Rechargeable Lithium Ion Batteries: Lunar Energy Products

The products referenced herein are exempt articles and are not subject to OSHA's Hazard Communication Standard requirements for the preparation of Safety Data Sheets (SDS).

Safety Data Sheets (SDS)

Safety Data Sheets (SDS) are a sub-requirement of the Occupational Safety and Health Administration (OSHA) Hazard Communication Standard, 29 CFR Subpart 1910.1200. This Hazard Communication Standard does not apply to various subcategories including anything defined by OSHA as an “article.” OSHA has defined “article” as a manufactured item other than a fluid or particle; (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 under normal conditions of use does not release more than very small quantities (e.g., minute or trace amounts) of a hazardous chemical, and does not pose a physical hazard or health risk to employees.

Lunar Energy battery products meet the OSHA definition of “article.” Thus, they are exempt from the requirements of the Hazardous Communication Standard therefore, an SDS is not required.

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1. Identification of Products and Company

Product	Rechargeable lithium-ion energy storage system for residential applications, and modules and sub-assemblies that can be installed in the Lunar Battery (Lunar Energy Products). Specific part numbers are listed below.	
Locations	**Manufacturer**	755 Ravendale Dr Mountain View, CA 94043 Tel: +1 (855) 255-2381 (Do not use for emergencies; see below) www.lunarenergy.com
Emergency Contacts	**CHEMTREC**	For Hazardous Materials [or Dangerous Goods] Incidents: Spill, Leak, Fire, Exposure, or Accident Call CHEMTREC Day or Night Toll-Free: 1-800-424-9300/ +1 703-527-3887 CHEMTREC Customer Number (CCN): 1011986

The Lunar Battery contains battery subassemblies made up of rechargeable lithium-ion cells. The Lunar System and their respective battery subassemblies are covered by this document (Lunar Energy Products).

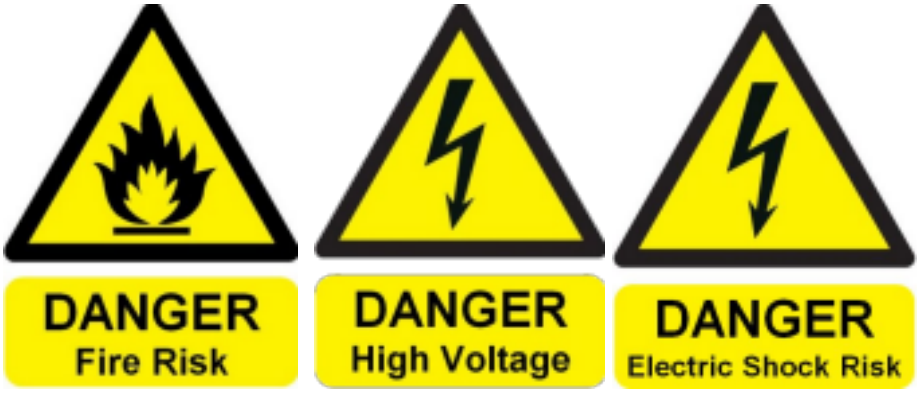
Lunar Energy Products contain sealed lithium-ion battery cells (cells) that are similar to rechargeable batteries in many consumer electronic products. Cells are individually, hermetically sealed prismatic cells approximately 160 mm x 116 mm x 50 mm. These prismatic cells each contain lithium-ion electrodes and electrolyte (approximate composition listed below). THE CELLS AND BATTERIES DO NOT CONTAIN METALLIC LITHIUM. Individual cells have nominal voltages of approximately 3.2 V.

Materials/Ingredients of Battery Cells	**% by wt.**
Lithium Iron Phosphate	≥30-≤40
Graphite	≥22-≤30
Copper	≥5-≤10
Ethyl methyl carbonate	≥2-≤10
Carbonic acid diethyl ester	≥1-≤8
1,3-Dioxolan-2-one	≥1-≤8
Aluminum	≥1-≤7
Lithium hexafluorophosphate(1-) ($LiPF_6$)	≥1-≤5
Carbon	≥0.5-≤5
Polyethylene	≥1-≤5
1-Propene homopolymer	≥0.5-≤5
1,1,2,3,3,3-Hexafluoro-1-propene, 1,1-difluoroethene polymer	≥0.1-≤2
Carboxymethyl ether cellulose	≥0.1-≤1
Ethenylbenzene polymer with 1,3-butadiene	≤1

Individual lithium-ion cells are connected to form blocks. Blocks are assembled together and installed as a Lunar Battery System on site. Approximate specifications of lithium-ion based modules and battery blocks are listed below. Modules and blocks are battery sub-assemblies.

