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Material Safety Data Sheet

Aluminum Company of America, 1501 Alcoa Building, Pittsburgh, PA 15219

 ALCOA NO. 684D

Common Name	Phone	Date
Remelt Ingot and Cast Aluminum Products, 3XX.X Series Alloys	Emergency: 412-553-4001	Rev 92-09-30
	Chemtrec: 800-424-9300	Orig 90-03-16
	Technical: 412-553-4649	

Prepared by the Hazardous Materials Control Committee.

SECTION I. Material Description 356

Chemical Name & Formula: Mixture

Other Designation: Granulated, pebbled, aluminizing, foundry, rich alloy, rotor, RSI. 3XX.X Series Alloys, C3, C65, C22F, C23F, C24F, C34F, C37F, C57F, C69F, C70F, C73F, C81F, C87F, C88F, C91F, C93F, C119, C253, C269, C277, CE40, CE66, CR37, CR80, CR92, CZ29.

Does not include A357.2, 358.2, and 364.2 (MSDS No. 303).

CAS No.: See Section II

Manufacturer: Alcoa

Product Use: Alloying, metalizing, or cast aluminum products

SECTION II. Ingredients and Occupational Exposure Limits

Hazardous ingredients are listed if they comprise $\geq 1.0\%$ by weight.

"Special Hazardous Substances" (Pennsylvania Right-to-Know Regulations) are listed if they comprise $\geq 0.01\%$.

Ingredient	CAS Number	% by Weight	Ingredient	CAS Number	% by Weight
Aluminum	7429-90-5	74.4 min.	Zinc	7440-66-6	2.9 max.
Silicon	7440-21-3	20.0 max.	Magnesium	7439-95-4	1.3 max.
Copper	7440-50-8	5.0 max.	Iron	7439-89-6	1.1 max.
Nickel	7440-02-0	3.0 max.	Chromium	7440-47-3	0.5 max.

Occupational Exposure Limits (TWA in mg/m³ unless noted)

	ACGIH TLV	OSHA PEL
Aluminum, total dust	10.0	15 (total), 5 (respirable)
Aluminum, fume	5.0	5.0
Chromium, metal	0.5	1.0
Chromium II & III compounds	0.5	0.5
Cr VI compounds, water soluble and certain water insoluble	0.05	0.1
Copper, fume	0.2	0.1
Iron oxide, fume	5.0	10
Magnesium oxide, fume	10.0	10 (total), 5 (respirable)
Nickel, metal	1.0	1.0
Nickel, soluble compounds	0.1	0.1
Silicon, nuisance dust	10 (total dust)	10 (total dust), 5 (respirable)
Zinc oxide, fume	5, 10 (STEL)	5, 10 (STEL)
Zinc oxide, nuisance dust	10	10 (total), 5 (respirable)
* Ozone	0.1 ppm, 0.3 ppm (STEL)	0.1 ppm, 0.3 ppm (STEL)
*Nitric oxide	25 ppm	25 ppm
*Nitrogen dioxide	3 ppm, 5 ppm (ceiling)	5 ppm (ceiling)

* Refer to Section VI for processes where ozone and nitric oxide limits apply.

No LD₅₀ or LC₅₀ found for oral, dermal or inhalation routes of administration except for:
 Nickel: oral rat LD₅₀: 9000 mg/kg body weight
 Silicon - oral rat LD₅₀: 3160 mg/kg body weight

SECTION III. Physical Data

Physical Form: Solid

Boiling Temperature: Not applicable

Freeze-Melt Temperature: Range: generally 900-1200°F (482-649°C)

Vapor Pressure (mm): Not applicable; Vapor Density (air = 1): Not applicable

Evaporation Rate: Not applicable

Specific Gravity: Not applicable

Density: Range: generally (0.095-0.113 lb/in³) 2.63-3.12 g/cm³

Water Solubility: None

pH: Not applicable

Color: Silvery

Odor: None Odor Threshold (ppm): Not applicable

Coefficient of water/oil distribution: Not applicable

SECTION IV. Fire and Explosion Data

Flashpoint:	Auto-Ignition Temp.:	Flammability Limits in Air: Upper: Lower:
None	Not applicable	Not applicable

Water and other forms of contamination on or contained in remelt ingot are known to have caused explosions in melting operations. While all efforts are made to minimize surface roughness and internal voids in the casting of remelt ingot, there remains the possibility of moisture contamination or entrapment. See Section VIII for precautions.

