Material Safety Data Sheet

Product Name: ATOMIZED ALUMINUM POWDER **ID: 123**

* * * Section 1 - Chemical Product and Company Identification * * *

Chemical Formula: Aluminum, Al
Product Use: Various metallurgical/chemical/structural/coating applications
Other Designations: All non-alloyed, non-coated nodular aluminum powder containing <1% trace elements; 101, 104, 101T, 120, 123, 1124, 1202, 1233, 1235, 1401/S2(1406), 1403, 1404, 1407, 1401/S9(1409), 1125, 4402, 6401, 7123, 7124, 7125, 7401

Alcoa Inc.
201 Isabella Street
Pittsburgh, PA 15212-5858
Phone: Health and Safety: 1-412-553-4649

Manufacturer/Supplier
Alcoa Aluminio SA - Brazil
Rodovia Pocos de Caldas/Andradas, Km 10
CEP 37701-970
Pocos de Caldas, Minas Gerais Brazil,
Phone: (+55 35) 3729-5000

Alcoa Inc.
Rockdale Operations
Market Road 1786
Rockdale, TX 76567
Phone: 1-800-331-5370

Emergency Information: USA: Chemtrec: 1-800-424-9300 or 1-703-527-3887 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

* * * Section 2 - Hazards Identification * * *

EMERGENCY OVERVIEW

Solid, finely divided powder. Silvery to gray color. Odorless. Dust or fines dispersed in the air can be explosive. Dust and fines may be readily ignitable.
Explosion/fire hazards may be present when (See Sections 5, 7 and 10 for additional information):
* Dust or fines are dispersed in the air.
* Dust or fines are in contact with water.
* Dust or fines are in contact with certain metal oxides (e.g. rust).
Do not use water for spill clean-up. Use natural bristle broom (push type recommended) and non-sparking tools. Avoid all ignition sources. Prohibit smoking.

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: Can cause mechanical irritation.
Skin: Can cause mechanical irritation.
Ingestion: Can cause irritation.
Inhalation: Can cause irritation of upper respiratory tract.

Carcinogenicity and Reproductive Hazard: Does not present any cancer or reproductive hazards.

Medical Conditions Aggravated By Exposure to Product, Components or Compounds Formed During Processing

Asthma, chronic lung disease, and skin rashes.

* * * Section 3 - Composition / Information on Ingredients * * *

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

CAS #	Component	Percent
7429-90-5	Aluminum	>99.7

* * * Section 4 - First Aid Measures * * *

First Aid: Eyes: Flush eyes with plenty of water or saline for at least 15 minutes. Consult a physician.

First Aid: Skin

Wash skin with soap and water for at least 15 minutes. Consult a physician if irritation persists.

First Aid: Ingestion

If swallowed, dilute by drinking large amounts of water. Recommend quantities up to 30 mL (~1 oz.) in children and 250 mL (~9 oz.) in adults. *Never give anything by mouth to a convulsing or unconscious person.* Do **not** induce vomiting. Consult a physician.

First Aid: Inhalation

Remove to fresh air. If unconscious or severely injured, check for clear airway, breathing and presence of pulse. Perform CPR if there is no pulse or respiration. Consult a physician.

* * * Section 5 - Fire Fighting Measures * * *

Flammable/Combustible Properties

Dust or fines dispersed in the air can be explosive. Dust and fines may be readily ignitable.

Fire/Explosion

May be a potential hazard under the following conditions:

* Dust or fines dispersed in the air can 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.
* Dust or fines in contact with water can generate flammable/explosive hydrogen gas. Hydrogen gas could present an explosion hazard in confined or poorly ventilated spaces.
* Dust or fines in contact with certain metal oxides (e.g., rust). A thermite reaction, with considerable heat generation, can be initiated by a weak ignition source.

Extinguishing Media

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. Allow the fire to burn out. Avoid mixing of the extinguishing agent with the burning material. Do not disturb the material until completely cool.

Unsuitable Extinguishing Media

DO NOT USE:

* Water.
* Halogenated agents.
* ABC dry chemical agents.

These agents will react with the burning material.

Fire Fighting Equipment/Instructions

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

* * * Section 6 - Accidental Release Measures * * *

Small/Large Spill

Avoid all ignition sources around spill. Prohibit smoking. Do not use water for spill clean-up. Avoid dusting of powder to the greatest extent possible. Use natural bristle broom (push type recommended) and non-sparking tools. Recover using non-sparking tools and place in a dry, water-tight, sealed container. After complete cleaning, area may be washed down with large quantities of water.

