TRI-ARROWS ALUMINUM INC.

5XXX SERIES ALLOYS

MSDS No.1002

Rev. Date
08/05/11

IMPORTANT: Read this MSDS before handling and disposing of this product and pass this information on to employees, customer, and users of this product.

1. PRODUCT and COMPANY IDENTIFICATION

Material Identity 5XXX Series Alloys

Trade Name(s) 5XXX Series Alloys

Other Names Rigid Container Sheet, Aluminum Sheet

Chemical Description **Aluminum**

Manufacturer's Address

Tri-Arrows Aluminum, Inc.
9960 Corporate Campus Drive
Suite 3000
Louisville, KY 40223
502-566-5700 (Louisville Office)

Telephone Numbers

For Chemical Emergency
Spill, Leak, Fire, Exposure, or Accident
Call CHEMTREC Day or Night

Within USA and Canada: 1-800-424-9300
Outside USA and Canada: +1 703-527-3887 (collect calls accepted)

2. COMPONENTS and EXPOSURE LIMITS

Components	CAS No.	% Conc.	Exposure Classification	ACGIH (TLV)		OSH (PEL)	
				TWA	STEL	**TWA**	**Ceiling**
Aluminum	7429-90-5	94 – 97 %	Aluminum (tot. dust)	10 mg/m^3	None	15 mg/m^3	None
			---Fume, powder, resp. dust	5 mg/m^3	None	5 mg/m^3	None
Magnesium	7439-95-4	2.6 – 5.0%	Magnesium oxide(fumes)	10 mg/m^3	None	None	None
			---Total Part.	None	None	15 mg/m^3	None
Manganese	7439-96-5	0.50% max.	Manganese (Mn) (fumes)	0.2 mg/m^3	None	None	5 mg/m^3

EXPOSURE LIMITS: (ACGIH=American Conference of Governmental Industrial Hygienists; TLV=Threshold Limit Value; OSHA=Occupational Safety and Health Administration [USA]; PEL=Permissible Exposure Limit; TWA=Time-Weighted Average; STEL=Short Term Exposure Limit; Ceiling=Ceiling value)

Additional Information: Rigid container sheet (RCS) may be coated with proprietary vinyl, epoxy, acrylic, polymeric or blended resin coating systems. RCS may also be lubricated with a proprietary or commercial lubricant. The amount of these lubricants is below the minimum reporting requirements for OSHA or WHMIS.

3. HAZARD IDENTIFICATION

WARNING

Hazards: Small chips, fine turnings and dust may ignite readily. Explosion potential may be present when: (1) dusts or fines are dispersed in the air, (2) fines, dust or molten aluminum are in contact with certain metal oxides or (3) chips, fines, dust or molten aluminum are in contact with water or moisture.
If coated with oil, may cause skin irritation / dermatitis by contact.
If metal is has been coated, combustion of the coatings may generate toxic and irritating gases.
Hydrogen chloride, a product of pyrolysis, can cause irritation of the eyes, skin and upper respirator tract. Overexposure can result in fluid in the lungs.

Precautions: Keep aluminum dust or turnings away from ignition sources. Use adequate explosion-proof ventilation in the event of dust generation. Avoid generating dust. Wear appropriate eye & skin protection to prevent contact. Wear appropriate respiratory protection (P95, acid gas respirator if hydrogen chloride is generated) if concentrations exceed the permissible limits.

ACUTE HEALTH HAZARDS

Routes of Exposure

Inhalation (Primary)	Solid aluminum does not present an inhalation hazard. Aluminum dusts generated during use are considered nuisance particulates. Excessive dust can cause respiratory irritation. If the metal has been coated with oil and is heated well above ambient temperatures or machined, oil vapor or mist may be generated. Oil vapor and mist may cause irritation of respiratory tract. If Hydrogen chloride gas is generated, exposure can cause severe irritation and corrosive burns of eyes, skin and upper respiratory tract. Acute overexposure to Hydrogen chloride can cause fluid in the lungs (pulmonary edema).
Skin contact	Skin contact with hot metal can cause burns. If the metal has been coated with oil and contact occurs, skin irritation may develop. Skin contact with dust may result in skin irritation due to mechanical abrasion.
Eye contact	Aluminum dust can irritate the eyes (mechanical abrasion).
Ingestion	Not expected to be an issue under normal conditions

Summary of Chronic Hazards	Medical conditions aggravated by exposure to the product may occur 1) if metal is coated with oil, 2) dust is generated due to further processing, 3) if metal is heated: Asthma, chronic lung disease, skin rashes and secondary Parkinson's disease

SUPPLEMENTARY INFORMATION: Aluminum fumes generated during welding or melting present low health risks. Welding or plasma arc cutting of aluminum alloys can generate ozone, nitric oxides and ultraviolet radiation. Ozone overexposure may result in mucous membrane irritation or pulmonary discomfort. UV radiation can cause skin erythema and welders flash. High concentrations of freshly formed magnesium oxide and manganese oxide fumes can produce symptoms of metal fume fever. High concentrations of manganese dust can affect the central nervous system (apathy, drowsiness, weakness and other symptoms resembling to Parkinson's disease).

