



SAFETY DATA SHEET

1. Identification

Product identifier WROUGHT ALUMINUM PRODUCTS, 7xxx SERIES ALLOYS

Other means of identification

SDS number 669

Version # 09

Revision date May 26, 2015.

Other means of identification

Synonyms

7xxx series alloys * C001D, C04S, C05U, C07U, C104, C10Z, C11T, C13T, C15T, C16B, C16U, C17B, C17Z, C185, C18Z, C19N, C19U, C21B, C21T, C22N, C23T, C25E, C28B, C28H, C31E, C31H, C32Z, C36Z, C38E, C39E, C39N, C405, C40E, C410F, C419F, C41E, C41U, C420F, C42E, C42H, C435F, C436F, C437F, C438F, C43E, C43U, C450F, C453F, C461F, C46E, C46H, C47H, C481F, C48T, C507, C52T, C538, C53T, C53W, C53Z, C545, C549F, C54J, C54T, C550, C551F, C555, C55J, C55P, C55T, C56E, C56J, C56T, C573F, C578F, C57C, C57P, C57T, C57W, C58T, C591F, C595F, C59T, C59Z, C606F, C60Z, C61Z, C622F, C62Z, C7004, C7005, C7010, C7021, C7029, C7039, C7046, C7049, C7050, C7055, C7072, C7072X, C7075, C7076, C7085, C7090, C7093, C70H, C70N, C70P, C70T, C7116, C7129, C7149, C715, C7150, C7150V, C7175, C7178, C71N, C71T, C71W, C7229, C72N, C72P, * C72T, C73N, C73T, C7475, C74N, C75H, C76N, C77E, C77T, C78E, C78H, C78N, C78T, C79E, C79H, C79N, C79S, C79T, C79Z, C80A, C80AA, C80E, C80H, C80T, C81A, C81E, C81H, C81T, C82A, C82E, C82H, C82S, C82T, C83A, C83E, C83H, C83U, C84A, C84E, C84H, C84U, C85E, C85T, C86U, C87N, C89H, C89U, C905F, C90T, C91H, C91T, C92A, C92H, C92N, C92T, C92U, C93T, C93U, C94Z, C96H, C96T, C97T, C97U, CK38, CU31, CU75, CU95, CW10, CZ99, MIC6

Recommended use Various fabricated aluminum parts and products

Recommended restrictions None known.

Manufacturer/Importer/Supplier/Distributor information

Manufacturer

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Health and Safety Tel: 1-412-553-4649
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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, respiratory Category 1

Sensitization, skin Category 1

Carcinogenicity Category 2

Environmental hazards Not classified.

Authority defined hazards Combustible dust

Label elements



Signal word

Danger

Hazard statement

Suspected of causing cancer. May cause allergy or asthma symptoms or breathing difficulties if inhaled. May cause an allergic skin reaction.

Precautionary statement

Prevention

Do not handle until all safety precautions have been read and understood. Avoid breathing dust/fume. In case of inadequate ventilation wear respiratory protection. Wear protective gloves. Do not eat, drink or smoke when using this product. Contaminated work clothing should not be allowed out of the workplace.

Response

If inhaled: If breathing is difficult, remove person to fresh air and keep comfortable for breathing. IF ON SKIN: Wash with plenty of soap and water. IF exposed or concerned: Get medical advice/attention. Wash contaminated clothing before reuse.

Storage

Store in a dry place.

Disposal

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

Hazard(s) not otherwise classified (HNOC)

None known.

Supplemental information

Dust and fumes from processing: Can cause irritation of the eyes, skin and upper respiratory tract. Contains (Cobalt, Nickel). May produce an allergic reaction.

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

Explosion/fire hazards may be present when:

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

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 | >84 |
| Zinc | | 7440-66-6 | <12 |
| Copper | | 7440-50-8 | <4.7 |
| Magnesium | | 7439-95-4 | <3.7 |
| Cobalt† | | 7440-48-4 | <2.0 |
| Manganese | | 7439-96-5 | <1.5 |
| Iron | | 7439-89-6 | <1.4 |
| Silicon | | 7440-21-3 | <1.2 |
| Chromium | | 7440-47-3 | <0.4 |
| Nickel†† | | 7440-02-0 | 0 - 0.2 |
| Lead‡ | | 7439-92-1 | <0.05 |

Additional Information

† - Alloys: 7064 and 7090.