* * * Section 7 - Handling and Storage * * *

Handling/Storage

Product should be kept dry. Avoid generating dust. Prohibit smoking. Storage rooms must be of fire-resistant construction. Do not store powder in same room as other combustible materials.

Requirements for Processes Which Generate Dusts or Fines

Obtain and follow the safety procedures and equipment guides contained in Aluminum Association Bulletin TR-2 and National Fire Protection Association (NFPA) brochures listed in Section 16. Use non-sparking handling equipment. Cover and reseal partially empty containers. Provide grounding and bonding where necessary to prevent accumulation of static charges during 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. 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.

Process equipment, storage containers, vessels and buildings should be equipped with explosion/pressure relief valves, panels and windows. Precautions must also be taken to prevent water leakage or seepage which could contact the powder. Refer to NFPA 651.

Avoid all ignition sources. Good housekeeping practices must be maintained. Do not use compressed air to remove settled material from floors, beams or equipment. Do not allow fines or dust to contact water, particularly in enclosed areas.

* * * Section 8 - Exposure Controls / Personal Protection * * *

Engineering Controls

Use with adequate explosion-proof ventilation designed to handle particulates to meet the limits listed in Section 8, Exposure Guidelines.

Personal Protective Equipment

Respiratory Protection

Use NIOSH-approved respiratory protection as specified by an Industrial Hygienist or other qualified professional if concentrations exceed the limits listed in Section 8, Exposure Guidelines. Suggested respiratory protection: N95

Eye Protection

Wear safety glasses/goggles to avoid eye contact.

Skin Protection

Wear appropriate gloves to avoid direct skin contact. Wear fire resistant clothing or equivalent full-length fire resistant pants and jackets along with electrically conductive safety shoes or grounding straps. Great caution is required to avoid contact with unprotected electrical devices when wearing conductive safety shoes or grounding straps.

Exposure Guidelines

A: General Product Information

No information available for product.

B: Component Exposure Limits

Aluminum (7429-90-5)

ACGIH 10 mg/m3 TWA (metal dust)
OSHA 15 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable fraction)

* * * Section 9 - Physical & Chemical Properties * * *

Physical State:	Solid, finely divided powder	**Appearance:**	Silvery to gray color
Boiling Point:	Not applicable	**Melting Point:**	1195-1215°F (646-657°C)
Vapor Pressure:	Not applicable	**Solubility in Water:**	Insoluble
Density:	Range: generally 0.8-1.30 g/cm3 (50-81 lb./ft.3)	**pH Level:**	Not applicable
Odor:	Odorless	**Octanol-Water Coefficient:**	Not applicable
Auto Ignition	650°C (layered).	**LFL**	40 mg/L

* * * Section 10 - Chemical Stability & Reactivity Information * * *

Stability

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

Conditions to Avoid

* **Water:** Slowly generates flammable/explosive hydrogen gas and heat. Generation rate is greatly increased with smaller particles (e.g., fines and dusts).
* **Heat:** Oxidizes at a rate dependent upon temperature and particle size.
* **Strong oxidizers:** Violent reaction with considerable heat generation. Can react explosively with nitrates (e.g., ammonium nitrate and fertilizers containing nitrate) particularly when heated.
* **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 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.
* **Iron powder and water:** An explosive reaction forming hydrogen gas occurs when heated above 1470°F (800°C).

* * * Section 11 - Toxicological Information * * *

Health Effects Associated with Individual Ingredients

Aluminum dust, fines and fumes Low health risk by inhalation. Generally considered to be biologically inert.

Acute Toxicity of Ingredients/Formed Compounds

A: General Product Information

No information available for product.

B: Component Analysis - LD50/LC50

No LD50/LC50's are available for this product's components.

C: Formed Compound Toxicity - LD50s/LC50s

This material has no components listed.

Carcinogenicity of Ingredients

A: Ingredient Carcinogenicity - IARC/NTP

None of this product's components are listed by IARC or NTP.

B: Ingredient Carcinogenicity - ACGIH

None of this product's components are listed by ACGIH.

Carcinogenicity of Compounds Formed During Processing

A: General Product Information

No new/additional compounds are expected to be formed during processing.

* * * Section 12 - Ecological Information * * *

Ecotoxicity

A: General Product Information

No information available for product.

B: Component Analysis - Ecotoxicity - Aquatic Toxicity

No ecotoxicity data was found for this product's components.