Small chips, fine turnings, and dust may ignite readily. Use coarse water spray on chips, turnings, etc. Use Class D extinguishing agents on small chips or fines.

Dust clouds may be explosive; prevent formation of a dust cloud during processing.

Firefighters should wear NIOSH approved, positive pressure, self-contained breathing apparatus and full protective clothing when appropriate.

SECTION V. Reactivity Data

Stable under normal conditions of use, storage, and transportation.

Molten aluminum can react violently with water, rust, certain metal oxides (e.g., oxides of copper, iron, and lead), and nitrates (e.g., ammonium nitrate and fertilizers containing ammonium nitrate).

For finely divided aluminum (e.g., small chips, fines):

With water: Generates hydrogen and heat slowly. Water/aluminum mixtures may be hazardous when confined.

With heat: Oxidizes at a temperature-dependent rate.

With strong oxidizers: Violent reaction with much heat generation.

With acids and alkalis: Reacts to generate hydrogen.

With halogenated compounds: Halogenated hydrocarbons can react violently with finely divided aluminum.

SECTION VI. Health Hazard Information (See Attachment for exposure limits.)

Exposure to nickel dust and fume in excess of recommended limits has been associated with pneumoconiosis in animal studies. Nickel metal and its oxides are animal carcinogens when administered intratracheally, intraplurally, or intramuscularly. Certain nickel compounds have caused cancer of lungs, larynx, and paranasal sinuses by inhalation, intramuscular, intraperitoneal

routes of administration in lab animals. Nickel compounds are carcinogenic to humans by inhalation as defined by the National Toxicology Program (NTP) and the International Agency for Research on Cancer (IARC) (Group 1). Nickel metal is possibly carcinogenic to humans as defined by IARC (Group 2B).

Hexavalent chromium (Chrome VI) may cause lung, nasal, and gastrointestinal cancer by inhalation on chronic overexposures. Chrome VI may cause pulmonary edema, asthma, kidney damage, primary irritant dermatitis, sensitization dermatitis and skin ulceration. Hexavalent chromium is listed as carcinogenic to humans by the International Agency for Research on Cancer (IARC) (Group 1). Chromium and its compounds are listed as carcinogenic by the National Toxicology Program (NTP).

Overexposure to copper dust/mists can cause irritation of upper respiratory tract. Chronic overexposure may result in blood disorders (e.g., anemia). Overexposure to copper fume can result in upper respiratory tract irritation, nausea, and metal fume fever.

Exposure to zinc oxide fume subsequent to burning, welding, and molten metal work can result in "zinc chills" (metal fume fever). Temporary symptoms can include fever, chills, nausea, vomiting, and muscular pain. Exposure to dust/fines presents a low health risk by inhalation.

Exposure to magnesium oxide fumes may cause metal fume fever. Temporary symptoms can include fever, chills, nausea, vomiting, and muscular pain. Exposure to magnesium metal or oxide dust should be a low health risk by inhalation and should be treated as a nuisance dust.

High exposures to iron oxide (Fe_2O_3) dust or fume can cause x-ray changes (siderosis or iron pigmentation) in the lungs as a result of long-term exposure. Siderosis is a benign condition and is not associated with pulmonary fibrosis.

Chronic exposure to inert dusts of silicon may cause increased airways resistance and contribute to chronic bronchitis. Intratracheal administration of silicon in rabbits produced significant pulmonary lesions.

Aluminum dust/fines and fumes are a low health risk by inhalation. For standard operations (e.g., milling, cutting, grinding), aluminum should be treated as a nuisance dust and is so defined by the American Conference of Governmental Industrial Hygienists (ACGIH).

When plasma arc cutting with auxiliary gases containing nitrogen, the exposure limits for oxides of nitrogen can be exceeded. Nitrogen dioxide can cause irritation of eyes, nose, throat and delayed pulmonary edema. Short exposure to very high concentrations (>250 ppm) may cause pulmonary edema and death.