†† - Alloys: 7093 and C7093.

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

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 | Contains (Cobalt, Nickel). May produce an allergic reaction. May cause sensitization of susceptible persons by skin contact or by inhalation of dust. Dust and fumes from processing: 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: Chronic exposure may cause dermatitis. |
| Medical conditions aggravated by exposure | Asthma, chronic lung disease, Secondary Parkinson's disease and skin rashes. |
| Indication of immediate medical attention and special treatment needed | Provide general supportive measures and treat symptomatically. |
| General information | 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 fines, dust or molten metal. Use coarse water spray on chips and turnings. |
| Unsuitable extinguishing media | DO NOT USE halogenated extinguishing agents on small chips/fines. DO NOT USE water in fighting fires around molten metal. These fire extinguishing agents will react with the burning material. |
| Specific hazards arising from the chemical | Explosion/fire hazards may be present when: <ul style="list-style-type: none">• Dust clouds may be explosive. Even a minor dust cloud can explode violently. Dust accumulation on the floor, ledges and beams can present a risk of ignition, flame propagation and secondary explosions.• Chips, fines and dust in contact with water can generate flammable/explosive hydrogen gas. These gases could present an explosion hazard in confined or poorly ventilated spaces.• Dust and fines in contact with certain metal oxides (e.g., rust, copper oxide). A thermite reaction, with considerable heat generation, can be initiated by a weak ignition source.• Molten metal in contact with water/moisture or certain metal oxides (e.g., rust, copper oxide). Moisture entrapped by molten metal can be explosive. Contact of molten aluminum with certain metal oxides can initiate a thermite reaction. Finely divided metals (e.g., powders or wire) may have enough surface oxide to produce thermite reactions/explosions. Thermite reactions can also occur with oxides of lead, copper, iron, bismuth and certain other metals. |
| 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 possible, isolate the burning material to prevent fire spread, and allow the material to burn itself out. |
| General fire hazards | This product does not present fire or explosion hazards as shipped. Small chips, fine turnings, and dust from processing may be readily ignitable. |
| Explosion data | |
| Sensitivity to mechanical impact | Not applicable. |
| Sensitivity to static discharge | Take precautionary measures against static discharges when there is a risk of dust explosion. |

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

Avoid generating dust. Avoid contact with sharp edges or heated metal. Molten, heated and cold aluminum look alike; do not touch unless you know it is cold. Avoid inhalation of fumes from molten product. 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

Collect spillage. Reuse or recycle material whenever possible.

7. Handling and storage

Handling

Keep material dry. Avoid generating dust. Avoid contact with sharp edges or heated metal. Hot and cold aluminum are not visually different. Hot aluminum does not necessarily glow red. 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 or if extremely fine particulate is generated, obtain and follow the safety procedures and equipment guides contained in Aluminum Association Bulletin F-1 and National Fire Protection Association (NFPA) standards listed in Section 16.

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

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

Do not allow chips, fines or dust to contact water, particularly in enclosed areas.

Avoid all ignition sources. Good housekeeping practices must be maintained. Dust accumulation on the floor, ledges and beams can present a risk of ignition, flame propagation and secondary explosions. Do not use compressed air to remove settled material from floors, beams or equipment

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 a 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

