SECTION 1: IDENTIFICATION

Manufacturer: Valimet, Inc.  Telephone: 209-444-1600  
431 Sperry Rd.  Emergency: 800-424-9300 (Chemetec)  
Stockton, CA 95206
Trade Name: ALUMINUM POWDER, UNCOATED (ATOMIZED)
Synonyms: Aluminum Powder, Aluminum, Metallic, Powder (Atomized)(Spherical)  
Aluminium Powder (Stabilised); Valimet Grade H-XXX, V-XXX
Chemical Name: Aluminum  Chemical Family: Non-Ferrous Metal

SECTION 2: COMPOSITION/INGREDIENTS

<table>
<thead>
<tr>
<th>BASE METAL:</th>
<th>CAS NUMBER</th>
<th>EC Number</th>
<th>%COMPOSITION(By Wt.)</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
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<tbody>
<tr>
<td>Aluminum</td>
<td>7429-90-5</td>
<td>231-072-3</td>
<td>99.7</td>
<td>10.0(Total)</td>
<td>15.0(Total)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5.0(Resp.)</td>
<td>5.0(Resp.)</td>
</tr>
</tbody>
</table>

SECTION 3: HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:
Aluminum powders are a combustible metal in powder form and are subject to the requirements of NFPA 484.
Aluminum powders may form potentially explosive dust clouds when suspended in air.
Excessive accumulations of fugitive aluminum dust are to be avoided, as they present a secondary explosion hazard.
Aluminum powders are water reactive and may undergo an exothermic reaction in contact with water with the generation of heat and hydrogen gas.
Finely divided aluminum, in contact with certain metal oxides (e.g. iron oxide (rust), copper oxide) presents a fire/explosion hazard (Thermite).
Aluminum powders may react violently with halogenated compounds.

POTENTIAL HEALTH EFFECTS
Target Organs/ Routes of Entry:

Eyes:
Mechanical irritation.

Skin:
May cause irritation.

Ingestion:
May cause irritation.

Inhalation:
May cause irritation of upper respiratory tract.

Health Effects of Ingredients:
Aluminum powders are considered nuisance particulates with little or no adverse effects with proper exposure controls. Continued exposure to concentrations above the recommended TLV may cause irritation of the eyes, mucous membranes and upper respiratory tract.

Medical Conditions Aggravated by Exposure:
Skin rashes, chronic lung disease, asthma
SECTION 4: FIRST AID MEASURES

INHALATION: Remove from exposure. If subject is not breathing, follow standard procedures. Consult a physician immediately.

EYES: Remove from exposure. Wash eyes for a minimum of 15 minutes with a sterile eyewash solution. Consult a physician immediately.

SKIN: Remove from exposure. Wash skin with soap and water.

INGESTION: None.

SECTION 5: FIRE FIGHTING MEASURES

AUTO IGNITION: 650°C (Layer)  FLAMMABILITY LIMITS IN AIR (MEC): 45gm/m3
EXTINGUISHER MEDIA: Type D  MEC/MIE: Refer to NFPA 484, Sec. A4.3.1

SPECIAL FIRE FIGHTING PROCEDURES: Avoid water, halogenated extinguishing agents. Avoid generation of dust. Cover to eliminate oxygen. Isolate burning material with ring of dry sand or Type D extinguishent. Do not disturb burning powder until completely cool. Use of ABC rated extinguishers may accelerate fire.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Reacts with water, acids, alkalis to produce hydrogen. Dust/air mixture may explode violently when ignited. High heat of fire may cause underlying concrete to fracture. Dust/Fines in contact with metal oxides (e.g. rust) may present hazard of a thermite reaction. Dust/fines in contact with water may generate hazardous quantities of flammable/explosive hydrogen gas. Avoid risk of secondary explosion by limiting accumulations of fugitive dust.

SECTION 6: ACCIDENTAL RELEASE MEASURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Reseal container. Remove all sources of ignition. Prohibit smoking in area. Use non-sparking conductive tools to transfer spilled material to a leak-proof container. Brushes/Brooms should have natural bristles. Avoid synthetic materials. Avoid generation of dust cloud during clean-up.

SECTION 7: HANDLING AND STORAGE

HANDLING AND STORAGE: Avoid accumulations of dust. Good housekeeping practices are essential to mitigate/prevent risk of secondary explosions. Local ventilation and vacuum systems must be suitable for use with Group E explosive dusts. Do not store in areas protected by automatic sprinkler systems. Do not store with oxidizing materials. Proper grounding of process equipment is essential. Use non-sparking, conductive tools. Proper bonding of containers during transfer operations is essential. All electrical equipment must be suitable for Class II, Group E locations. Avoid static build-up and discharge. Prohibit smoking in areas where aluminum powders are stored or handled. Refer to Aluminum Association Bulletin TR-2 "Recommendations for Storage and Handling of Aluminum Powders and Pastes" for more detailed information (see Section 16). For further information on control of static electricity and bonding and grounding procedures, see NFPA # 77 (see section 16). For detailed information on handling and storage of aluminum powders, refer to NFPA # 484 (see Section 16).
SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS: Local ventilation systems must be suitable for Class II, Group E
dusts, per the National Electrical Code, NFPA 70. See NFPA #484 for detailed information on
requirements for ventilation systems handling combustible metal dusts.

