## SECTION 1. IDENTIFICATION

### Product Identifier

**Product Name:** Energy Storage System  
**Models:** Storion-SMILE-B3

### Other Means of Identification

**SDS #:** SDS005  
**Synonyms:** Lithium Iron Phosphate (LiFePO4, LFP)  
**Proper Shipping Name:** Lithium ion batteries contained in equipment  
**UN/ID No:** UN3481

### Recommended Use of the Chemical and Restrictions on Use

**Recommended Use:** Energy Storage; Battery Packs

**Details of Manufacturer or Importer**

**Manufacturer Address**  
Alpha ESS Co., Ltd.  
JiuHua Road 888, Nantong High-Tech Industrial Development Zone, Nantong City, China  
+86 (0) 513-80606891  
info@alpha-ess.com  
www.alpha-ess.com

**Emergency Phone Number**

**Emergency Telephone** +86 (0) 513-80606891 (China)

## SECTION 2. HAZARDS IDENTIFICATION

### Classification of the hazardous chemical

Not dangerous with normal use. The materials within the battery may only represent a hazard if the structural integrity of the battery is compromised. Do not expose the batteries to fire or open flame. Do not mix batteries of varying sizes, chemistries, or types. Do not short circuit, puncture, incinerate, crush, over-charge, over discharge, or expose the batteries to temperatures above or below the declared limit. Damage to the batteries will result in the risk of fire or explosion, which could release dangerous hydrogen fluoride gas and exposure to the ingredients contained within or their combustion products could be harmful.

### Hazards

This product is a Lithium Iron Phosphate Battery with certified compliance under the UN Recommendations on Transport of Dangerous Goods, Manual of Tests and Criteria, Part III,
sub-section 38.3. For the battery cell, chemical materials are stored in a hermetically sealed metal case, designed to withstand temperatures and pressures encountered during normal use. As a result, during normal use, there is no physical danger of ignition or explosion and chemical danger of hazardous materials' leakage. However, if exposed to a fire, added mechanical shocks, decomposed, added electric stress by misuse, the gas release vent will be operated. The battery cell case will be breached at the extreme. Hazardous materials may be released. Moreover, if heated strongly by the surrounding fire, acrid or harmful fume may be emitted.

**Toxicity:**
If a battery burns, the vapors can irritate eyes, skin and the respiratory tract.

### SECTION 3. COMPOSITION & INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS No</th>
<th>Weight [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPCC-Fe</td>
<td>7439-89-6</td>
<td>22-26</td>
</tr>
<tr>
<td>Lithium Iron Phosphate (LFP)</td>
<td>15365-14-7</td>
<td>15-17</td>
</tr>
<tr>
<td>Iron</td>
<td>7439-89-6</td>
<td>14-17</td>
</tr>
<tr>
<td>Lithium Hexafluorophosphate</td>
<td>21324-40-3</td>
<td>10-12</td>
</tr>
<tr>
<td>Copper Metal</td>
<td>7440-50-8</td>
<td>8-12</td>
</tr>
<tr>
<td>Carbon</td>
<td>7440-44-0</td>
<td>3-5</td>
</tr>
<tr>
<td>Aluminum Metal</td>
<td>7429-90-5</td>
<td>5-9</td>
</tr>
<tr>
<td>Polyester Resin</td>
<td>63148-65-2</td>
<td>3-5</td>
</tr>
<tr>
<td>Acrylonitrile-butadiene-styrene (ABS)</td>
<td>9003-56-9</td>
<td>1-3</td>
</tr>
<tr>
<td>Polyvinylidene Fluoride</td>
<td>24937-79-9</td>
<td>1-3</td>
</tr>
<tr>
<td>Polycarbonate</td>
<td>25037-45-0</td>
<td>1-3</td>
</tr>
<tr>
<td>Nickel</td>
<td>7440-02-0</td>
<td>0-1</td>
</tr>
</tbody>
</table>

