

HAZARDOUS MATERIALS - IDENTIFICATION AND MATERIAL SAFETY DATA SHEETS

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1. SCOPE

This standard covers the identification of hazardous materials used and/or produced by Alcoa. Definitions coincide with those delineated in 29 CFR 1910.1200 - the OSHA Hazard Communication Standard. In many instances, those materials considered as "hazardous" are or will be documented on Alcoa Material Safety Data Sheets (MSDS). Most materials used and/or produced by Alcoa, whether "hazardous" or not, are listed in Engineering Standard Index 18.15.1.

2. DEFINITION

The definitions specified in OSHA's Hazard Communication Standard 29 CFR 1910.1200 which are delineated below, define physical and chemical hazardous materials for our purposes. These definitions are sufficiently broad so as to include many materials which may not pose a risk to Health, Safety, or the Environment; however, they are included to conform to the regulatory definitions under 1910.1200. Physical hazards include:

- 1) flammables
- 2) combustibles
- 3) compressed gases
- 4) explosives
- 5) organic peroxides
- 6) oxidizers
- 7) pyrophorics
- 8) reactives
- 9) water reactives

Health hazards include:

- 1) carcinogens
- 2) irritants
- 3) corrosives
- 4) sensitizers
- 5) materials which are acutely toxic
- 6) materials which cause other serious toxic effects (i.e., teratogenicity, reproductive dysfunction, etc.).

Moreover, materials listed in the OSHA PEL tables or the ACGIH TLV limits are by definition "hazardous" materials.

2.1 Physical Hazards.

2.1.1 Flammable. "Flammable" means a chemical that falls into one of the following categories:

- (i) "Aerosol, flammable" means an aerosol that, when tested by the method described in 16 CFR 1500.45, yields a flame projection exceeding 18 inches at full valve opening, or a flashback (a flame extending back to the valve) at any degree of valve opening;
- (ii) "Gas, flammable" means:
 - A) A gas that, at ambient temperature and pressure, forms a flammable mixture with air at a concentration of thirteen (13) percent by volume or less; or
 - B) A gas that, at ambient temperature and pressure, forms a range of flammable mixtures with air wider than twelve (12) percent by volume, regardless of the lower limit;
- (iii) "Liquid, flammable" means any liquid having a flashpoint below 100°F (37.8°C), except any mixture having components with flashpoints of 100°F (37.8°C) or higher, the total of which make up 99 percent or more of the total volume of the mixture.

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- (iv) "Solid, flammable" means a solid, other than a blasting agent or explosive as defined in paragraph 1910.109(a), that is liable to cause fire through friction, absorption of moisture, spontaneous chemical change, or retained heat from manufacturing or processing, or which can be ignited readily and when ignited burns so vigorously and persistently as to create a serious hazard. A chemical shall be considered to be a flammable solid if, when tested by the method described in 16 CFR 1500.44, it ignites and burns with a self-sustained flame at a rate greater than one-tenth of an inch per second along its major axis.

"Flashpoint" means the minimum temperature at which a liquid gives off a vapor in sufficient concentration to ignite when tested as follows:

- (i) Tagliabue Closed Tester (see American National Standard Method of Test for Flash Point by Tag Closed Tester, Z11.24-1979 (ASTM D56-79)) for liquids with a viscosity of less than 45 Saybolt Universal Seconds (SUS) at 100°F (37.8°C), that do not contain suspended solids and do not have a tendency to form a surface film under test; or
- (ii) Pensky-Martens Closed Tester (see American National Standard Method of Test for Flash Point by Pensky-Martens Closed Tester, Z11.7-1979 (ASTM D 93-79)) for liquids with a viscosity equal to or greater than 45 SUS at 100°F (37.8°C), or that contain suspended solids, or that have a tendency to form a surface film under test; or
- (iii) Setaflash Closed Tester (see American National Standard Method of Test for Flash Point by Setaflash Closed Tester (ASTM D3278-78)).

2.1.2 **Combustible Liquid.** Any liquid having a flashpoint at or above 100°F (37.8°C) but below 200°F (93.3°C), except any mixture having components with flashpoints of 200°F (93.3°C), or higher, the total volume of which makes up 99 percent or more of the total volume of the mixture.

2.1.3 **Compressed Gas.** "Compressed gas" means:

- (i) A gas or mixture of gases having, in a container, an absolute pressure exceeding 40 psi at 70°F (21.1°C), or
- (ii) A gas or mixture of gases having, in a container, an absolute pressure exceeding 104 psi at 130°F (54.4°C), regardless of the pressure of 70°F (21.1°C), or
- (iii) A liquid having a vapor pressure exceeding 40 psi at 100°F (37.8°C) as determined by ASTM D-323-72.