Part Number	Description	Voltage – as shipped (V)	Nominal Voltage – as installed (V)	Max Voltage – as installed (V)	Weight (kg)	Height (cm)	Width (cm)	Depth (cm)
90-002802	Battery With Cover and Brackets, Boxed	51.9~52.7	51.2	58.4	55	44	73	51

2. Handling and Use Precautions/ Identification of Hazards



The products described by this document are dangerous if mishandled. Injury to property or person, including loss of life is possible if mishandled.

Lunar Energy Products contain lithium-ion batteries. **A battery is a source of energy**. Do not short circuit, puncture, incinerate, crush, immerse, force discharge or expose to temperatures above the declared operating temperature range of the product. An internal or external short circuit can cause significant overheating and provide an ignition source resulting in fire, including surrounding materials or materials within the cell or battery. Under normal conditions of use, the electrode materials and electrolyte they contain are not exposed, provided the battery integrity is maintained and seals remain intact. Risk of exposure may occur only in cases of abuse (mechanical, thermal, electrical).

A. High Voltage Hazards

Under normal conditions of use, provided that a Lunar Energy Product enclosure remains closed, handling the product does not pose an electrical hazard. Numerous safeguards have been designed into Lunar Energy Products to help ensure that the high voltage battery is kept safe and secure as a result of a number of expected abuse conditions. All of the constituent component battery cells are sealed within the system as sub-groups in metal enclosures. The exterior of each block is isolated from internal components and connectors are touch-safe. Blocks are then installed in a rigid enclosure, which is isolated from high voltage.

A Lunar Energy Product may pose a significant high voltage and electrocution risk if the outer enclosure, block enclosures, and/or safety circuits have been compromised or have been significantly damaged. **A battery pack, even in a normally discharged condition is likely to contain substantial electrical charge and can cause injury or death if mishandled.** If a Lunar Energy Product has been significantly visibly damaged or its enclosure compromised, then practice appropriate high-voltage preventative measures until the danger has been assessed (and dissipated if necessary).

WARNING: NEVER CUT INTO A LUNAR ENERGY PRODUCT ENCLOSURE due to the high voltage and electrocution risks.

For proper installation / removal instructions please contact the Installer or Customer Support Team:

- (650) 535-1969: Installer Support
- (650) 547-6001: Customer Support

B. Hazards Associated with Mechanical Damage

Mechanical damage to Lunar Energy Products can result in a number of hazardous conditions (discussed below) including:

- Leaked cell electrolyte (see Section 2D)
- Rapid heating of individual cells due to exothermic reaction of constituent materials (cell thermal runaway), venting of cells, and propagation of self-heating and thermal runaway reactions to neighboring cells
- Fire

To prevent mechanical damage to Lunar Energy Products, these items should be stored in their original packaging when not in use or prior to being installed (see Section 6 below).

C. Hazards Associated with Elevated Temperature Exposure

The Lunar Battery is designed to withstand operating temperatures up to 45°C (113°F), with up to 100% operating humidity (condensing), and storage temperatures up to 60°C (140°F) and <95% relative humidity (non-condensing) for up to 24 hours.

Exposure of Lunar Energy Products to elevated temperatures can drive battery cells into thermal runaway and result in a fire.

- Storage for more than 24 hours at temperatures above approximately 80°C (176°F) could result in cell thermal runaway reactions and should be avoided.
- Storage for more than a few minutes at temperatures above approximately 150°C (302°F) could result in cell thermal runaway reactions and should be avoided.
- Storage up to 60°C (140°F) is allowed for less than 30 consecutive days. Please refer to the Lunar Battery Installation Guidelines for all long-term storage conditions.

Time Period	Temperature Limits	Relative Humidity (%RH)
Absolute Limit	–4°F to 140°F (-20°C to 60°C)	< 95%
Up to 30 days	–4°F to 113°F (-20°C to 45°C)	< 60%
Up to 60 days	32°F to 95°F (0°C to 35°C)	< 60%
Up to 24 Months	65°F to 82°F (18°C to 28°C)	< 60%

Exposure of battery packs to localized heat sources such as flames could result in cell thermal runaway reactions and should be avoided.

D. Hazards Associated with Leaked Electrolyte

The electrolyte within constituent cells includes a volatile hydrocarbon-based liquid and a dissolved lithium salt (which is a source of lithium ions) such as lithium hexafluorophosphate. The electrolyte is largely absorbed in electrodes within individual sealed cells. Under normal usage conditions, battery electrolyte should not be encountered by anyone handling a Lunar Energy Product.