Occupational exposure limits

| U.S. - OSHA Components | Type | Value | Form |
|--|---------|--|-------------------------------------|
| Aluminum (CAS 7429-90-5) | TWA | 5 mg/m ³ 15 mg/m ³ | Respirable fraction Total dust |
| Chromium (CAS 7440-47-3) | TWA | 1 mg/m ³ | |
| Cobalt† (CAS 7440-48-4) | TWA | 0.1 mg/m ³ | Dust and fume. |
| Copper (CAS 7440-50-8) | TWA | 1 mg/m ³ 0.1 mg/m ³ | Dust and mist. Fume. |
| Manganese (CAS 7439-96-5) | Ceiling | 5 mg/m ³ | Fume |
| Nickel†† (CAS 7440-02-0) | TWA | 1 mg/m ³ | |
| Silicon (CAS 7440-21-3) | TWA | 5 mg/m ³ 15 mg/m ³ | Respirable fraction. Total dust |
| Additional components | Type | Value | Form |
| Aluminum oxide (non-fibrous) (CAS 1344-28-1) | TWA | 5 mg/m ³ 15 mg/m ³ | Respirable fraction. Total dust. |
| Chromium (II) compounds | TWA | 0.5 mg/m ³ | (as Cr) |
| Chromium (III) compounds | TWA | 0.5 mg/m ³ | (as Cr) |
| Chromium (VI) compounds, certain water insoluble forms | TWA | 0.0025 mg/m ³ | Action Level as Cr(VI)) |

U.S. - OSHA

| Additional components | Type | Value | Form |
|--------------------------------------|-------------|--------------------------|------------------------|
| Chromium (VI) compounds | TWA | 0.0025 mg/m ³ | Action Level as Cr(VI) |
| Iron oxide (CAS 1309-37-1) | TWA | 10 mg/m ³ | Fume. |
| Lead compounds, inorganic | TWA | 0.05 mg/m ³ | (as Pb) |
| | | 0.03 mg/m ³ | Action Level (as Pb) |
| Manganese compounds, inorganic | Ceiling | 5 mg/m ³ | (as Mn) Fume |
| Nickel compounds, insoluble | TWA | 1 mg/m ³ | (as Ni) |
| Nitric oxide (CAS 10102-43-9) | TWA | 30 mg/m ³ | |
| | | 25 ppm | |
| Oil mist, mineral (CAS 8012-95-1) | TWA | 5 mg/m ³ | Mist. |
| Ozone (CAS 10028-15-6) | TWA | 0.2 mg/m ³ | |
| | | 0.1 ppm | |
| Zinc oxide (CAS 1314-13-2) | TWA | 5 mg/m ³ | Respirable fraction. |
| | | 5 mg/m ³ | Fume. |
| | | 15 mg/m ³ | Total dust. |

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

| Components | Type | Value | Form |
|--|-------------|-------------------------|-------------|
| Lead‡ (CAS 7439-92-1) | TWA | 0.05 mg/m ³ | |
| Additional components | Type | Value | Form |
| Chromium (VI) compounds, certain water insoluble forms | TWA | 0.005 mg/m ³ | as Cr(VI) |
| Chromium (VI) compounds, water soluble forms | TWA | 0.005 mg/m ³ | |
| Chromium (VI) compounds | TWA | 0.005 mg/m ³ | as Cr(VI) |

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

| Additional components | Type | Value | Form |
|---|-------------|----------------------|--------------------|
| Magnesium oxide fume (CAS 1309-48-4) | PEL | 15 mg/m ³ | Total particulate. |
| Nitrogen dioxide (CAS 10102-44-0) | Ceiling | 9 mg/m ³ | |
| | | 5 ppm | |
| Oil mist, mineral (CAS 8012-95-1) | PEL | 5 mg/m ³ | Mist. |

ACGIH

| Components | Type | Value | Form |
|--|------------------------------|------------------------|--|
| Manganese (CAS 7439-96-5) | TWA (inhalable fraction) | 0.2 mg/m ³ | (inhalable fraction) |
| | TWA (respirable fraction) | 0.02 mg/m ³ | (respirable fraction) |
| Additional components | Type | Value | Form |
| Aluminum oxide (non-fibrous) (CAS 1344-28-1) | TWA | 1 mg/m ³ | Respirable fraction, as Al |
| Chromium (VI) compounds, water soluble forms | TWA | 0.05 mg/m ³ | (as Cr) |
| Chromium (VI) compounds | TWA | 0.05 mg/m ³ | 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