2.1.4 **Explosives.** "Explosives" means a chemical that causes a sudden, almost instantaneous release of pressure, gas, and heat when subjected to sudden shock, pressure, or high temperature.

2.1.5 **Organic Peroxide.** "Organic peroxide" means an organic compound that contains the bivalent -O-O-structure and which may be considered to be a structural derivative of hydrogen peroxide where one or both of the hydrogen atoms has been replaced by an organic radical.

2.1.6 **Oxidizer.** "Oxidizer" means a chemical other than a blasting agent or explosive as defined in Sec. 1910.109(a), that initiates or promotes combustion in other materials, thereby causing fire either of itself or through the release of oxygen or other gases.

2.1.7 **Pyrophoric.** "Pyrophoric" means a chemical that will ignite spontaneously in air at a temperature of 130°F (54.4°C) or below.

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- 2.1.8** Reactive. "Unstable (reactive)" means a chemical which in the pure state, or as produced or transported, will vigorously polymerize, decompose, condense, or will become self-reactive under conditions of shocks pressure or temperature.
- 2.1.9** Water Reactive. "Water-reactive" means a chemical that reacts with water to release a gas that is either flammable or presents a health hazard.
- 2.2** Health Hazards. The following definitions apply to "Health Hazards" as specified under 29 CFR 1910.1200. If a mixture has not been tested as a whole to determine whether the mixture is a health hazard, the mixture shall be assumed to present the same health hazards as do the components which comprise one percent (by weight or volume) or more of the mixture. For carcinogens, the figure is 0.1%. Materials which are present in quantities less than 1% would also be classified as "Health Hazards" if one has evidence to show that they would exceed an established OSHA PEL or ACGIH TLV or could present a health hazard to employees in those concentrations.
- 2.2.1** Any chemical substance contained in 29 CFR Part 1910 Subpart Z Toxic and Hazardous Substances, Occupational Safety and Health Administration or OSHA, or any chemical substance covered within the latest edition of the document "Threshold Limit Values for Chemical Substances and Physical Agents in the Work Environment" as published by the American Conference of Governmental Industrial Hygienists (ACGIH) is defined as a "hazardous" material.
- 2.2.2** Carcinogens. A carcinogen or potential carcinogen for hazard communication purposes is defined as being contained in the following listings if present at concentrations of 0.1% or greater:
- (i) National Toxicology Program (NTP), Annual Report on Carcinogens (latest edition);
 - (ii) International Agency for Research on Cancer (IARC) Monographs (latest editions); or
 - (iii) 29 CFR Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration.
- 2.2.3** Corrosive. A chemical that causes visible destruction of or irreversible alterations in, living tissue by chemical action at the site of contact (reference 49 CFR Part 173 - Department of Transportation (DOT) regulations).
- 2.2.4** Irritants. Chemicals are defined as skin irritants if Draize scores of 5 or more are recorded when tested in conformance with the protocol defined in 16 CFR 1500.41 - Commercial Practices, Consumer Product Safety Commission. A chemical is an eye irritant if so determined under the procedure listed in 16 CFR 1500.42 - Commercial Practices, Consumer Product Safety Commission. Irritants are distinguished from corrosive materials by the reversibility of the inflammatory effect at the site of contact.
- 2.2.5** Sensitizer. A chemical upon repeated exposure which results in a substantial proportion of exposed animals or people developing an allergic response in normal tissue.
- 2.2.6** Acutely Toxic.
- A) Ingestion - A chemical that has a rat oral LD₅₀ of 500 mg/kg of body weight or less. Highly toxic denotes an oral LD₅₀ in rats of 50 mg/kg or less per kilogram of body weight.
 - B) Absorption - A chemical that has a dermal LD₅₀ in rabbits of 1000 mg/kg or less when exposed for 24 hours. Highly toxic by skin absorption is a chemical that has an LD₅₀ in rabbits of 200 mg/kg of body weight or less when exposed for 24 hours.

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- C) Inhalation - A chemical that has an LC₅₀ concentration in air of 2000 ppm or less of gas and vapor or 20 mg/L or less of mist, fume, or dust when administered for one hour or less to rats. Highly toxic by inhalation is a chemical that has a median lethal concentration (LC₅₀) in air of 200 ppm or less of gas and vapor or 2 mg/L or less of mist, fume, or dust when administered for one hour or less to rats.

2.2.7 Target Organ Effects. Materials which can induce a specific, organotoxic effect at a concentration which is realistic in the work environment. This category includes but is not limited to such serious toxic agents as mutagens, teratogens, hepatotoxins, etc.

