SAFETY DATA SHEET

1. Identification

Product identifier: WHITE FUSED ALUMINUM OXIDE
Other means of identification:
- Synonyms: AL, ALSD, ALHD, ALLD, ALZD, ALC
Recommended use: Abrasives, Ceramics, Flooring, Surface Treatment and Refractory.
Recommended restrictions: -

Manufacturer/Importer/Supplier/Distributor information:
- Company Identification: ELFUSA GERAL DE ELETROFUSÃO LTDA
- Telephone: +55.19.3634.2300
- Personal responsible for the SDS: qualidade@elfusa.com.br
- Commercial: comercial@elfusa.com.br
- Homepage: www.elfusa.com.br
- Contact person: Mr. Ruben Sinato
- Emergency telephone: +55.11.99973.8421
- E-mail: ruben.sinato@grupocurimbaba.com.br

2. Hazard(s) identification

Physical hazards: Not classified.
Health hazards: Not classified.
OSHA defined hazards: Not classified.

Label elements:
- Hazard symbol: None.
- Signal word: None.
- Hazard statement: The product does not meet the criteria for classification.

Precautionary statement:
- Prevention: Observe good industrial hygiene practices.
- Response: Wash hands after handling.
- Storage: Store away from incompatible materials.
- Disposal: Dispose of waste and residues in accordance with local authority requirements.

Hazard(s) not otherwise classified (HNOC): None known.
Supplemental information: None.

3. Composition/information on ingredients

Substances:

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>Common name and synonyms</th>
<th>CAS number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum oxide</td>
<td>-</td>
<td>1344-28-1</td>
<td>≥ 98</td>
</tr>
<tr>
<td>Impurities: SiO2+Fe2O3+Na2O+CaO+MgO+TiO2</td>
<td>-</td>
<td>N/A</td>
<td>≤ 2</td>
</tr>
</tbody>
</table>

Composition comments: All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume. For more detailed chemical composition, refer to the certificate of analysis.

4. First-aid measures

Inhalation: Move to fresh air. Get medical attention if any discomfort continues.
Skin contact: Wash with soap and water. Get medical attention if irritation develops or persists.
Eye contact: Flush eyes thoroughly with water for at least 15 minutes. Get medical attention if irritation develops or persists.

Ingestion: Immediately rinse mouth and drink plenty of water. Get medical attention if irritation develops and persists.

Most important symptoms/effects, acute and delayed: Irritation of eyes and mucous membranes. Irritation of nose and throat.

Indication of immediate medical attention and special treatment needed: Treat symptomatically.

General information: Get medical attention if any discomfort develops.
5. Fire-fighting measures

Suitable extinguishing media
Use fire-extinguishing media appropriate for surrounding materials.

Unsuitable extinguishing media
No restrictions known.

Specific hazards arising from the chemical
None known.

Special protective equipment and precautions for firefighters
Self-contained breathing apparatus, operated in positive pressure mode and full protective clothing must be worn in case of fire.

Firefighting equipment/instructions
Move containers from fire area if you can do it without risk.

General fire hazards
The product is not flammable.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures
Ensure adequate ventilation. Avoid inhalation of dust and contact with skin and eyes. Wear protective clothing as described in Section 8 of this safety data sheet.

Methods and materials for containment and cleaning up
Recover and recycle, if practical. Sweep up or vacuum up spillage and collect in suitable container for disposal. Do not vacuum clean unless vacuum cleaners are equipped with HEPA filter.

Environmental precautions
Avoid release to the environment. Prevent further leakage or spillage if safe to do so.

7. Handling and storage

Precautions for safe handling
Provide adequate ventilation. Use work methods which minimize dust production. Avoid inhalation of dust and contact with skin and eyes. Wear appropriate personal protective equipment. Do not add wet alumina to electrolysis cells. Observe good industrial hygiene practices.

Conditions for safe storage, including any incompatibilities
Store in a dry place.

8. Exposure controls/personal protection

Occupational exposure limits

| US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) |
|-------------------------------------|-------------------|-----------------|
| Material                           | Type      | Value          | Form             |
| White Fused Aluminum Oxide         | PEL       | 5 mg/m3        | Respirable fraction. |
|                                     |           | 15 mg/m3       | Total dust.       |

| US. ACGIH Threshold Limit Values   |
|------------------------------------|-------------------|-----------------|
| Material                           | Type      | Value          | Form             |
| White Fused Aluminum Oxide         | TWA       | 1 mg/m3        | Respirable fraction. |

Biological limit values
No biological exposure limits noted for the ingredient(s).

Exposure guidelines
No exposure standards allocated

Appropriate engineering controls
Provide sufficient ventilation for operations causing dust formation. If engineering measures are not sufficient to maintain concentrations of dust particulates below the Occupational Exposure Limit (OEL), suitable respiratory protection must be worn.