| Additional components | 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

| Additional components | 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 | |
| Cobalt† (CAS 7440-48-4) | TWA | 0.02 mg/m3 | |
| Lead‡ (CAS 7439-92-1) | TWA | 0.05 mg/m3 | |
| Nickel†† (CAS 7440-02-0) | TWA | 1.5 mg/m3 | Inhalable fraction. |

| Additional components | 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 | 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 fume (CAS 1309-48-4) | TWA | 10 mg/m3 | Inhalable fraction. |
| Manganese compounds, inorganic | TWA | 0.1 mg/m3 | Inhalable fraction. |
| Nickel compounds, insoluble | TWA | 0.02 mg/m3 0.2 mg/m3 | Respirable fraction. Inhalable fraction. |
| 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 10 mg/m3 | Respirable fraction Total dust |
| Cobalt† (CAS 7440-48-4) | TWA | 0.02 mg/m3 | Inhalable fraction |
| Manganese (CAS 7439-96-5) | TWA | 0.05 mg/m3 | Total dust. |
| Nickel†† (CAS 7440-02-0) | TWA | 0.02 mg/m3 1 mg/m3 | Respirable fraction. |

| Additional components | Type | Value | Form |
|--|------|--------------------------|--|
| Aluminum oxide (non-fibrous) (CAS 1344-28-1) | TWA | 3 mg/m3 10 mg/m3 | Respirable fraction. Total dust. |
| Chromium (VI) compounds | TWA | 0.25 µg/m3 | |
| Manganese compounds, inorganic | TWA | 0.05 mg/m3 0.02 mg/m3 | Total dust, as Mn. 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 | If dust is 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. When material is heated, wear gloves to protect against thermal burns. |
| 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). |
| Respiratory protection | Dust and fumes from processing: Use NIOSH-approved respiratory protection as specified by an Industrial Hygienist or other qualified professional if concentrations exceed the limits listed in Section 8. Suggested respiratory protection: P95, P100 for Lead. |
| Thermal hazards | Contact with molten material can cause thermal burns. Hot aluminum does not necessarily glow red. Flame retardant protective clothing is recommended. When material is heated, wear gloves to protect against thermal burns. |
| General hygiene considerations | Handle in accordance with good industrial hygiene and safety practice. When using, do not eat, drink or smoke. Wash hands before breaks and at the end of workday. |
| Control parameters | Follow standard monitoring procedures. |
| 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 |
| Melting point/freezing point | 890 - 1215 °F (476.67 - 657.22 °C) |
| 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. |
| Vapor pressure | Not applicable |
| Vapor density | Not applicable |
| Relative density | Not determined |
| Solubility(ies) | Insoluble |
| Partition coefficient (n-octanol/water) | Not applicable. Not applicable |
| Auto-ignition temperature | Not applicable |
| Decomposition temperature | Not applicable |
| Viscosity | Not applicable |

10. Stability and reactivity

| | |
|---|--|
| Reactivity | Not available. |
| 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 | <p>Chips, fines, dust and molten metal are considerably more reactive with the following:</p> <ul style="list-style-type: none">• 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. <p>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.</p> <p>Coils of foil may be a potential hazard under the following conditions:</p> <ul style="list-style-type: none">• 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 <p>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.</p> |
| Incompatible materials | <p>Chips, fines, dust and molten metal are considerably more reactive with the following:</p> <ul style="list-style-type: none">• Strong oxidizers: Violent reaction with considerable heat generation. Can react explosively with nitrates (e.g., ammonium nitrate and fertilizers containing nitrate) when heated or molten.• Acids and alkalis: Reacts to generate flammable/explosive hydrogen gas. Generation rate is greatly increased with smaller particles (e.g., fines and dusts).• Halogenated compounds: Many halogenated hydrocarbons, including halogenated fire extinguishing agents, can react violently with finely divided or molten aluminum.• Iron oxide (rust) and other metal oxides (e.g., copper and lead oxides): A violent thermite reaction generating considerable heat can occur. Reaction with aluminum fines and dusts requires only very weak ignition sources for initiation. Molten aluminum can react violently with iron oxide without external ignition source.• Iron powder and water: Explosive reaction forming hydrogen gas when heated above 1470°F (800°C). <p>Thermite reactions can occur with oxides of lead, copper, iron, bismuth and certain other metals. 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.</p> |
| Hazardous decomposition products | No hazardous decomposition products are known. |

11. Toxicological information

Health effects associated with ingredients

Aluminum dust/fines and fumes: Low health risk by inhalation. Generally considered to be biologically inert (milling, cutting, grinding).