Severe mechanical damage (e.g. severe crushing, pouch perforation) can cause a small quantity of electrolyte (up to approximately 70g) to leak out of a cell. For the electrolyte liquid to come into contact with a user of a Lunar Energy Product, the battery system or external enclosure, the block enclosure, and the cell would have to be mechanically damaged.

Any released electrolyte liquid is likely to evaporate rapidly, leaving a white salt residue. Evaporated electrolyte is flammable and will contain carbonate compounds. Leaked electrolyte is colorless and characterized by a sweet odor. If an odor is obvious, evacuate or clear the surrounding area and ventilate the area. **WARNING: AVOID CONTACT WITH ELECTROLYTE.**

Leaked electrolyte solution is flammable and corrosive/irritating to the eyes and skin. If a liquid is observed that is suspected electrolyte, ventilate the area and avoid contact with the liquid until a positive identification can be made and sufficient protective equipment can be obtained (eye, skin, and respiratory protection). Chemical classifier strips can be used to identify the spilled liquid (electrolyte will contain organic carbonate-based solvent and fluorinated compounds).

In case of an electrolyte leak, the following protective equipment is recommended: an air purifying respirator with organic vapor/acid gas cartridges, safety goggles or a full face respirator, and safety gloves (Butyl rubber or laminated film (e.g., Silver Shield)). Protective clothing should be worn. Use a dry absorbent material to clean up a spill.

**An acceptable exposure concentration of electrolyte has not been identified by the American Council of Governmental Industrial Hygienists (ACGIH). In case of electrolyte leakage from the battery, the oral (rat) LD50 is greater than 2 g/kg (estimated).*

E. Hazards Associated with Vented Electrolyte

Lithium-ion cells are sealed units, and thus under normal usage conditions, venting of electrolyte should not occur. If subjected to abnormal heating or other abuse conditions, electrolyte and electrolyte decomposition products can vaporize and be vented from cells. Accumulation of liquid electrolyte is unlikely in the case of abnormal heating. Vented gasses are a common early indicator of a thermal runaway reaction – an abnormal and hazardous condition, however, thermal runaway is not guaranteed.

If gasses or smoke are observed escaping from a Lunar Battery, evacuate the area and notify a first responder team and/or the local fire department. Gasses or smoke exiting a lithium-ion battery pack are likely flammable and could ignite unexpectedly as the condition that led to cell venting may also cause ignition of the vent gasses. A venting Lunar Battery should only be approached with extreme caution by trained first responders equipped with appropriate personal protective equipment (PPE), as discussed in Section 3.

Cell vent gas composition will depend upon a number of factors, including cell composition, cell state of charge, cell age, and the cause of cell venting. Vent gasses may include volatile organic compounds (VOCs) such as methane, ethylene, ethane and other hydrocarbons; hydrogen gas; carbon dioxide; carbon monoxide; soot; and particulates containing oxides of nickel, aluminum, lithium, copper, and cobalt. Additionally, phosphorus pentafluoride, POF_3, and HF vapors may form.

WARNING: AVOID CONTACT WITH VENTED GASSES. Vented gasses may irritate the eyes, skin, and throat. Cell vent gasses are typically hot; upon exit from a cell, vent gas temperatures can exceed 600°C (1,110°F). Contact with hot gasses can cause thermal burns. Vented electrolyte is flammable, and may ignite on contact with a competent ignition source such as an open flame, spark, or a sufficiently heated surface. Vented electrolyte may also ignite on contact with cells undergoing a thermal runaway reaction.

3. First Aid Measures

Electric Shock: Seek immediate medical assistance if an electrical shock has occurred or is suspected.

Contact with Leaked Electrolyte: The constituent battery cells are sealed. Contents of an open (broken) constituent battery cell can cause skin irritation and/or chemical burns. If materials from a ruptured or otherwise damaged cell or battery contact skin, flush immediately with water and wash the affected area with soap and water. If a chemical burn occurs or if irritation persists, seek medical assistance.

For eye contact, flush with significant amounts of water for 15 minutes without rubbing and see a physician at once.

Inhalation of Electrolyte Vapors: If inhalation of electrolyte vapors occurs, move the person into fresh air. If they are not breathing, give artificial respiration. Seek immediate medical assistance.

Vent Gas Inhalation: The constituent battery cells are sealed and venting of cells should not occur during normal use. If inhalation of vent gasses occurs, move the person into fresh air. If they are not breathing, give artificial respiration. Seek immediate medical assistance.