4. EMERGENCY and 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.
Skin contact	In case of burns with hot metal, rinse with plenty of cold water. If burn is severe, consult a physician. If contact with dust occurs, wash skin with soap and water. If contact with the oil that may have been applied to the metal occurs, wash skin with soap and water. Remove any clothing contaminated with oil and wash before reusing. If irritation due to contact with dust or oil occurs, consult physician.
Eye contact	Flush eyes thoroughly with water, taking care to rinse under eyelids. If irritation persists, continue flushing for 15 minutes, rinsing from time to time under eyelids. If discomfort continues, consult a physician.
Ingestion	Not expected to be a problem under normal conditions.

5. FIRE and EXPLOSION

Fire and Explosion Hazards	Not a fire hazard unless in particle form. Suspensions of aluminum dust in air may pose a severe explosion hazard. A potential for explosion exists for a mixture of fine and coarse particles if at least 15% to 20% of the material is finer than 44 microns (325 mesh). Buffing and polishing generate finer material than grinding, sawing and cutting. Small chips, turnings, dust and fines from processing may be readily ignitable. Chips 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) may initiate a thermite reaction with considerable heat generation. This reaction may be initiated by a weak ignition source. Molten metal in contact with water may result in moisture entrapment and potential explosion. Contact of molten aluminum with other metal oxides may initiate a thermite reaction. Combustion of the coatings may generate toxic and irritating hydrogen chloride gas.
Extinguishing Media	Use a class D dry-powder extinguishing agents on dusts, fines or molten metal. Do not use water or halogenated extinguishing media.
Special Firefighting Procedures	Fire fighters should wear NIOSH approved, positive pressure, self-contained breathing apparatus and full protective clothing when appropriate.

6. ACCIDENTAL RELEASE MEASURES

Precautions if Material is Spilled or Released

Recycle. Aluminum in the form of particles may be reactive and its hazardous characteristics should be determined prior to disposal. If a molten metal spill occurs, contain the flow using dry sand as a dam. Do not use shovels or hand tools to halt the flow of molten metal. Allow the spill to cool before remelting as scrap.

7. HANDLING and STORAGE

Handling, Storage and Decon Procedures

Because of the risk of explosion, aluminum ingots and metal scrap should be thoroughly dried prior to remelting. Use standard techniques to check metal temperature before handling. Hot aluminum does not present any warning color change. Exercise great caution, since the metal may be hot. Avoid generating dust. Avoid contact with sharp edges.

Requirements for Processes Which Generate Dusts or Fumes

If product processing includes operations where dust or extremely fine particles are generated, obtain and follow the safety procedures and equipment guides contained in Aluminum Association Bulletin F-1 and National Fire Protection Association (NFPA) brochures. These guides are listed below. Cover and reseal partially empty containers. Use non-sparking handling equipment. Provide grounding and bonding where necessary to prevent accumulation of static charges during charges during dust handling and transfer operations.

Guidelines and Brochures

The Aluminum Association, 900 19th Street, N.W., Washington, DC 20006.

- Aluminum Association's Bulletin F-1, Guidelines for Handling Aluminum Fines Generated During Various Aluminum Fabricating Operations"
- Aluminum Association, "Guidelines for Handling Molten Aluminum"

National Fire Protection Association

- NFPA 65, Standard for Processing and Finishing of Aluminum
- 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

Requirements for Remelting of Scrap Material

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 and rust free. Molds and ladles must be preheated or oiled prior to casting. 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, may 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 or heavy items adequately before charging into a furnace containing molten metal. This may be achieved by placing the metal into a large drying oven, homogenizing furnace, or preheater. It is important to ensure that the internal metal temperature of each metal segment is heated to 400^0F and then held at that temperature for 6 hours.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Special ventilation should be used to convey finely divided metallic dust generated by grinding, sawing etc., in order to eliminate explosion hazards. Maintain dust concentration in ventilation ducts below the lower explosive limit of 40 g/m^3 (0.04 oz/ft^3). See "National Fire Protection Association Codes":

- NFPA 65, Standard for Processing and Finishing of Aluminum
- 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

Respiratory Use an approved respirator designed for the hazard, where concentrations exceed exposure limits. Consult an Industrial Hygienist or other qualified professional to determine the appropriate respiratory protection.