2.3 Article. Articles are not covered by the standard. An "article" means a manufactured item:

- (i) which is formed to a specific shape or design during manufacture;
- (ii) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and
- (iii) which does not release, or otherwise result in exposure to a hazardous chemical under normal conditions of use.

The above criteria for classifying a material as hazardous are not meant to be all-inclusive or completely adaptable to every situation which arises. In such cases, the Corporate Hazardous Materials Control Committee acting through its members will assist in deciding how a material should be classified.

3. ALCOA MATERIAL SAFETY DATA SHEET (AMSDS)

3.1 The purpose of the Alcoa Material Safety Data Sheet is to assemble key information on each "hazardous" material relating to:

- a) hazard class
- b) material description
- c) ingredients
- d) physical properties
- e) safe handling and storage
- f) fire and explosion data
- g) emergency fire fighting procedures
- h) reactivity data
- i) health hazard information
- j) first aid procedures
- k) spill recovery and disposal
- l) special information relative to protection and precaution data.

It is intended that these data sheets be made available to key persons in the Safety, Industrial Hygiene, Environmental Control, Fire Prevention and Traffic Departments at all locations who need to be aware of the safety and health aspects of hazardous materials. These people in cooperation with their corporate counterparts will have the responsibility for assessing, interpreting and passing judgment on information presented in these materials safety data sheets. Moreover, all plant personnel including hourly employees should have access to these sheets on an as needed basis.

3.2 Following is a description of some of the key items on the Material Safety Data Sheet to aid in understanding the completed form.

3.2.1 Phone Number. It will be the responsibility of each Alcoa location to select an appropriate telephone number for seeking emergency information in matters pertaining to hazardous materials. This number may be for one of the following location management individuals:

- a) Safety Manager
- b) Industrial Hygienist
- c) Environmental Manager
- d) Fire Marshall, or
- e) Some other person designated to handle this responsibility.

Consequently for Alcoa-developed MSDS sheets which cover internally used products, the phone number is intentionally left blank.

higher hardness than the surrounding area. This difference in hardness can be determined with a fine cut file. If the affected area is shallow, hand dressing may be sufficient to remove the damage and salvage the hook. Such dressing should be followed by magnetic particle or dye penetrant testing to make certain any cracks have been completely removed.

Hooks in regular service shall be dimensionally checked for overloading and wear monthly, and the dimensions recorded on the record card along with the name of the inspector. The inspector shall be a person regularly responsible for this check. This same person shall also be responsible for an annual crack inspection which shall be noted on the record card.

9. WELDING

The general rule is that welding is not permitted on hooks. Exceptions to this rule are sometimes made in the case of handles. These exceptions must be covered in detail on the hook drawing which should show weld location, welding rod and procedure and any subsequent thermal treatment required for stress relief.

8. FREQUENCY OF INSPECTION

This will, of course, depend upon the rate of use. Hooks which are in regular service shall be visually inspected daily by the person using the hook.

HOOK INSPECTION RECORD CARD									
Hook No. _____		Bldg No. _____		Dept _____					
or Section XX	Eye Type			Shank Type			Rated Capacity	Allowable	
	or Section XX								
Discard hook if A, B, C, or E wear beyond allowable values of: A= new A-15% for circular section, A= new A-10% for rectangular section; B= new B-15%; C= new C+10%; E= new E+15%									
Date Inspected	Inspector	A	B	C	E	Remarks			
(new)									

Figure 1. Suggested 5 X 8 record card. Back of card would provide additional space for inspection records.

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For MSDS sheets for commercial Alcoa products, a central security phone number (412-553-4001) which is accessible 24 hours a day has been established. When calls are received at this station, they will be referred to appropriate individuals (i.e., Industrial Hygiene, Safety, Medical, Environmental) within the organization for handling. A formal procedure has been established to address these needs.

3.2.2 Hazard Class. Categories are provided which specify the particular "physical" and "health" hazards which pertain to the chemical product in question. More than one hazard class may be applicable for a given substance. Classifications conform to those defined in the OSHA Hazard Communication Standard 29 CFR 1910.1200.

3.2.3 Section I - Material Description. This section lists the chemical name and formula and other designations or synonyms. Chemical name refers to the scientific designation of a chemical. The common name referenced at the top of the sheet means a designation or identification such as code name, trade name, brand name, or generic name used to identify a chemical other than by its chemical name. Section I also provides the Chemical Abstract Service (CAS) number and the manufacturer where applicable.