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

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

Manganese dust or fumes: Chronic overexposures: Can cause inflammation of the lung tissues, scarring of the lungs (pulmonary fibrosis), central nervous system damage, Secondary Parkinson's Disease and reproductive harm in males.

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

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.

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

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

Some products are supplied with an oil coating or have residual oil from the manufacturing process. Oil: Can cause irritation of skin. Skin contact (prolonged or repeated): Can cause dermatitis.

Health effects associated with compounds formed during processing

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

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

Zinc oxide fumes: Can cause irritation of upper respiratory tract. Acute overexposures: Can cause metal fume fever (nausea, fever, chills, shortness of breath and malaise).

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).

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

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

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).

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.

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

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

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

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 (methemoglobin). Can cause cough, shortness of breath, accumulation of fluid in the lungs (pulmonary edema) and death. Effects can be delayed up to 2-3 weeks.

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

Information on likely routes of exposure

| | |
|---------------------|---|
| Eye contact | Dust and fumes from processing: Can cause irritation. |
| Skin contact | Contains (Cobalt, Nickel). May produce an allergic reaction. Prolonged or repeated skin contact may cause sensitization and allergic contact dermatitis. Dust from processing: Can cause mechanical irritation. Contact with residual oil/oil coating: Can cause irritation. Prolonged or repeated skin contact may cause dermatitis. |
| Inhalation | Contains (Cobalt, Nickel). May produce an allergic reaction. Dust from mechanical processing: Can cause irritation of the upper respiratory tract. Chronic overexposures: Can cause damage to the heart muscle (cardiomyopathy), reduction in the number of red blood cells (anemia), skin abnormalities (pigmentation changes), respiratory sensitization, central nervous system damage, secondary Parkinson's disease, reproductive harm and lung disease. Additional health effects from elevated temperature processing (e.g., welding, melting): Acute exposure: Can cause metal fume fever (nausea, fever, chills, shortness of breath and malaise). Chronic overexposures: Can cause scarring of the lungs (pulmonary fibrosis) and lung cancer. |
| Ingestion | Not relevant, due to the form of the product. |

Symptoms related to the physical, chemical and toxicological characteristics

Contains (Cobalt, Nickel). May produce an allergic reaction. May cause sensitization of susceptible persons by skin contact or by inhalation of dust.

Dust and fumes from processing:

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

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.

Contains nickel, which can cause lung or nasal cancer. Long-term breathing of this material may cause chronic lung disease.

Lead may damage kidney function, the blood forming system and the reproductive system.

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 |
| Additional components | Species | Test Results |
| Aluminum oxide (non-fibrous) (CAS 1344-28-1) | | |
| Acute | | |
| Inhalation | | |
| LC50 | Rat | > 2.3 mg/l 7.6 mg/l |
| Oral | | |
| LD50 | Rat | > 5000 mg/kg |
| Iron oxide (CAS 1309-37-1) | | |
| Acute | | |
| Oral | | |
| LD50 | Rat | > 10000 mg/kg |
| Nitric oxide (CAS 10102-43-9) | | |
| Acute | | |
| Inhalation | | |
| LC50 | Rat | 115 ppm, 1 Hours 57.5 ppm, 4 Hours |