Eyes Wear safety glasses with side shields or goggles to avoid eye contact.

Skin Wear impervious gloves to avoid repeated or prolonged skin contact with residual oils. The metal may also present a potential for contact with sharp edges, wear work gloves & arm guards to prevent contact.

Other Hygienic and Work Practices Personnel working with molten metal should utilize both primary and secondary protective equipment when handling molten metal. The "Aluminum Association Guidelines" should be consulted for additional recommendations. Primary Protective clothing includes face shields, fire resistant coats, leggings, spats, fire resistant hoods and similar equipment to prevent burn injuries. It is also recommended that personnel wear secondary clothing that is fire resistant and sheds molten metal splashes in addition to the primary protective clothing.

Minimize generation of oil vapors and mist. Utilize appropriate controls to avoid breathing oil vapors and mist. Clothing that becomes contaminated with oil should be laundered or dry-cleaned before reuse. Oil contaminated shoes should be removed and cleaned before reuse. If oil contacts skin, wash skin thoroughly with soap and water. Wash hands before breaks and meals, and at the end of the work shift.

9. PHYSICAL and CHEMICAL PROPERTIES

pH: Not applicable.
Boiling point: Not applicable.
Melting point: 535 - 660°C
Vapor pressure: Not applicable.
Vapor density (air=1): Not applicable.
Evaporation rate: Not applicable.
Relative density (water=1): 2.8
Water solubility: Not applicable.
Odor threshold: Not applicable.

Flashpoint: Not applicable.
Autoignition temperature: Not applicable.
Lower flammable limit: Not applicable.
Higher flammable limit: Not applicable.
Explosive properties: Not applicable.
NFPA fire code: 0
Oxidizing properties: Not applicable.
Partition coefficient (n-octanol/water): Not applicable.
Physical State: Solid, Bare & Coated coiled sheet

10. STABILITY and REACTIVITY

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

Conditions to Avoid Metal forms such as chips, dust, fines, and molten metal are more reactive with the following items:
- Water: Contact with water provides for slow generation of heat flammable/explosive hydrogen gas. 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.
- Heat: Oxidation occurs at a rate dependent upon temperature and particle size.
- Oxidizers & Halogenated Compounds: Aluminum particles may react explosively when mixed with halogenated acids, halogenated solvents, bromates, iodates or ammonium nitrate
- **Acids and Alkalis:** Reacts to form flammable/explosive gas. Generation of gas increases significantly with decreased particle sizes.
- Iron Oxide (Rust) & other metal oxides (e.g., copper & lead oxides): An intense thermite reaction generating significant heat may occur. This reaction requires only minimal weak ignition sources for initiation. Molten Aluminum may react violently with iron oxide without an external ignition source.

Hazardous Decomposition If metal is coated, combustion of the coating may generate toxic and irritating gases including Hydrogen chloride, carbon monoxide, carbon dioxide, partially oxidized hydrocarbons and chlorinated hydrocarbons.

11. TOXICOLOGICAL INFORMATION

General Product Information: No information is available for product.

Component Analysis (LD_{50} / LC_{50})

NAME	CAS #	LD_{50}	LC_{50}
Aluminum	7429-90-5	Unknown	Unknown
Magnesium	7439-95-4	Unknown	Unknown
Manganese	7439-96-5	9 GM/kg (oral-rat)	Unknown

Component Carcinogenicity:

Carcinogenicity / Mutagenicity / Reproductive toxicity: None of the ingredients present at concentrations equal to or greater than 0.1% are listed as a carcinogen or potential carcinogen by IARC, NTP or OSHA. (IARC=International Agency for Research on Cancer; NTP=National Toxicology Program [USA]; OSHA=Occupational Safety and Health Administration [USA])

12. ECOLOGICAL INFORMATION

Ecotoxicity Aluminum and its alloys under solid form, such as ingots or manufactured items, do not present any hazard for the environment because metals are not biologically available. Aluminum can be recycled.

13. DISPOSAL CONSIDERATIONS

Waste Disposal Methods Recycle. Aluminum in the form of particles may be reactive and its hazardous characteristics should be determined prior to disposal. Dispose of waste in accordance with federal, state, or local regulations.