Environmental Fate

No information available for product.

* * * Section 13 - Disposal Considerations * * *

Disposal Instructions

Reuse or recycle material whenever possible. **Material that cannot be reused may be sent to a metals reclamation facility that is able to handle fines.** Waste material that cannot be reclaimed for metal value should be rendered non-reactive prior to disposal in an industrial landfill.

US EPA Waste Number & Descriptions

A: General Product Information

RCRA Status: Not federally regulated in the U.S. if disposed of "as is." Otherwise, characterize in accordance with applicable regulations (40 CFR 261 or state equivalent in the U.S.)

B: Component Waste Numbers

RCRA waste codes other than described under Section A may apply depending on use of product. Refer to 40 CFR 261 or state equivalent in the U.S.

* * * Section 14 - Transportation Information * * *

Special Transportation

	PSN #1	PSN #2	PSN #3	PSN #4
Notes:	(1)(2)(3)(4)			
UN NA Number:	-			
Proper Shipping Name:	Not regulated			
Hazard Class:	-			
Packing Group:	-			
RQ:	-			
Other - Tech Name:	-			
Other - Marine Pollutant:	-			
Other:	MSDS-123 Atomized Aluminum Powder			
STCC:	33-991-19			
HTS:	7603.10.0000			
ECCN:	EAR99			

Notes:

(1) This material was tested by the United States Department of Interior Bureau of Mines in 1991 under UN criteria and found not to meet the definition of a hazard class 4 and does not meet the definition of any other hazard class.

(2) Standard Transportation Commodity Code STCC 33-991-19 Aluminum or Aluminum Alloy Powder, NEC applies and is required for rail shipments.

(3) The import/export HTSUS (Harmonized Tariff Schedule) subheading 7603.10.0000 Aluminum powders of nonlamellar structure applies.

(4) When "Not regulated," enter the proper freight classification, "MSDS Number," and "Product Name" on the shipping paperwork.

Canadian TDG Hazard Class & PIN:	Not regulated

* * * Section 15 - Regulatory Information * * *

US Federal Regulations

A: General Product Information

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 that will meet this requirement.
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.

B: Component Analysis

This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65) and/or CERCLA (40 CFR 302.4).

Aluminum (7429-90-5)

SARA 313: 1.0 % de minimis concentration (dust or fume only)

SARA 311/312 Physical and Health Hazard Categories:

Immediate (acute) Health Hazard: No
Delayed (chronic) Health Hazard: No
Fire Hazard: No
Sudden Release of Pressure: Yes (if dust clouds are generated during processing)
Reactive: No

State Regulations

A: General Product Information: No information available for product.

B: Component Analysis - State

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS #	CA	FL	MA	MN	NJ	PA
Aluminum	7429-90-5	Yes	No	Yes	Yes	Yes	Yes

Other Regulations

A: General Product Information: Material meets the criteria for inclusion in WHMIS B6.

B: Component Analysis - WHMIS IDL

The following components are identified under the Canadian Hazardous Products Act Ingredient Disclosure List:

Component	CAS #	Minimum Concentration
Aluminum	7429-90-5	1 %

C: Component Analysis - Inventory

Component	CAS #	TSCA	DSL	EINECS	AUST.	MITI
Aluminum	7429-90-5	Yes	Yes	Yes	Yes	No

Inventory information

MITI Inventory: Pure metals are not specifically listed by CAS or MITI number on the MITI Inventory. However, the class of compounds for each of these metals is listed.

* * * Section 16 - Other Information * * *

MSDS History

Original: September 17, 1980
Supersedes: August 23, 2006
Revised: July 12, 2007

MSDS Status

07/12/2007: Changes in Sections 1, 2, 3, 4 and 14.
08/23/2006: Changes in Sections 1, 2, 3, 5, 7, 8, 9, 10, 11 and 14.
05/06/2004: Changes in Sections 1, 2, 3, 14 and 15.

Prepared By

Hazardous Materials Control Committee
Preparer: Stephanie Williams, 412-553-1479/Jon N. Peace, 412-553-2293

MSDS System Number

145308

Other Information

***** 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
***** Aluminum Association Bulletin TR-2, "Recommendations for Storage and Handling of Aluminum Pigments and Powders"
***** Bureau of Mines #6516, Explosibility of Metal Powders (1964)
***** Aluminum Association Video, "Safe Handling of Auminum Powder and Paste".
***** Guide to Occupational Exposure Values-2007, 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.
* 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, www.expub.com, Expert Publishing, LLC.

