



MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

Material Name MAGNESIUM RIBBON
MSDS Number 230
Manufacturer information Alcoa Inc.
201 Isabella Street
Pittsburgh, PA 15212-5858 US
Health and Safety +1-412-553-4649

Alcoa Inc.
Alcoa Cleveland Works
1600 Harvard Avenue
Cleveland, OH 44105-3092
+1-216-641-3600
Emergency Information USA: Chemtrec: +1-703-527-3887 +1-800-424-9300 ALCOA: +1-412-553-4001
Website For a current MSDS, refer to Alcoa websites: www.alcoa.com or Internally at my.alcoa.com EHS Community

2. Hazards Identification

Emergency overview Solid. Metal ribbon. Silvery-white. Odorless. Thin sheet, chips and shavings can be ignited at temperatures near 950°F (510°C) and can burn with intense heat and brilliant white light. Dust and fines from processing may be ignitable.

Explosion/fire hazards may be present when (See Sections 5, 7 and 10 for additional information):
• Heavily concentrated dust clouds are dispersed in the air.
• Molten metal is in contact with water/moisture.

Dust and fumes from processing: Can cause irritation of the eyes, skin and upper respiratory tract.
Dust and fumes from welding or elevated temperature processing: Acute overexposures: Can cause metal fume fever.
Direct viewing of magnesium fires may result in eye injury.

Potential health effects

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.

Eyes Dust and fume from processing: Can cause irritation.

Skin Dust and fumes from processing: Can cause irritation.

Inhalation Dust and fumes from mechanical processing: Can cause irritation of the upper respiratory tract and metal fume fever.

Dust and fumes from welding or elevated temperature processing: Acute overexposures: Can cause metal fume fever (nausea, chills, fever, shortness of breath and malaise).

Carcinogenicity and Reproductive Hazard

Does not present any cancer or reproductive hazards.

Medical conditions aggravated by exposure to product

Dust and fume from processing: Asthma, chronic lung disease, and skin rashes.

3. Composition / Information on Ingredients

Components	CAS #	Percent
Magnesium	7439-95-4	99.8

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

4. First Aid Measures

First aid procedures

Eye contact	Dust and fume 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: Wash with soap and water for at least 15 minutes. Get medical attention if irritation develops or persists.
Inhalation	Dust and fume from processing: Remove to fresh air. Check for clear airway, breathing, and presence of pulse. Provide cardiopulmonary resuscitation for persons without pulse or respirations. Consult a physician.

5. Fire Fighting Measures

Flammable/Combustible Properties	This product does not present fire or explosion hazards as shipped. Thin sheet, chips and shavings can be ignited at temperatures near 950°F (510°C) and can burn with intense heat and brilliant white light.
Fire / Explosion Hazards	May be a potential hazard under the following conditions: <ul style="list-style-type: none">• Dust clouds may be explosive. Even a minor dust cloud can explode violently.• Molten metal in contact with water/moisture. Moisture entrapped by molten metal can be explosive.
Extinguishing media	
Suitable extinguishing media	Smother fires with dry graphite or other suitable dry powders.
Unsuitable extinguishing media	DO NOT USE: Foam, halogenated agents or carbon dioxide. DO NOT USE water in fighting fires around molten metal. These fire extinguishing agents will react with the burning material.
Protection of firefighters	
Protective equipment for firefighters	Fire fighters should wear NIOSH approved, positive pressure, self-contained breathing apparatus and full protective clothing when appropriate. Direct viewing of magnesium fires may result in eye injury.

6. Accidental Release Measures

Spill or leak procedure	Collect scrap for recycling. If molten: Contain the flow using dry sand or salt flux as a dam. All tooling (e.g., shovels or hand tools) and containers which come in contact with molten metal must be preheated or specially coated and rust free. Allow the spill to cool before remelting as scrap.
--------------------------------	--

7. Handling and Storage

Handling	Avoid generating dust. Avoid contact with sharp edges or heated metal. Keep material dry.
Storage	Protect containers from physical damage. Keep material dry. Wet, moist or high humidity storage conditions will lead to corrosion of the product. Store away from combustibles. Store in a metal cabinet.
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). 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 and containers which come in contact with molten metal must be preheated or specially coated. Molds and ladles must be preheated or oiled prior to casting. Any surfaces that may contact molten metal (i.e., 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.