14. TRANSPORT INFORMATION

TDGR: Not regulated
CFR 49: Not regulated
IMO: Not regulated
ICAO: Not regulated
IATA: Not regulated

(TDGR=Transport of Dangerous Good Regs.(Canada); CFR 49=Code of Federal Regs.(USA); IMO=International Maritime Organization; ICAO=International Civil Aviation Organization; IATA=International Air Transport Association)

15. REGULATORY INFORMATION

US FEDERAL REGULATIONS:

SARA

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 percent de minimis concentration (fume or dust only)
Manganese (7439-96-5)
SARA 313: 1.0 percent de minimis concentration

SARA 311/312 Physical and Health Hazard Categories

Immediate (acute) Health Hazard: Yes, if particulates / fumes are generated during processing.
Delayed (chronic) Health Hazard: Yes, if particulates / fumes are generated during processing.
Fire Hazard: No
Sudden Release of Pressure: No
Reactive: yes, if molten

California Safe Drinking Water and Toxic Enforcement Act OF 1986 – Proposition 65
This product contains trace amounts of lead (<0.01). Any process resulting in exposure to more than 0.5 mg/m^3 of metal dust per day may result in a daily dose of lead of over 0.5 ug/day, the dose above which the "California Safe Drinking Water and Toxic Enforcement Act" of 1986 requires notification. Refer to the appropriate regulation notification wording guidelines. The dose is not considered dangerous for health according to current toxicology studies.

State Regulations
The following components are listed on one or more of the following state hazardous substances lists:

Component	CAS #	MA	PA	CA	MN	NJ	FL
Aluminum	7429-90-5	Yes	Yes	Yes	Yes	Yes	Yes
Magnesium	7439-95-4	Yes	Yes	Yes	No	Yes	Yes
Manganese	7439-96-5	Yes	Yes	Yes	Yes	Yes	Yes

CANADIAN REGULATION
WHMIS CLASSIFICATION: D2 Material causing other toxic effects (if Mn>1 %)
EUROPEAN UNION CLASSIFICATION: Not classified
Warning symbol: None
Warning word: None
Risk phrases: None
Safety phrases: None

16. OTHER INFORMATION

Abbreviations:
WHMIS= Working hazardous material information system. CAS#= Chemical Abstracts Service Registry Number.
LD_{50}= Lethal dose 50%; LC_{50}= Lethal concentration 50%; LCL_0= lowest published lethal concentration.

Although the information in this MSDS was obtained from sources, which we believe to be reliable, it cannot be guaranteed. In addition, this information may be used in a manner beyond our knowledge or control. The information is therefore provided for advice purposes only, without any representation or warranty express or implied.

Date of previous MSDS: 03/25/2002
Date of current MSDS: 08/05/2011
Revisions Completed: Revised MSDS to reflect TAA format and added additional wording to address coatings / oils which may be applied to metal.

5XXX SERIES ALLOYS

WARNING

HAZARDS: Small chips, fine turnings and dust may ignite readily. Explosion potential may be present when: (1) fines, dust or molten aluminum are in contact with certain metal oxides (2) dusts or fines are dispersed in the air or (3) chips, fines, dust or molten aluminum are in contact with water or moisture.

Aluminum dust generated during processing is considered nuisance particulate. Excessive dust may cause respiratory and eye irritation. Skin contact with hot metal can cause burns. Welding or plasma arc cutting of aluminum alloys can generate ozone, nitric oxides and ultraviolet radiation.

If oil has been applied to metal, contact with oil may cause skin irritation / dermatitis by contact.

If metal is coated, combustion of the coating may generate toxic and irritating gases including Hydrogen chloride. Overexposures to Hydrogen Chloride may result in fluid in the lungs and may cause Irritation of the eyes, skin and upper respiratory tract.

Overexposure to fumes (fine dusts) of magnesium oxide and Manganese oxide may cause metal fume fever by inhalation.

Chronic overexposure to manganese dust can cause central nervous system damage, scarring of the lungs and reproductive harm in males.

Precautions: Keep product dry. Avoid generating dust. Keep away from ignition sources. Wear appropriate eye & skin protection to prevent contact. Wear appropriate respiratory protection (P95, acid gas respirator if hydrogen chloride is generated) if concentrations exceed the permissible limits.

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.

Skin contact: In case of burns with hot metal, rinse with plenty of cold water. If burn is severe, consult a physician. If contact with aluminum dust or oil that may have been applied to the metal occurs, wash skin with soap and water. Remove any clothing contaminated with oil and wash before reusing. Remove shoes that have been contaminated with oil and clean before reuse. If irritation due to contact with dust or oil occurs, consult physician.

Eye contact: Flush eyes thoroughly with water, taking care to rinse under eyelids. If irritation persists, continue flushing for 15 minutes, rinsing from time to time under eyelids. If discomfort continues, consult a physician.

Emergency Information: 1 (800) 424-9300 CHEMTREC (USA)

Components	CAS No.
Aluminum	7429-90-5
Magnesium	7439-95-4
Manganese	7439-96-5

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