3.2.4 Section II - Ingredients and Health Hazard Data. This section includes ingredients, composition, concentrations and health hazard data which indicates acceptable levels of exposure.

3.2.4.1 Exposure Limits. Values are published by the Occupational Safety and Health Administration (OSHA), Mine Safety and Health Administration (MSHA), and American Conference of Governmental Industrial Hygienists (ACGIH). Exposure limits used by OSHA are known as Permissible Exposure Limits - PELs. ACGIH limits are referred to as threshold limit values (TLVs).

Exposure limits are either ceiling concentrations (peak exposures) or time weighted averages (TWA). Most are TWA. TWA and/or ceiling exposure values refer to the approximate maximum concentrations which most employees may be exposed to day after day without adverse health effects. The OSHA PELs and MSHA limits, which are the legal limits, should be followed in most instances. ACGIH values should be followed in place of the OSHA PEL and MSHA limits in those cases where the Corporate Industrial Hygiene Division decides that these values are more appropriate than the OSHA PELs and MSHA limits to protect employees' health. In those instances where OSHA or ACGIH limits are not sufficient to provide adequate protection, an Alcoa internal limit will be referenced. Units for TLV and PELs are usually ppm (parts per million) or mg/m³ (milligrams per cubic meter).

3.2.4.2 Toxicity Terminology.

- a) LD₅₀ - "Lethal Dose Fifty" - The calculated dose of a particular chemical substance which results in the death of 50% of a given population by any exposure route other than inhalation. The exposure route (oral, dermal, intravenous, etc.) needs to be specified. When the percentage of population varies from fifty, it is denoted by changing the numerical subset value to reflect the particular lethal percentage (i.e. LD₁₀ would represent the calculated dose of a particular chemical substance which results in the death of 10% of a given population).
- b) LDLo - "Lethal Dose Low" - The lowest dose of a particular chemical substance reported to have caused death in a given population when introduced by any route other than inhalation. The exposure route (oral, dermal, intravenous, etc.) needs to be specified.

- c) LC₅₀ - "Lethal Concentration Fifty" - The calculated air concentration of a particular chemical substance for a specified period of time which results in the death of 50% of a given population when given by inhalation for a specified period of time. When the percentage of population varies from fifty, it is denoted by changing the numerical value to reflect the particular lethal percentage (i.e. LC₁₅ would represent the air concentration of a particular chemical substance which results in the death of 15% of a given population).
- d) LCLO - "Lethal Concentration Low" - The lowest airborne concentration reported to have caused death in a given population when administered by inhalation for a specified period of time.
- e) TDLo - "Toxic Dose Low" - The lowest dose of a particular chemical substance which has been reported to produce a specified toxic effect in a given population when introduced by any route other than inhalation. The exposure route (oral, dermal, intravenous, etc.) needs to be specified.
- f) TCLO - "Toxic Concentration Low" - The lowest concentration in air for a particular chemical substance which has been reported to have produced a specified toxic effect when administered by inhalation in a given population.
- g) (Skin) - The connotation of "skin" when used in conjunction with a TLV or PEL indicates that skin exposure itself may be dangerous as a result of systemic absorption. It is possible that even though the air concentration may be below the prescribed TLV limit value, a hazard may still exist as a result of skin contact and absorption for those compounds characterized by "skin".
- h) IDLH - Concentrations which are immediately dangerous to life or health.

3.2.5 Section III - Physical Data. Definitions: (Both °C and °F and units for all other measurements are indicated.)

3.2.5.1 Physical Form - Gas, liquid, solid (powder, crystal).

3.2.5.2 Boiling Temperature - Temperature of the liquid at which its vapor pressure is equal to the atmospheric pressure (760 mm Hg).

3.2.5.3 Melt/Freeze Temperature - Temperature at which the liquid changes to a solid, or from a solid to a liquid.

3.2.5.4 Vapor Pressure - Pressure, measured in pounds per square inch absolute (PSIA) or mm Hg, which is exerted by a volatile liquid at room temperature.

3.2.5.5 Evaporation Rate - Relative rate at which material will evaporate as compared to ether (Ether = 1).

3.2.5.6 Specific Gravity - Ratio of the weight of a substance to the weight of an equal volume of water at 39.2°F. This determines whether the material floats or sinks in water.

3.2.5.7 Density - The amount of matter contained in a unit volume of a substance (mass per unit volume). Expressed as pounds per cubic foot or grams per cubic centimeter.

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3.2.5.8 Solubility in Water - Degree to which the material will dissolve in water at room temperature. The following terms based on weight percent are used.