8. Exposure Controls / Personal Protection

Engineering controls Dust and fume from processing: Use with adequate explosion-proof ventilation to meet the limits listed in Section 8.

Exposure data This material does not have established exposure limits.

Occupational exposure limits

U.S. - OSHA

Compounds Formed During Processing	Type	Value	Form
Magnesium oxide (1309-48-4)	TWA	15 mg/m ³	(fume, total particulate)

ACGIH

Compounds Formed During Processing	Type	Value	Form
Magnesium oxide (1309-48-4)	TWA	10 mg/m ³	(inhalable fraction)

Personal protective equipment

Eye / face protection Wear safety glasses with side shields.

Skin protection Wear appropriate gloves to avoid any skin injury.

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

General

Wear appropriate fire-resistant clothing (e.g., gloves, coveralls) when exposing magnesium chips and turnings to elevated temperatures (950°F/510°C) which can cause ignition.

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).

9. Physical & Chemical Properties

Form Solid. Metal ribbon.

Appearance Silvery-white.

Boiling point 2030 °F (1110 °C)

Melting point 1202 °F (650 °C)

Flash point Not applicable

Auto-ignition temperature	950 °F (510 °C)
Flammability limits in air, lower, % by volume	Not applicable
Flammability limits in air, upper, % by volume	Not applicable
Vapor pressure	Not applicable
Vapor density	Not applicable
Solubility (water)	Insoluble
Density	1.74 g/cm ³ (0.063 lb/in ³)
pH	Not applicable
Odor	Odorless.
Partition coefficient (n-octanol/water)	Not applicable

10. Chemical Stability & Reactivity Information

Chemical stability	Stable under normal conditions of use, storage, and transportation as shipped.
Conditions to avoid	<p>Chips, fines, dust and molten metal are considerably more reactive with the following:</p> <ul style="list-style-type: none"> • 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. • Heat: Oxidizes at a rate dependent upon temperature and particle size. Supports ignition above 950°F (510°C) and burns extremely vigorously with white, hot flame. • Strong oxidizers: Violent reaction with considerable heat generation. • 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: Reacts with chlorine, bromine and iodine. <p>Thin sheet, chips and shavings can be ignited at temperatures near 950°F (510°C) and can burn with intense heat and brilliant white light.</p>
Hazardous polymerization	Will not occur.

11. Toxicological Information

Health effects associated with compounds formed during processing

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).

Component analysis - LD50 No LD50/LC50s are available for this products components.

Components

Toxicology Data - Selected LD50s and LC50s

Magnesium (7439-95-4)

Oral LD50 Rat: 230 mg/kg

Carcinogenicity Not listed by ACGIH, IARC, NIOSH, NTP OR OSHA.

Compounds Formed During Processing

ACGIH - Threshold Limit Values - Carcinogens

Magnesium oxide (1309-48-4)

A4 - Not Classifiable as a Human Carcinogen

12. Ecological Information

Environmental Fate No data available for product.

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: Not federally regulated in the U.S. if disposed of "as is."
 RCRA waste codes other than described here may apply depending on use of the product. Status must be determined at the point of waste generation. Refer to 40 CFR 261 or state equivalent in the U.S.

14. Transport Information**General Shipping Information****Basic shipping description:**

UN number UN1869
Proper shipping name Magnesium
Hazard class 4.1
Packing group III

General Shipping Notes

- Classification applies to: Magnesium and Magnesium Alloy with more than 50% magnesium in pellets, turnings or ribbons.

Alternate Shipping Information**Alternate Basic Shipping Description #1****Basic shipping description:**

Proper shipping name Not regulated
Hazard class -
Packing group -

Alternate Shipping Notes #1

- When "Not regulated", enter the proper freight classification, MSDS Number and Product Name onto the shipping paperwork.

IATA**Basic shipping description:**

UN number UN1869
Proper shipping name Magnesium
Hazard class 4.1
Packing group III

IATA Notes

- Single packagings are not authorized and packagings must meet the packing group II performance level (PI 419).

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.

