37/EC: on the protection of workers from the risks related to exposure to carcinogens and mutagens at work, as amended

Chromium (VI) compounds (CAS 18540-29-9)

Directive 92/85/EEC: on the safety and health of pregnant workers and workers who have recently given birth or are breastfeeding, as amended

†Lead (CAS 7439-92-1)

‡Nickel (CAS 7440-02-0)

Lead compounds, inorganic (CAS S~PB~I)

Other EU regulations

Directive 2012/18/EU on major accident hazards involving dangerous substances

Chromium (VI) compounds (CAS 18540-29-9)

Copper (CAS 7440-50-8)

Lead compounds, inorganic (CAS S~PB~I)

Magnesium (CAS 7439-95-4)

Nitrogen dioxide (CAS 10102-44-0)

Zinc (CAS 7440-66-6)

Zinc oxide (CAS 1314-13-2)

Directive 98/24/EC on the protection of the health and safety of workers from the risks related to chemical agents at work, as amended

†Lead (CAS 7439-92-1)

‡Nickel (CAS 7440-02-0)

Aluminium (CAS 7429-90-5)

Chromium (VI) compounds (CAS 18540-29-9)

Lead compounds, inorganic (CAS S~PB~I)

Magnesium (CAS 7439-95-4)

Nitrogen dioxide (CAS 10102-44-0)

Zinc (CAS 7440-66-6)

Directive 94/33/EC on the protection of young people at work, as amended

†Lead (CAS 7439-92-1)

‡Nickel (CAS 7440-02-0)
 Chromium (VI) compounds (CAS 18540-29-9)
 Lead compounds, inorganic (CAS S~PB~I)
 Nitrogen dioxide (CAS 10102-44-0)

Other regulations The product is classified and labelled in accordance with EC directives or respective national laws.

National regulations This safety datasheet has been prepared according to European Union legislation.

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).

15.2. Chemical safety assessment No Chemical Safety Assessment has been carried out.

SECTION 16: Other information

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.

Recommended restrictions For industrial use only.

Further information Refer to NFPA 654, Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids, for safe handling.

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

Other information

- Guide to Occupational Exposure Values 2016, Compiled by the American Conference of Governmental Industrial Hygienists (ACGIH).
- NIOSH Pocket Guide to Chemical Hazards, U.S. Department of Health and Human Services, September 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 metre, cm centimetre, mm millimetre, in inch,	
g gram, kg kilogram, lb pound, µg microgram,	
ppm parts per million, ft feet	

*** End of SDS ***

CONTAINS: Nickel; Lead; Aluminium; Chromium; Copper; Iron; Magnesium; Manganese; Silicon; Zinc

Hazard statements

May form combustible dust concentrations in air.

Precautionary statements

Observe good industrial hygiene practices.

Prevent dust accumulation to minimize explosion hazard.

Keep dry.

P402 - Store in a dry place.

Reuse or recycle material whenever possible.

P501 - Dispose of contents/container in accordance with local/regional/national/international regulations.

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 sensitisation, reproductive harm and lung cancer.

Contains nickel. May produce an allergic reaction.

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

This product does not present fire or explosion hazards as shipped. Small chips, fine turnings, and dust from processing may be readily ignitable.

Explosion/fire hazards may be present when:

- Dust or fines are dispersed in air.
- Dust and fines in contact with water can generate flammable/explosive hydrogen gas. These gases could present an explosion hazard in confined or poorly ventilated spaces.
- Dust and fines are in contact with certain metal oxides (e.g., rust, copper oxide).
- Molten metal in contact with water/moisture or certain metal oxides (e.g., rust, copper oxide).

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

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

IN CASE OF SPILL: 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.



ARCONIC

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