| Additional components | Species | Test Results |
|--|---|---------------------|
| Nitrogen dioxide (CAS 10102-44-0) | | |
| Acute | | |
| Inhalation | | |
| LC50 | Guinea pig | 30 ppm, 1 Hours |
| | Rat | 88 ppm, 4 Hours |
| Silica, amorphous (CAS 69012-64-2) | | |
| Acute | | |
| Oral | | |
| LD50 | Mouse | > 15000 mg/kg |
| | Rat | > 22500 mg/kg |
| Zinc oxide (CAS 1314-13-2) | | |
| Acute | | |
| Inhalation | | |
| LC50 | Mouse | > 5.7 mg/l, 4 Hours |
| Oral | | |
| LD50 | Mouse | 7950 mg/kg |
| | Rat | > 5000 mg/kg |
| | | > 5 g/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: Not classified. | |
| | Dust and fumes from processing: Contains (Cobalt, Nickel). May produce an allergic reaction. May cause sensitization by inhalation. | |
| Skin sensitization | Dust and fume from processing: Direct contact may irritate. Contact with residual oil/oil coating: Frequent or prolonged contact may defat and dry the skin, leading to discomfort and dermatitis. | |
| 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. | |
| | Health effects from mechanical processing (e.g., cutting, grinding): Can present a cancer hazard (Cobalt, Nickel, Lead). | |
| | Health effects from elevated temperature processing (e.g., welding, melting): Can present a cancer hazard (Hexavalent chromium compounds, Nickel compounds, Lead compounds, Welding fumes). | |
| 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. | |
| Reproductive toxicity | Product as shipped: Does not present any reproductive hazards. | |
| | Dust or fume from processing: Can present a reproductive hazard (Lead, Manganese, Manganese compounds and Lead compounds). | |
| Routes of exposure | Inhalation. Skin contact. Eye contact. | |
| Specific target organ toxicity - single exposure | Not classified. Based on available data, the classification criteria are not met. | |

| | |
|---|---|
| Specific target organ toxicity - repeated exposure | Not classified. Based on available data, the classification criteria are not met. |
| Aspiration hazard | Not applicable. |
| Chronic effects | Prolonged exposure may cause chronic effects. |
| Further information | None known. |

12. Ecological information

Ecotoxicity Not expected to be harmful to aquatic organisms.

| 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 |
| Additional components | | | |
| Species | | | |
| Test Results | | | |
| Nitrogen dioxide (CAS 10102-44-0) | | | |
| Aquatic | | | |
| Fish | LC50 | Tench (Tinca tinca) | 19.6 mg/l, 96 hours |
| Ozone (CAS 10028-15-6) | | | |
| Aquatic | | | |
| Fish | LC50 | Rainbow trout,donaldson trout (Oncorhynchus mykiss) | 0.0081 - 0.0106 mg/l, 96 hours |
| Zinc oxide (CAS 1314-13-2) | | | |
| Aquatic | | | |
| Fish | LC50 | Fathead minnow (Pimephales promelas) | 2246 mg/l, 96 hours |

Persistence and degradability The product is not expected to be biodegradable.

| | |
|----------------------------------|-------------------------------------|
| Bioaccumulative potential | The product is not bioaccumulating. |
| Mobility in soil | Not considered mobile. |
| Mobility in general | Not applicable. |
| 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. |
| Waste from residues / unused products | Not applicable. |
| Contaminated packaging | Not applicable. |

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. |
| Cobalt† (CAS 7440-48-4) | 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 |
|------------------|------------|---------------------|-----------------------------|--|--|
| Ozone | 10028-15-6 | 100 | 100 lbs | | |
| Nitrogen dioxide | 10102-44-0 | 10 | 100 lbs | | |
| Nitric oxide | 10102-43-9 | 10 | 100 lbs | | |

SARA 311/312 Hazardous chemical No

SARA 313 (TRI reporting)

| Chemical name | CAS number | % by wt. |
|--|-------------------|----------|
| Aluminum | 7429-90-5 | >84 |
| Zinc | 7440-66-6 | <12 |
| Copper | 7440-50-8 | <4.7 |
| Cobalt† | 7440-48-4 | <2.0 |
| Manganese | 7439-96-5 | <1.5 |
| Nickel†† | 7440-02-0 | 0 - 0.2 |
| Zinc oxide | 1314-13-2 | 1 |
| Manganese compounds, inorganic | No. Not available | 1 |
| Nickel compounds, insoluble | No. Not available | 1 |
| Chromium (II) compounds | No. Not available | 1 |
| Chromium (III) compounds | No. Not available | 1 |
| Chromium (VI) compounds, water soluble forms | No. Not available | 1 |
| Chromium (VI) compounds, certain water insoluble forms | No. Not available | 1 |
| Ozone | 10028-15-6 | 1 |
| Chromium (VI) compounds | No. Not available | 1 |
| Lead compounds, inorganic | No. Not available | 1 |