Nitric oxide is a severe eye, skin, and mucous membrane irritant; it may cause formation of methemoglobin and subsequent action on the central nervous system. Nitrogen monoxide can be fatal if inhaled at very high concentrations (>100 ppm).

Welding aluminum, plasma arc cutting, and arc spray metalizing can generate ozone. Overexposure to ozone can result in mucous membrane irritation as well as pulmonary changes including irritation, congestion, and edema. Welding fumes have been defined as possibly carcinogenic to humans by the International Agency for Research on Cancer (IARC) (Group 2B).

First Aid:

Inhalation: Immediately remove to fresh air. If breathing has stopped, provide oxygen and respiration. Consult a physician.

Skin and eyes: If irritation develops, consult a physician.

SECTION VII. Spill, Leak & Disposal Procedures

Collect scrap for remelting.

RCRA Hazardous Waste No.: If material is to be disposed, TCLP leachate testing for chromium is recommended to determine if waste is RCRA hazardous.

SECTION VIII. Special Protection and Precautions

Precautions are mandatory to minimize safety risks during melting operations. The following minimum guidelines should be observed:

1. Inspect all remelt ingot prior to furnace charging and remove surface contamination, such as ice, snow, deposits of grease and oil or other surface contamination resulting from shipment or storage.
2. Store ingot in dry, heated areas with any cracks or cavities pointed downwards.
3. Preheat and dry ingot adequately before charging into a furnace containing molten aluminum. This is typically done by use of a drying oven or homogenizing furnace. The drying cycle should bring the metal temperature of the coldest ingot of the batch to 400°F and then hold at that temperature for 6 hours.
4. Ingot that is charged into molten aluminum should always be preheated.

Molten aluminum and water can be an explosive combination. The risk is greatest when there is sufficient molten metal to entrap or seal off the water. If confined, even a few drops of water can lead to violent explosions. Drops of molten aluminum in water (e.g., plasma arc cutting), while not normally an explosion hazard, can generate enough flammable hydrogen gas to present an explosion hazard. Circulation of the water and removal of the metal particles minimize the hazards.

For fume exposure, use with adequate ventilation to meet the exposure limits as listed in Section II. Where the exposure limit is or may be exceeded, use NIOSH approved respiratory protection. Select appropriate respirator (e.g., dust and fume respirator) based on actual or potential airborne contaminants and their concentrations present.

SECTION IX. Regulatory Information

Components of this product are listed on the TSCA inventory (USA), the Domestic Substances List (Canada), and the EINECS core inventory (EC) market.

Nickel and chromium are listed by Pennsylvania as "Special Hazardous Substance" under Pennsylvania Worker and Community Right-to-Know Regulations.

Nickel and hexavalent chromium are known to the State of California to cause cancer (California Prop. 65).

For purposes of SARA III reporting, this substance contains the following listed ingredients:

Aluminum (fume/dust), Chromium, Copper, Nickel, Zinc -- Section 313 List

For purposes of CERCLA reporting, this substance contains the following listed ingredients:

Chromium, Copper, Nickel, Zinc.

If particulates or fumes are generated during processing, this material would fit the EPA Hazard Category definitions of Immediate (Acute) and Delayed (Chronic) Health Hazards under SARA Sections 311, 312.

If molten, this material would fit the EPA Hazard Category of Reactive Hazard under SARA Sections 311, 312.

D.O.T. Shipping Name, Hazard Class, I.D. No. (if applicable) Not Regulated
Canadian TDG Hazard Class & PIN -- Not Regulated

SECTION X. References

Alcoa MSDS No. 478 - Molten Aluminum

Comprehensive information is contained in the Aluminum Association's "Guidelines for Handling Molten Aluminum." Write the Aluminum Association, 900 Nineteenth Street NW, Washington, DC 20006 for a copy.

U.S. Dept. of Health and Human Services, NIOSH: Registry of Toxic Effects of Chemical Substances, 1985-86 Edition

Sax, N. Irving: Dangerous Properties of Industrial Materials, Van Nostrand Reinhold Co., Inc., 1984

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