RESPIRATORY PROTECTION: Where exposure exceeds TLV (see Section 2), use NIOSH approved
respiratory protection. Recommended respiratory protection: N95.

PROTECTIVE GLOVES: As needed. Glove material should be electrically conductive to
avoid static build-up and discharge.

EYE PROTECTION: Safety glasses or goggles. Full face shield recommended when working
in areas of suspended dust.

OTHER: Coveralls should be made from fire resistant materials which tend to not accumulate
static charges. They should be designed in such a way as to avoid accumulation of dust in
cuffs, pockets, etc.

SECTION 9: PHYSICAL & CHEMICAL PROPERTIES

Appearance: Granular metal powder, grayish color  Odor: Odorless
Vapor Pressure: N/A  Vapor Density: N/A
Bulk Density: 0.8-1.3 gm/cc (50-80 lb/ft3)  Specific Gravity: 2.7 (H2O=1)
Boiling Point: N/A  Melting Point: 1215 F.
Solubility in Water: Insoluble  pH Level: N/A

Dust Explosion Hazards: May form potentially explosive dust/air mixtures
MEC: 45-120 (gm/m3)  MIE: 4-13 (mJ)  Kst: 90-300 (bar-m/sec)  MIT (Layer): 650C
Explosivity characteristics may vary with particle size. Refer to NFPA 484, sec. A4.3.1 for
further data for specific particle sizes.

SECTION 10: CHEMICAL STABILITY & REACTIVITY INFORMATION

STABILITY: Stable under normal conditions  HAZARDOUS POLYMERIZATION: Will Not Occur

INCOMPATIBILITY: (Materials to Avoid): Water, acids, alkalis, halogenated compounds,
oxidizers. Avoid contact with iron oxide (rust) and other metal oxides. See NFPA "Fire

HAZARDOUS DECOMPOSITION PRODUCTS: Exothermic reaction with water, acids, alkalis, to generate
hydrogen and heat.

SECTION 11: TOXICOLOGICAL INFORMATION

LD50/LC50: No information available.
ACUTE TOXICITY: No information available.
CHRONIC TOXICITY: Aluminum dust is considered to be a nuisance particulate by OSHA.
Continued exposure to concentrations above the recommended TLV may cause irritation of the
eye, mucous membranes and upper respiratory tract.
CARCINOGENICITY: None of the components of this product are listed as a carcinogen or
potential carcinogen by OSHA, AGCIH, IARC or NTP.

SECTION 12: ECOLOGICAL INFORMATION

ECOTOXICITY/ENVIRONMENTAL FATE: No information on ecotoxicity or environmental fate was
found for this product.
SECTION 13: DISPOSAL CONSIDERATIONS

DISPOSAL INFORMATION: Reuse or recycle product whenever possible. Material unfit for reuse may be sent to a metals recovery facility that is properly equipped to handle finely divided materials. Material that cannot be reclaimed or recycled should be disposed of in accordance with applicable Federal, State and Local regulations.

RCRA STATUS: Not federally regulated in the United States, if disposed of in a "as is" state. If modified, characterize in accordance with 40CFR 261 (U.S.).

SECTION 14: TRANSPORTATION INFORMATION

HAZARD CLASS: Not Regulated UN NUMBER: Not Applicable PACKING GROUP: N/A

Note: Valimet aluminum powders have been tested in accordance with the UN Model Regulations on the Transport of Dangerous Goods, Manual of Tests and Criteria and have been found to NOT meet the definitions of hazard class 4 or any other hazard class. See attachment to MSDS for further information.

SECTION 15: REGULATORY INFORMATION

Electrical equipment must be suitable for use in hazardous atmospheres involving Group E combustible dusts in accordance with 29CFR1910.307. Refer to the National Electrical Code (NFPA 70) for guidance in determining the type and design of equipment and installation which meets this requirement.

SARA Title III: Section 311/312: Reactive (Sudden Release of Pressure).
Section 313 Toxic Chemicals: Aluminum (Fume or Dust).

TSCA: All components of this product are listed on the TSCA inventory.

DSL (Canada): All components of this product are listed.

EINECS (Europe): All components of this product are listed.

AICS (Australia): All components of this product are listed.

MITI (Japan): All components are listed.