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

US - New Jersey RTK - Substances: Listed substance

Aluminum (CAS 7429-90-5)
 Chromium (CAS 7440-47-3)
 Cobalt† (CAS 7440-48-4)
 Copper (CAS 7440-50-8)
 Lead‡ (CAS 7439-92-1)
 Magnesium (CAS 7439-95-4)
 Manganese (CAS 7439-96-5)
 Nickel†† (CAS 7440-02-0)
 Silicon (CAS 7440-21-3)
 Zinc (CAS 7440-66-6)

US - Pennsylvania RTK - Hazardous Substances: All compounds of this substance are considered environmental hazards

Chromium (CAS 7440-47-3)
 Cobalt† (CAS 7440-48-4)
 Copper (CAS 7440-50-8)
 Lead‡ (CAS 7439-92-1)
 Manganese (CAS 7439-96-5)
 Nickel†† (CAS 7440-02-0)
 Zinc (CAS 7440-66-6)

US - Pennsylvania RTK - Hazardous Substances: Special hazard

Chromium (CAS 7440-47-3)
 Nickel†† (CAS 7440-02-0)

US. California Controlled Substances. CA Department of Justice (California Health and Safety Code Section 11100)
Not listed.**US. California. Candidate Chemicals List. Safer Consumer Products Regulations (Cal. Code Regs, tit. 22, 69502.3, subd. (a))**

Aluminum (CAS 7429-90-5)
 Chromium (CAS 7440-47-3)
 Cobalt† (CAS 7440-48-4)
 Copper (CAS 7440-50-8)
 Iron (CAS 7439-89-6)

Lead‡ (CAS 7439-92-1)
Manganese (CAS 7439-96-5)
Nickel†† (CAS 7440-02-0)
Zinc (CAS 7440-66-6)

US. Massachusetts RTK - Substance List

Aluminum (CAS 7429-90-5)
Chromium (CAS 7440-47-3)
Cobalt† (CAS 7440-48-4)
Copper (CAS 7440-50-8)
Lead‡ (CAS 7439-92-1)
Magnesium (CAS 7439-95-4)
Manganese (CAS 7439-96-5)
Nickel†† (CAS 7440-02-0)
Silicon (CAS 7440-21-3)
Zinc (CAS 7440-66-6)

US. New Jersey Worker and Community Right-to-Know Act

Aluminum (CAS 7429-90-5)
Chromium (CAS 7440-47-3)
Cobalt† (CAS 7440-48-4)
Copper (CAS 7440-50-8)
Lead‡ (CAS 7439-92-1)
Manganese (CAS 7439-96-5)
Nickel†† (CAS 7440-02-0)
Zinc (CAS 7440-66-6)

US. Pennsylvania RTK - Hazardous Substances

Aluminum (CAS 7429-90-5)
Chromium (CAS 7440-47-3)
Cobalt† (CAS 7440-48-4)
Copper (CAS 7440-50-8)
Lead‡ (CAS 7439-92-1)
Magnesium (CAS 7439-95-4)
Manganese (CAS 7439-96-5)
Nickel†† (CAS 7440-02-0)
Silicon (CAS 7440-21-3)
Zinc (CAS 7440-66-6)

US. Pennsylvania Worker and Community Right-to-Know Law

Aluminum (CAS 7429-90-5)
Chromium (CAS 7440-47-3)
Cobalt† (CAS 7440-48-4)
Copper (CAS 7440-50-8)
Lead‡ (CAS 7439-92-1)
Magnesium (CAS 7439-95-4)
Manganese (CAS 7439-96-5)
Nickel†† (CAS 7440-02-0)
Silicon (CAS 7440-21-3)
Zinc (CAS 7440-66-6)