Individual protection measures, such as personal protective equipment

<table>
<thead>
<tr>
<th>Eye/face protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wear goggles/face shield.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Skin protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wear protective gloves. Suitable gloves can be recommended by the glove supplier.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Respiratory protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>In case of inadequate ventilation or risk of inhalation of dust, use suitable respiratory equipment with particle filter. Seek advice from local supervisor.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Thermal hazards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wear appropriate thermal protective clothing, when necessary.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>General hygiene considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wash hands after handling. Routinely wash work clothing and protective equipment to remove contaminants. Handle in accordance with good industrial hygiene and safety practice. Follow up on any medical surveillance requirements.</td>
</tr>
</tbody>
</table>

9. Physical and chemical properties

<table>
<thead>
<tr>
<th>Appearance</th>
</tr>
</thead>
<tbody>
<tr>
<td>White powder.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Physical state</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Powder.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>White.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Odor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odorless.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Odor threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not available.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>pH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not applicable.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Melting point/freezing point</th>
</tr>
</thead>
<tbody>
<tr>
<td>3704°F (2040 ºC)</td>
</tr>
</tbody>
</table>
Initial boiling point and boiling range: Not available
Flash point: Not applicable
Evaporation rate: Not applicable
Flammability (solid, gas): Non flammable
Upper/lower flammability or explosive limits:
  - Flammability limit-lower (%): Not available
  - Flammability limits-upper (%): Not available
  - Explosive limit-lower (%): Not available
  - Explosive limit-upper (%): Not available
Vapor pressure: Not applicable
Vapor density: Not applicable
Relative density: 3.97 at 20°C
Solubility (ies):
  - Solubility (water): Insoluble
Partition coefficient (n-octanol/water): Not applicable
Auto-ignition temperature: Not applicable
Decomposition temperature: Not available
Viscosity: Not applicable
Other information:
  - Bulk density: Not applicable
  - Explosive limit: Not applicable
  - Explosive properties: Not explosive
  - Oxidizing properties: Not oxidizing
  - Percent volatile: Not available

10. Stability and reactivity
Reactivity: The product is stable and non reactive under normal conditions of storage and transport.
Chemical stability: Stable at normal conditions.
Possibility of hazardous reactions: Hazardous polymerization does not occur. Hazardous reactions do not occur.
Conditions to avoid: Moisture. Contact with incompatible materials.
Incompatible materials: None known.
Hazardous decomposition products: No hazardous decomposition products are known.

11. Toxicological information
Information on likely routes of exposure:
  - Inhalation: Dust may irritate respiratory system.
  - Skin contact: Dust may irritate skin.
  - Eye contact: Dust may irritate the eyes.
  - Ingestion: Ingestion may cause irritation and malaise.
Symptoms related to the physical, chemical and toxicological characteristics: Irritation of eyes and mucous membranes. Irritation of nose and throat.
Information on toxicological effects:
Acute toxicity: Ingestion may cause irritation and malaise.

<table>
<thead>
<tr>
<th>Product</th>
<th>Species</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>White Fused Aluminum Oxide</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inhalation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LC50</td>
<td>Rat</td>
<td>&gt; 2.3 mg/l, 4 hours</td>
</tr>
<tr>
<td>Oral</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LD50</td>
<td>Rat</td>
<td>&gt; 5000 mg/kg</td>
</tr>
</tbody>
</table>

Components:
Aluminum oxide (CAS 1344-28-1)
Acute
Inhalation
LC50 | Rat | > 2.3 mg/l, 4 hours |
Oral | | |
LD50 | Rat | > 5000 mg/kg |
Skin corrosion/irritation: May cause irritation through mechanical abrasion.
Serious eye damage/eye irritation  May cause irritation through mechanical abrasion.
Respiratory or skin sensitization  Not classified.
Respiratory sensitization  Not a skin sensitizer.
Skin sensitization  Not classified.
Germ cell mutagenicity  Test data conclusive but not sufficient for classification.
Carcinogenicity  Test data conclusive but not sufficient for classification.
IARC Monographs. Overall Evaluation of Carcinogenicity  Not listed.
NTP Report on Carcinogens  Not listed.
Reproductive toxicity  Test data conclusive but not sufficient for classification.
Specific target organ toxicity-single exposure  Test data conclusive but not sufficient for classification.
Specific target organ toxicity-repeated exposure  Test data conclusive but not sufficient for classification.
Aspiration hazard  Not classified.
Further information  Prolonged and repeated overexposure to dust can lead to pneumoconiosis.

12. Ecological information

Ecotoxicity  The product is not expected to be hazardous to the environment.