### SECTION 4. FIRST AID MEASURES

**Description of necessary first aid measures**

**Eye Contact**  
Rinse eyes with flowering water for 15 minutes and seek medical attention.

**Skin Contact**  
Wash the affected area thoroughly with soap and water for 15 minutes and seek medical attention.

**Inhalation**  
If internal contents are inhaled, evacuate the contaminated area, and seek medical attention.

**Ingestion**  
If ingestion of internal contents occurs, rinse mouth thoroughly with water. **DO NOT INDUCE VOMITING.** If vomiting occurs naturally, have victim lean forward to reduce risk of aspiration and continue to rinse mouth with water. Seek medical attention immediately.
**Symptoms caused by exposure**

**Symptoms**
Adverse effects not expected from this product. Exposure to battery contents may cause irritation and potential burns.

**Medical attention and special treatment**

**Notes to Physician**
Treat symptomatically.

---

### SECTION 5. FIRE-FIGHTING MEASURES

**Suitable extinguishing media**

In case of fire suitable extinguishing media: carbon dioxide or dry chemical. Use Novec 1230, FM-200, or dioxide extinguisher. ABC extinguishers are not effective when the battery pack is on fire.

**Special hazards arising from chemical**

Contents react with water. May explode if exposed to high temperatures due to pressure build up in battery casing. Lithium may burn in a fire situation and may be ejected from the battery. Damaged cells may evolve toxic and flammable vapours.

**Specific protective equipment and precautions for firefighters**

Evacuate area and contact emergency services. Toxic gases may be evolved in a fire situation. Remain upwind and notify those downwind of hazard. Wear full protective equipment including Self Contained Breathing Apparatus (SCBA) and protective gear in compliance with the Directive on Personal Protective Equipment 89/686/EEC when combating fire. Use water fog to cool intact containers and nearby storage areas.

Hazchem code

4  Dry Agent (water MUST NOT be allowed to come into contact with substance).

W  Risk of violent reaction or explosion. Wear liquid-tight chemical protective clothing and breathing apparatus. Contain spill and run-off.

---

### SECTION 6. ACCIDENTAL RELEASE MEASURES

**Personal precautions, protective equipment and emergency procedures**

Wear Personal Protective Equipment (PPE) as detailed in SECTION 8 of this SDS.

**Environmental precautions**

See SECTION 12 for additional Ecological Information.

**Methods and materials for containment and cleaning up**

If spilt, collect and reuse where possible. If battery is broken or damaged, absorb liquid with sand or similar. Contain spillage, then collect and place in suitable containers for disposal.
CAUTION: Avoid exposure to contents.
For waste disposal, see SECTION 13 of the SDS.
SECTION 7. HANDLING AND STORAGE

Precautions for safe handling
Before use carefully read the product manuals. Use of safe work practices are recommended to avoid eye or skin contact and inhalation. Observe good personal hygiene, including washing hands before eating. Prohibit eating, drinking and smoking in contaminated areas.

Conditions for safe storage, including any incompatibilities
Store tightly sealed in a cool, dry, well ventilated area, removed from water, incompatible substances, heat or ignition sources and foodstuffs. Ensure containers are adequately labelled, protected from physical damage and sealed when not in use. Check regularly for leaks or spills. Store within the recommended limit of -20°C to 45°C. Do not expose to high temperature (55°C). Since short circuit can cause burn hazard or safety vent to open, do not store with metal jewelry, metal covered tables, or metal belt.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure control measures
This product presents no health hazards to the user when used according to label directions for its intended purposes.

Biological monitoring

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Determinant</th>
<th>Sampling Time</th>
<th>BEI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polyvinylidene Fluoride</td>
<td>Fluoride in urine</td>
<td>Prior to shift</td>
<td>2 mg/L</td>
</tr>
<tr>
<td>Fluoride</td>
<td>Fluoride in urine</td>
<td>End of shift</td>
<td>3 mg/L</td>
</tr>
</tbody>
</table>

Reference: ACGIH Biological Exposure Indices

Control banding
Control banding is not used.