US. Rhode Island RTK

Aluminum (CAS 7429-90-5)
Chromium (CAS 7440-47-3)
Cobalt† (CAS 7440-48-4)
Copper (CAS 7440-50-8)
Lead‡ (CAS 7439-92-1)
Manganese (CAS 7439-96-5)
Nickel†† (CAS 7440-02-0)
Zinc (CAS 7440-66-6)

US. California Proposition 65

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

| | |
|--------------------------|-------------------------|
| Cobalt† (CAS 7440-48-4) | Listed: July 1, 1992 |
| Lead‡ (CAS 7439-92-1) | Listed: October 1, 1992 |
| Nickel†† (CAS 7440-02-0) | Listed: May 7, 2004 |

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

| | |
|-----------------------|---------------------------|
| Lead‡ (CAS 7439-92-1) | Listed: February 27, 1987 |
|-----------------------|---------------------------|

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

Lead‡ (CAS 7439-92-1)

Listed: February 27, 1987

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

Lead‡ (CAS 7439-92-1)

Listed: February 27, 1987

International Inventories

| Country(s) or region | Inventory name | On inventory (yes/no)* |
|-----------------------------|--|------------------------|
| Australia | Australian Inventory of Chemical Substances (AICS) | Yes |
| Canada | Domestic Substances List (DSL) | Yes |
| Canada | Non-Domestic Substances List (NDSL) | No |
| China | Inventory of Existing Chemical Substances in China (IECSC) | Yes |
| Europe | European Inventory of Existing Commercial Chemical Substances (EINECS) | Yes |
| Europe | European List of Notified Chemical Substances (ELINCS) | No |
| Japan | Inventory of Existing and New Chemical Substances (ENCS) | No |
| Korea | Existing Chemicals List (ECL) | Yes |
| New Zealand | New Zealand Inventory | Yes |
| Philippines | Philippine Inventory of Chemicals and Chemical Substances (PICCS) | Yes |
| United States & Puerto Rico | Toxic Substances Control Act (TSCA) Inventory | Yes |

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

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

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

May 26, 2015: Change(s) in Section: 2, 5, 11 and 15.

June 4, 2013: Change(s) in Section: 1, 2, 4, 5, 6, 7, 8, 10, 11, 12, 13, 15 and 16.

January 14, 2010: New format.

February 21, 2007: Change(s) in Section: 1, 2, 7 and 8.

October 26, 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 20, 2003: Change(s) in Section: 1, 2, 3, 8 and 15.

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

SDS System Number: 115824

Revision date

May 26, 2015.

Version #

09

Revision Information

Product and Company Identification: Synonyms

Hazards Identification: US Hazard Categories

Composition / Information on Ingredients: Ingredients

Physical & Chemical Properties: Multiple Properties

Transport Information: Material Transportation Information

Regulatory Information: Safety Phrases

GHS: Classification

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

Suspected of causing cancer. May cause allergy or asthma symptoms or breathing difficulties if inhaled. May cause an allergic skin reaction.

Precautionary statement**Prevention**

Do not handle until all safety precautions have been read and understood. Avoid breathing dust/fume. In case of inadequate ventilation wear respiratory protection. Wear protective gloves. Do not eat, drink or smoke when using this product. Contaminated work clothing should not be allowed out of the workplace.

Response

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

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

Storage

Store in a dry place.

Disposal

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



Danger

Supplemental information

Dust and fumes from processing: Can cause irritation of the eyes, skin and upper respiratory tract. Non-combustible as supplied. Small chips, fine turnings and dust from processing may be readily ignitable.

Explosion/fire hazards may be present when:

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

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 halogenated extinguishing agents on small chips/fines.

DO NOT USE water in fighting fires around molten metal.

These fire extinguishing agents will react with the burning material.

IN CASE OF SPILL: Collect scrap for recycling. If molten: Use dry sand to contain the flow of material. All tooling (e.g., shovels or hand tools) and containers which come in contact with molten metal must be preheated or specially coated, rust free and approved for such use. Allow the spill to cool before remelting as scrap.

Contains (Cobalt, Nickel). May produce an allergic reaction.

See Alcoa SDS Number 0669.

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