<table>
<thead>
<tr>
<th>Product</th>
<th>Species</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>White Fused Aluminum Oxide</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aquatic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Algae</td>
<td>EC50 Green algae (Selenastrum capricornutum)</td>
<td>&gt; 100 mg/l 72 hours</td>
</tr>
<tr>
<td>Crustacea</td>
<td>EC50 Daphnia magna</td>
<td>&gt; 100 mg/l, 48 hours</td>
</tr>
<tr>
<td>Fish</td>
<td>LC50 Salmo trutta</td>
<td>&gt; 100 mg/l, 96 hours</td>
</tr>
</tbody>
</table>

Persistence and degradability  The product is not biodegradable.
Bioaccumulative potential  The product is not bioaccumulating.
Mobility in soil  Aluminum oxide is not mobile in the environment, unless it comes into contact with an aqueous environment with a pH below 5.5 or above 8.5.
Mobility in general  The product is insoluble in water.
Other adverse effects  Not expected to be harmful to aquatic organisms.

13. Disposal considerations

Disposal instructions  Dispose in accordance with all applicable regulations.
Hazardous waste code  Not regulated.
Waste from residues / unsed products  Recover and recycle, if practical. Dispose of in accordance with local regulations.
Contaminated packaging  Offer rinsed packaging material to local recycling facilities. Dispose of in accordance with local regulations.

14. Transport information

DOT  Not regulated as dangerous goods.
IATA  Not regulated as dangerous goods.
IMDG  Not regulated as dangerous goods.
Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code  Not available.

15. Regulatory information

US federal regulations  This product is not known to be a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200. All components are on the U.S. EPA TSCA Inventory List.
TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)
Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)
Not regulated.

CERCLA Hazardous Substance List (40 CFR 302.4)
Not listed.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories
Immediate Hazard - No
Delayed Hazard - No
Fire Hazard - No
Pressure Hazard - No
Reactivity Hazard - No

SARA 302 Extremely hazardous substance
Not listed.

SARA 311/312 Hazardous chemical - Yes

SARA 313 (TRI reporting)
Chemical name CAS number % by wt.
Aluminum oxide 1344-28-1 ≥ 98

Other federal regulations
Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List
Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)
Not regulated.

Safe Drinking Water Act (SDWA)
Not regulated.

US state regulations
US. Massachusetts RTK - Substance List
Aluminum oxide (CAS 1344-28-1)

US. New Jersey Worker and Community Right-to-Know Act
Aluminum oxide (CAS 1344-28-1)

US. Pennsylvania Worker and Community Right-to-Know Law
Aluminum oxide (CAS 1344-28-1)

US. Rhode Island RTK
Aluminum oxide (CAS 1344-28-1)

US. California Proposition 65
This product does not contain a chemical known to the State of California to cause cancer, birth defects or other reproductive harm.

International Inventories

<table>
<thead>
<tr>
<th>Country(s) or region</th>
<th>Inventory name</th>
<th>On inventory (yes/no)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>Australian Inventory of Chemical Substances (AICS)</td>
<td>Yes</td>
</tr>
<tr>
<td>Canada</td>
<td>Domestic Substances List (DSL)</td>
<td>Yes</td>
</tr>
<tr>
<td>Canada</td>
<td>Non-Domestic Substances List (NDLS)</td>
<td>No</td>
</tr>
<tr>
<td>China</td>
<td>Inventory of Existing Chemical Substances in China (IECSC)</td>
<td>Yes</td>
</tr>
<tr>
<td>Europe</td>
<td>European Inventory of Existing Commercial Chemical Substances (EINECS)</td>
<td>Yes</td>
</tr>
<tr>
<td>Europe</td>
<td>European List of Notified Chemical Substances (ELINCS)</td>
<td>No</td>
</tr>
<tr>
<td>Japan</td>
<td>Inventory of Existing and New Chemical Substances (ENCS)</td>
<td>Yes</td>
</tr>
<tr>
<td>Korea</td>
<td>Existing Chemicals List (ECL)</td>
<td>Yes</td>
</tr>
<tr>
<td>New Zealand</td>
<td>New Zealand Inventory</td>
<td>Yes</td>
</tr>
<tr>
<td>Philippines</td>
<td>Philippine Inventory of Chemicals and Chemical Substances (PICCS)</td>
<td>Yes</td>
</tr>
<tr>
<td>United States &amp; Puerto Rico</td>
<td>Toxic Substances Control Act (TSCA) Inventory</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s).
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).
16. Other information, including date of preparation or last revision

<table>
<thead>
<tr>
<th>Issue date</th>
<th>10-January-2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revision date</td>
<td>12-September-2017</td>
</tr>
<tr>
<td>Version</td>
<td>3</td>
</tr>
<tr>
<td>Disclaimer</td>
<td>The information in the sheet was written based on the best knowledge and experience currently available.</td>
</tr>
</tbody>
</table>

HMIS ratings
Health = 1
Flammability = 0
Physical Hazard = 0

NFPA ratings
0 1 0

References
IUCLID
Chemical safety report.

List of Abbreviations
LD50: Lethal Dose, 50%.
LC50: Lethal Concentration, 50%.