Engineering controls
Use local exhaust ventilation or other engineering controls to control sources of dust, mist, fume and vapor.

Personal protective equipment (PPE):

Eye Protection: Not necessary under normal use. Wear safety goggles if handling a ruptured or leaking battery cell.

Skin Protection: Not necessary under normal use for hands and body. Wear PVC or rubber gloves if handling a ruptured or leaking battery cell.

Respiratory Protection: Not necessary under normal use. In case of battery or cell rupture, use a self-contained full face respiratory mask.
### SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance:</td>
<td>Battery</td>
</tr>
<tr>
<td>Physical state:</td>
<td>Solid</td>
</tr>
<tr>
<td>Color:</td>
<td>Not Determined</td>
</tr>
<tr>
<td>Odour type:</td>
<td>Odorless</td>
</tr>
<tr>
<td>Melting point:</td>
<td>Not Determined</td>
</tr>
<tr>
<td>Freezing point:</td>
<td>Not Determined</td>
</tr>
<tr>
<td>Boiling point:</td>
<td>Not Determined</td>
</tr>
<tr>
<td>Boiling range:</td>
<td>Not Determined</td>
</tr>
<tr>
<td>Flash point:</td>
<td>Not Determined</td>
</tr>
<tr>
<td>Evaporative rate:</td>
<td>Not Determined</td>
</tr>
<tr>
<td>Flammability:</td>
<td>Not Determined</td>
</tr>
<tr>
<td>Flammability/explosive limits:</td>
<td>Not Determined</td>
</tr>
<tr>
<td>Oxidizing properties:</td>
<td>Not Determined</td>
</tr>
<tr>
<td>Relative density:</td>
<td>Not Determined</td>
</tr>
<tr>
<td>Auto-ignition Temperature</td>
<td>Not Determined</td>
</tr>
<tr>
<td>Solubility in Water:</td>
<td>Insoluble</td>
</tr>
<tr>
<td>Partition coefficient: n-octanol /water</td>
<td>Not Determined</td>
</tr>
<tr>
<td>Water/oil distribution coefficient:</td>
<td>Not Determined</td>
</tr>
<tr>
<td>Vapor pressure:</td>
<td>Not Determined</td>
</tr>
<tr>
<td>Decomposition temperature:</td>
<td>Not Determined</td>
</tr>
<tr>
<td>Vapor density: (air = 1)</td>
<td>Not Determined</td>
</tr>
<tr>
<td>Saturated vapor concentration</td>
<td>Not Determined</td>
</tr>
<tr>
<td>Specific heat value:</td>
<td>Not Determined</td>
</tr>
<tr>
<td>Particle size</td>
<td>Not Determined</td>
</tr>
<tr>
<td>Release of invisible flammable vapors and gases</td>
<td>Not Determined</td>
</tr>
<tr>
<td>Size distribution</td>
<td>Not Determined</td>
</tr>
<tr>
<td>Shape and aspect ratio</td>
<td>Not Determined</td>
</tr>
<tr>
<td>Crystallinity</td>
<td>Not Determined</td>
</tr>
<tr>
<td>Dustiness</td>
<td>Not Determined</td>
</tr>
<tr>
<td>Surface area</td>
<td>1.35 m²</td>
</tr>
<tr>
<td>Degree of aggregation or agglomeration, and dispersibility</td>
<td>Not Determined</td>
</tr>
<tr>
<td>Redox potential</td>
<td>Not Determined</td>
</tr>
<tr>
<td>Biodurability or biopersistence</td>
<td>Not Determined</td>
</tr>
<tr>
<td>Surface coating or chemistry</td>
<td>Polyester Resin</td>
</tr>
</tbody>
</table>
SECTION 10. STABILITY AND REACTIVITY

Reactivity:
Not Available

Chemical Stability:
Stable under normal use.

Possibility of hazardous reactions:
Polymerization will not occur.