CLEAN AIR ACT, TITLE VI (1990): This product does not contain, nor was it manufactured using ozone-depleting chemicals.

SECTION 16: OTHER INFORMATION


NFPA 77: Static Electricity
NFPA 484: Standard for Combustible Metals

NIOSH Pocket Guide to Chemical Hazards, U.S. Department of Health and Human Services


The information and suggestions contained in this Data Sheet were obtained from sources which Valimet, Inc. believes to be reliable. The accuracy and completeness of this data is not guaranteed and no warranty of any kind is made with respect to this data. Since Valimet, Inc. shall have no control over the use of the product described, Valimet, Inc. expressly disclaims any and all liability for loss or damage resulting from any use, proper or improper, of said product.

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CUSTOMIZED METAL POWDERS
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BUS(209) 444-1600 valimet@valimet.com FAX(209) 444-1636
To Whom it May Concern,

The United Nations publishes model regulations for the transportation of hazardous materials in a document called “Recommendations on the Transport of Dangerous Goods”. These recommendations form the basis for and are, in turn, incorporated into other national and international codes, including the IMDG code (ocean transport), the IATA code (air transport), U.S. DOT (49CFR, Subchapter C), and the Canadian TDGR code for the transport of dangerous goods. The UN recommendations also prescribe detailed test methods and criteria defining each class, division and packing group which are referenced by or incorporated into the national and international codes. The UN recommendations, as well as the various national and international codes are specific in placing the responsibility for classification of materials placed in transport on the shipper (UN Recommendations sec. 2.0.0, 49CFR 173.22(a)(1)).

The UN Recommendations, as well as the other codes, include lists of materials considered to be dangerous in transportation. These lists include information on proper shipping names, classification, packing group, identification and other special requirements for transport. All of the lists include entries for “Aluminum Powder, Uncoated” and “Aluminum Silicon Powder, Uncoated” as class 4.3, “Dangerous When Wet” materials, with UN numbers 1396 and 1398 respectively. The entries for Aluminum Powder, Uncoated and Aluminum Silicon Powder, Uncoated in the UN Recommendations and the IMDG Code, refer to special provision 223. Special provision 223 reads: “If the chemical or physical properties of a substance covered by this description are such that when tested it does not meet the established defining criteria for the class or division listed in column (3), or any other class or division, it is not subject to these regulations.” The IATA regulation, in it’s listing for Aluminum Powder, Uncoated and Aluminum Silicon Powder, Uncoated, includes a reference to special provision A3. IATA special provision A3 states: “If the chemical or physical properties of a substance covered by this description are such that when tested it does not meet the established defining criteria for the class or division listed in column C, or any other class or division, it is not subject to these regulations.” In addition, the DOT regulations declare in 49CFR 172.101c (12)(iv) that if a material is not forbidden in transportation (aluminum and aluminum silicon powders are not forbidden) “and does not meet the definition of any hazard class, the material is not a hazardous material.”.

Valimet, in concert with several other domestic producers of aluminum powders, participated in a testing program, in accordance with the test criteria in the UN recommendations, for its aluminum and aluminum silicon powders, conducted by the U.S. Bureau of Mines and other testing authorities. The results of that program have demonstrated that Valimet aluminum and aluminum silicon powders do not meet the criteria for inclusion in any division of class 4. Valimet aluminum and aluminum silicon powders do not meet the criteria for any other class or division and are therefore not subject to the transport of dangerous goods regulations, per UN and IMDG special provision 223, IATA special provision A3 or the DOT regulations in 49CFR. In addition Valimet aluminum and aluminum silicon powders have been tested I.A.W. Part 2, Annex I of (EC) 1272/2008 and found to not meet the classification criteria for the listed physical hazards in Table 3.1 of (EC) 1272/2008 (see Note T of the Table).

The Hazardous Materials Transportation Act (HMTA) declares that a person may not represent, by marking or other means, that a hazardous material is present in a package, container, motor vehicle, rail freight car, aircraft, or vessel if the hazardous material is not present (49 USC, Subtitle III, Ch. 51, sec. 5104(a)(2)). Since Valimet aluminum and aluminum silicon powders are not hazardous materials as defined by the test criteria and regulatory requirements discussed above, these powders are offered for transportation as non-hazardous materials, without any hazard class description or reference to a UN identification number.

In is important to note that while large quantities of aluminum powders are transported in both international and U.S. domestic commerce without a hazardous classification, the above information applies to aluminum powders in their original, as manufactured state, as shipped by the supplier. Users of aluminum powders are strongly encouraged to consider any alterations to the physical or chemical properties of aluminum powders, which may result from their processing or handling activities when offering products for transportation.

D.L. Oberholtzer  
Director of Corporate Services  
Valimet, Inc.