State regulations**Components****U.S. - California - 8 CCR Section 339 - Director's List of Hazardous Substances**

Magnesium (7439-95-4) Present

U.S. - Massachusetts - Right To Know List

Magnesium (7439-95-4) Present

U.S. - New Jersey - Right to Know Hazardous Substance List

Magnesium (7439-95-4) sn 1136

U.S. - Pennsylvania - RTK (Right to Know) List

Magnesium (7439-95-4) Present

Superfund Amendments and Reauthorization Act of 1986 (SARA)

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

Inventory status

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 New and Existing Chemicals (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	No
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)

Inventory information Japan - ENCS Inventory: Pure metals are not specifically listed by CAS or ENCS number. The class of compounds for each of these metals is listed on the ENCS inventory.

16. Other Information

MSDS History Origination date: February 1, 1982
Supersedes: September 20, 2005
Revision date: August 19, 2009

MSDS Status August 19, 2009: New format.
September 20, 2005: Reviewed on a periodic basis in accordance with Alcoa policy. Change(s) in Section: 1, 8, 11 and 15.
May 6, 2002: New format.

Prepared By Hazardous Materials Control Committee
Preparer: Jon N. Peace, 412-553-2293/Robert W. Barr, 412-553-2618

MSDS System Number 115926

Other information

- 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 65, Standard for Processing and Finishing of Aluminum (NFPA phone: 800-344-3555)
- NFPA 651, Standard for Manufacture of Aluminum and Magnesium Powder
- NFPA 70, Standard for National Electrical Code (Electrical Equipment, Grounding and Bonding)
- NFPA 77, Standard for Static Electricity
- Guide to Occupational Exposure Values 2009, Compiled by the American Conference of Governmental Industrial Hygienists (ACGIH).
- Documentation of the Threshold Limit Values and Biological Exposure Indices, Sixth Edition, 1991, Compiled by the American Conference of Governmental Industrial Hygienists, Inc. (ACGIH).
- NIOSH Pocket Guide to Chemical Hazards, U.S. Department of Health and Human Services, February 2004.
- Dangerous Properties of Industrial Materials, Sax, N. Irving, Van Nostrand Reinhold Co., Inc., 1984.
- Patty's Industrial Hygiene and Toxicology: Volume II: Toxicology, 4th ed., 1994, Patty, F. A.; edited by Clayton, G. D. and Clayton, F. E.: New York: John Wiley & Sons, Inc.
- expub, Expert Publishing, LLC., www.expub.com

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 MSDS ***

Disclaimer

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

MAGNESIUM RIBBON

WARNING

Thin sheet, chips and shavings can be ignited at temperatures near 950°F (510°C) and can burn with intense heat and brilliant white light. Dust and fines from processing may be ignitable. Explosion/fire hazards may be present when:

Heavily concentrated dust clouds are dispersed in the air. Molten metal is in contact with water/moisture.

Dust and fumes from processing: Can cause irritation of the eyes, skin and upper respiratory tract. Dust and fumes from welding or elevated temperature processing: Acute overexposures: Can cause metal fume fever.

Direct viewing of magnesium fires may result in eye injury.

FIRST AID

Eye contact Dust and fume 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: Wash with soap and water for at least 15 minutes. Get medical attention if irritation develops or persists.

Inhalation Dust and fume from processing: Remove to fresh air. Check for clear airway, breathing, and presence of pulse. Provide cardiopulmonary resuscitation for persons without pulse or respirations. Consult a physician.

FIRE FIGHTING

Suitable extinguishing media Smother fires with dry graphite or other suitable dry powders.

Extinguishing media which must not be used for safety reasons DO NOT USE: Foam, halogenated agents or carbon dioxide. DO NOT USE water in fighting fires around molten metal. These fire extinguishing agents will react with the burning material.

SPILL PROCEDURES

Spill or leak procedure Collect scrap for recycling. If molten: Contain the flow using dry sand or salt flux as a dam. All tooling (e.g., shovels or hand tools) and containers which come in contact with molten metal must be preheated or specially coated and rust free. Allow the spill to cool before remelting as scrap.

HANDLING AND STORAGE

Handling Avoid generating dust. Avoid contact with sharp edges or heated metal. Keep material dry.

Storage Protect containers from physical damage. Keep material dry. Wet, moist or high humidity storage conditions will lead to corrosion of the product. Store away from combustibles. Store in a metal cabinet.

Contains:

Magnesium

7439-95-4

See Alcoa Material Safety Data Sheet No. 230 for more information about use and disposal. Emergency Phone: (412) 553-4001.