Negligible.....less than 0.1 percent
Slight.....0.1 - 1 percent
Moderate.....1 - 10 percent
Appreciable.....more than 10 percent
Complete.....in all proportions

3.2.5.9 Color - Odor - For example, colorless - aromatic odor. See Chemical Card Number - Chemical Manufacturers Assoc. (CMA) card number (where available).

3.2.5.10 pH - Measure of the acidity or alkalinity of the material in question.

3.2.6 Section IV - Fire and Explosion Data.

3.2.6.1 Flash Point - Temperature at which the liquid mixture gives off vapor sufficient to form an ignitable mixture with air near the surface of the liquid. Temperatures are assumed to be for closed cup test unless marked oc for open cup test.

3.2.6.2 Auto-Ignition Temperature - Temperature at which the material will ignite spontaneously in air.

3.2.6.3 Flammable Limits (Explosive Limits) - Volume percent range of vapor or gas mixture in air in which propagation of flame or explosion can occur on contact with source of ignition.

3.2.6.4 Fire Fighting/Extinguishing - Indicates specific type of extinguishment material to use, procedures to follow, precautions to take and conditions to avoid when the material is on fire or involved in a fire. Examples: Use carbon dioxide or dry chemical extinguishers. Do not use water spray. Shut off gas flow. Indicate firefighters' protective gear.

3.2.7 Section V - Reactivity Data.

3.2.7.1 Reactivity Hazards - Indicates whether material is stable or unstable and if hazardous reactions can occur. Also lists the hazardous products produced from the reaction and the conditions and materials that should be avoided.

3.2.7.2 Metal Corrosion Problems - Indicates what metals are incompatible with the hazardous material so that contact can be avoided.

3.2.7.3 Additional Information - Lists any other special precautions not covered under metal corrosion or reactivity. Includes potential danger from inadvertent or accidental mixing.

3.2.8 Section VI - Health Hazard Information.

3.2.8.1 Effects of Exposure - Indicates the acute, subacute, and/or chronic adverse health effects which occur as a result of inhalation, skin contact, eye contact, or ingestion and the levels at which these effects can occur if known. Examples of adverse effects include such things as CNS depression, liver injury, teratogenicity, etc.

Acute - Characterized by adverse effects which occur in close proximity (within 24 hours or less) to the actual exposure.

Subacute - Characterized by adverse effects which occur after 24 hours and up to 3 months subsequent to the actual exposure.

Chronic - Characterized by adverse effects which occur sometime later (in excess of 3 months) after the actual exposure.

3.2.8.2 First Aid or Emergency Treatment

Eyes, Skin, Ingestion, Inhalation - Indicates the measures to take when a hazardous material makes contact with an individual by one or more of the above routes of exposure and either has or is likely to have serious health consequences.

3.2.9 Section VII - Spill Recovery and Disposal Procedures. Indicates measures, procedures and precautions to be taken for the recovery of small and large spills and the appropriate disposal procedure for that size spill.

3.2.9.1 Waste Disposal - Indicates the proper procedure for the safe disposal of the waste material during routine work not involving a spill.

3.2.10 Section VIII - Special Protection Information. Provides information regarding the need for adequate ventilation, use of respiratory protection, use of personal protective equipment, etc.

3.2.11 Section IX - Special Precautions and Comments. Indicates specific information and guidelines which were not covered in other sections. Examples of information contained in this section include:

3.2.11.1 Approved solvent safety cans, carrying containers for corrosives.

3.2.11.2 Explosion-proof electrical equipment, special ventilation, use of exhaust hoods.

3.2.11.3 Proper storage conditions including such factors as: store in a cool, dry, well-ventilated area with proper attention to separation of incompatible chemicals, avoidance of exposure to direct sunlight and any other special considerations.

3.2.11.4 D.O.T. proper shipping name, hazard class, and identification number if applicable.

3.2.12 Section X - References. Indicates important references including volume, page number, date and other relevant information. Common acronyms which may be referenced under Section 3.2.12 include:

ACGIH - American Conference of Governmental Industrial Hygienists

AIA - American Insurance Association

AIHA - American Industrial Hygiene Association

ASTM - American Society for Testing Materials

CFR - Code of Federal Regulations

CHRIS - Chemical Hazards Response Information System - U. S. Coast Guard

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3.2.12 Section X - References (continued).

CMA - Chemical Manufacturers Association

DOT - Department of Transportation

MSHA - Mine Safety & Health Administration

NFPA - National Fire Protection Agency

NSC - National Safety Council

NIOSH - National Institute for Occupational Safety & Health

OSHA - Occupational Safety & Health Act

SPCC - Spill Prevention Control & Countermeasure Plan

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