Conditions to avoid:

Incompatible materials:
Battery contents are incompatible with water (evolving flammable gas), oxidizing agents (e.g. hypochlorites), acids (e.g. nitric acid), alkalis (e.g. sodium hydroxide), heat and ignition sources.

Hazardous decomposition products:
May evolve hydrogen and lithium oxides when heated to decomposition.

SECTION 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Acute toxicity
Information available for the product:
No specific acute toxicity data exists for this product. Batteries consist of a hermetically sealed metallic container containing a number of chemicals and materials of construction that may be hazardous upon release. Over exposure considered unlikely unless battery ruptures and contact with contents occurs. Contents may be harmful.

Inhalation: Toxicity data and effects of inhalation exposure are not available. Not a likely route of exposure under normal use.
Ingestion: Toxicity data and effects of ingestion exposure are not available. Not a likely route of exposure under normal use.
Skin Contact: Toxicity data and effects of skin contact exposure are not available. Not a likely route of exposure under normal use.
Eye Contact: Toxicity data and effects of eye contact exposure are not available. Not a likely route of exposure under normal use.

Component information
<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Oral LD50</th>
<th>Dermal LD50</th>
<th>Inhalation LC50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon 7440-44-0</td>
<td>&gt; 8000 mg/kg (rat)</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Early onset symptoms and delayed health effect from exposure**

Please see SECTION 4 of this SDS for symptoms.

**Numerical Measures of Toxicity**

Not determined

**SECTION 12. ECOLOGICAL INFORMATION**

**Ecotoxicity**

The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

**Persistence and degradability**

Not determined.

**Bioaccumulative potential**

Not determined.

**Mobility in soil**

Not determined.

**Other adverse effects:**

Not determined.

**SECTION 13. DISPOSAL CONSIDERATIONS**

**Disposal Methods**

**Disposal of Wastes**

Recycling is encouraged. Do NOT dump into sewage or water bodies. Dispose of in accordance with local, state and federal laws and regulations.

**Contaminated Packaging**

Disposal should be in accordance with applicable regional, national and local laws and regulations.
**SECTION 14. TRANSPORT INFORMATION**

AlphaESS Product listed in Section 1 is designed to comply with standard international shipping regulations including the UN Recommendations on the Transport of Dangerous Goods; the IATA Dangerous Goods Regulations and the International Maritime Dangerous Goods Code.

<table>
<thead>
<tr>
<th>UN Number</th>
<th>LAND TRANSPORT (ADR / RID)</th>
<th>SEA TRANSPORT (IMDG / IMO)</th>
<th>AIR TRANSPORT (IATA / ICAO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3481</td>
<td>Lithium Ion Batteries packed contained in equipment</td>
<td>Lithium Ion Batteries packed contained in equipment</td>
<td>Lithium Ion Batteries packed contained in equipment</td>
</tr>
</tbody>
</table>

**Transport Hazard Class**  
9 9 9

**Packing Group**  
II II II

**Environmental hazards for transport purposes**  
No information provided

**Special precautions for user**  
No information provided

**Additional information**  
No information provided

**Hazchem or Emergency Action Code**  
4W
SECTION 15. REGULATORY INFORMATION

1) UN 3480 / UN 3481: Transportation regulations for lithium ion batteries including the tests according to the “UN Manual of Tests and Criteria, Part III, Section 38.3”.

2) ADR / RID: Regulations on the transportation of dangerous goods by road and railway.

3) IATA: Regulations on the transportation of dangerous goods by air.

4) IMDG-Code: Regulations on the transportation of dangerous goods by sea.

SECTION 16. OTHER INFORMATION

Original Preparation Date: 10th Jan 2019
Document Number: VPM_SDS005
Document Title: AlphaESS Battery SDS-Storion-SMILE-B3
Version Number: V01
Revision Summary: -
Current Revision Date: 10th Jan 2019

Prepared by:
Alpha ESS Co., Ltd.
JiuHua Road 888, Nantong High-Tech Industrial Development Zone, Nantong City, China
+86 (0) 513-80606891
info@alpha-ess.com
www.alpha-ess.com