Key-Legend:

ACGIH	American Conference of Governmental Industrial Hygienists
AICS	Australian Inventory of Chemical Substances
CAS	Chemical Abstract Service
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
EPA	Environmental Protection Act
IARC	International Agency for Research on Cancer
LC_{50}	Lethal concentration (50 percent kill)
LC_{Lo}	Lowest published lethal concentration
LD_{50}	Lethal dose (50 percent kill)
LD_{Lo}	Lowest published lethal dose
LFL	Lower Flammable Limit
MITI	Ministry of International Trade & Industry
NFPA	National Fire Protection Association
NIOSH	National Institute for Occupational Safety and Health
NORM	Naturally Occurring Radioactive Materials
NTP	National Toxicology Program
OEL	Occupational Exposure Limit
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
PIN	Product Identification Number
PSN	Proper Shipping Name
RCRA	Resource Conservation and Recovery Act
SARA	Superfund Amendments and Reauthorization Act
STEL	Short Term Exposure Limit
TCLP	Toxic Chemicals Leachate Program
TDG	Transportation of Dangerous Goods
TLV	Threshold Limit Value
TSCA	Toxic Substance Control Act
TWA	Time Weighted Average
UFL	Upper Flammable Limit
WHMIS	Workplace Hazardous Materials Information System

atm	atmosphere
cm	centimeter
g, gm	gram
in	inch
kg	kilogram
lb	pound
m	meter
mg	milligram
ml, ML	milliliter
mm	millimeter
mppcf	million particles per cubic foot
n.o.s.	not otherwise specified
ppb	parts per billion
ppm	parts per million
psia	pounds per square inch absolute
u	micron
ug	microgram

INFORMATION HEREIN IS GIVEN IN GOOD FAITH AS AUTHORITATIVE AND VALID; HOWEVER, NO WARRANTY, EXPRESS OR IMPLIED, CAN BE MADE.

This is the end of MSDS # 123

ATOMIZED ALUMINUM POWDER

⚠ WARNING

Hazards: Dust may ignite readily. Explosion potential may be present when (1) dust is dispersed in the air, (2) dust is in contact with certain metal oxides, e.g., rust or (3) dust is in contact with water or moisture.

Reactive with water, acids, oxidizers, and halogenated hydrocarbons.

Dust can cause mechanical irritation to the eyes, skin, and upper respiratory tract.

Precautions: Avoid formation of dust. Avoid all ignition sources. Prohibit smoking. Electrically ground all equipment including drums and containers when in use. Use with adequate explosion-proof ventilation designed to handle particulates. Use appropriate personal protective equipment (safety glasses/gloves) to avoid contact. Use appropriate NIOSH approved respiratory protection (N95) if concentrations exceed the permissible limits.

Take precautionary measures against static discharge. Wear fire resistant pants and jackets with electrically conductive safety shoes or grounding straps.

Accidental Release: **DO NOT USE** water for spill clean-up. Use natural bristle broom and non-sparking shovel. Avoid dusting of powder to the greatest extent possible.

First Aid: EYES: Flush eyes with plenty of water or saline for at least 15 minutes. Consult a physician. SKIN: Wash with soap and water for at least 15 minutes. Consult a physician if irritation persists. INHALATION: Remove to fresh air. Check for clear airway, breathing, and presence of pulse. Provide CPR for persons without pulse or respirations. Consult a physician. INGESTION: If swallowed, dilute by drinking large amounts of water. Recommend quantities up to 30 mL (~1 oz.) in children and 250 mL (~9 oz.) in adults. *Never give anything by mouth to a convulsing or unconscious person.* Do **not** induce vomiting. Consult a physician.

Fire Fighting: Use gentle surface application of Class D extinguishing agent or dry, inert granular material (e.g. sand) to cover and ring the burning powder. Avoid mixing the extinguishing agent with the burning powder. Do not disturb the powder until completely cool. If possible, isolate burning powder. DO NOT USE: water, halogenated agents, or ABC dry chemical agents.

For industrial use only.

See Alcoa Material Safety Data Sheet No. 123 for more information about use and disposal. Also, see NFPA 651 and Aluminum Association TR-2 for additional safe handling information.

Emergency Phone: (412) 553-4001.

INGREDIENTS:	CAS NUMBERS:
Aluminum	(7429-90-5)

Alcoa Inc.
201 Isabella Street, Pittsburgh, PA 15212-5858 USA

7/07 123