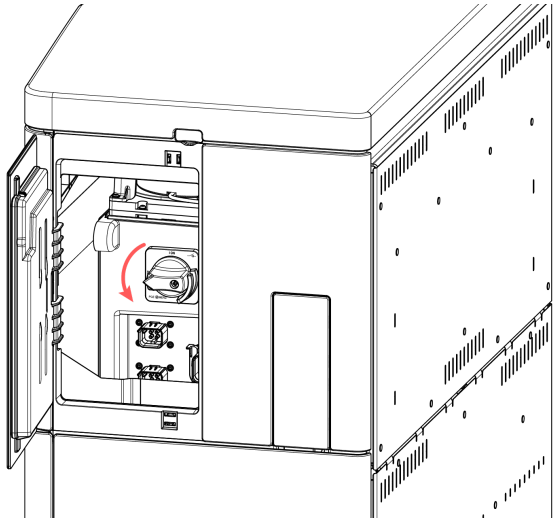
4. Firefighting Measures

Responding to a Venting Lunar Battery: Smoke emanating from an installed Lunar Battery or a battery block module prior to installation is an indication of an abnormal and hazardous condition. Smoke will always be the first sign of a thermal runaway event. The smoke is likely flammable and may ignite at any time. If fire or smoke is observed emanating from a Lunar Battery at any time, the following should be performed:

1. If possible, shut off the unit/system (see instructions below)
2. Evacuate the area
3. Notify appropriately trained first responders and the local fire department

How to Shut Off the Battery in an Emergency:

Open the access door at the right side of the inverter. Turn the rotary switch to OFF position.



WARNING: Shutting off power to the Lunar Battery does not de-energize the battery, and a shock hazard may still be present.

The Lunar Battery should then be monitored for evidence of continued smoke venting. Application of high volumes of water from a safe distance may help cool the unit and prevent further reactions or a fire from developing. If a fire develops and visible flames appear, the Incident Commander should determine whether an attempt will be made to suppress the fire (aggressive firefighting) or allow the battery to burn until it self-extinguishes while protecting surrounding materials (defensive firefighting). Lunar Energy recommends that copious volumes of water be used to fight a fire involving Lunar Battery. Virtually all fires involving lithium-ion batteries can be controlled with water. To date, water has been found to be the most effective agent for controlling lithium-ion battery fires. Water will suppress flames and can cool cells, limiting the propagation of thermal runaway reactions. If water is used, electrolysis of water (splitting of water into hydrogen and oxygen) may contribute to the flammable gas mixture formed by venting cells, burning plastic, and burning of other combustibles.

Gaseous agents such as CO_2 or Halon, or dry chemical suppressants may temporarily suppress flaming of lithium-ion battery packs, but they will not cool lithium-ion batteries and will not limit the propagation of cell thermal runaway reactions. Metal fire suppressants such as LITH-X, graphite powder, or copper powder are not appropriate agents for suppressing fires involving lithium-ion battery packs as they are unlikely to be effective.

A battery fire may continue for several hours and it may take 24 hours or longer for the battery pack to cool. A lithium-ion battery fire that has been extinguished can re-ignite due to the exothermic reaction of constituent materials from broken

or damaged cells. To avoid this, remove sources of ignition and cool the burned mass by flooding with water.

Aggressive Firefighting: If a decision is made to aggressively fight a fire involving a Lunar Energy Product, then copious amounts of water should be applied from a safe distance. The water may not suppress all cell thermal runaway reactions within the battery pack, but it may cool cells and control the spread of the fire. If possible, direct the application of water towards openings in the battery pack enclosure, if any have formed, with the intent of flooding the pack enclosure. The objective is to contact the surfaces of the affected and surrounding individual battery blocks and cells with water.

Defensive Firefighting If a decision is made to fight a Lunar Battery fire defensively, then the fire crew should pull back a safe distance and allow the battery to burn itself out. Fire crews may choose to utilize a water stream or fog pattern to protect exposures or control the path of smoke. A battery fire may continue for several hours and may result in multiple re-ignition events. It may take 24 hours or longer for the battery pack to cool.

Firefighter PPE. Firefighters should wear self-contained breathing apparatus (SCBA) and fire protective turnout gear. Cells or batteries may flame or leak potentially hazardous organic vapors if exposed to excessive heat, fire or over-voltage conditions. These vapors may include volatile organic compounds (VOCs), hydrogen gas, carbon dioxide, carbon monoxide, soot, and particulates containing oxides of nickel, aluminum, lithium, copper, and cobalt. Additionally, phosphorus pentafluoride, POF3 and HF vapors may form.

5. Storage Precautions

Lunar Battery and sub-assemblies should be stored in manufacturer-approved packaging before installation.

Do not store Lunar Battery in a manner that allows terminals to short circuit (do not allow the formation of an electrically conductive path).

Elevated temperatures can result in reduced battery service life. Lunar Battery can withstand temperatures of -20°C to 60°C for up to 30 days. However, Lunar Battery stored for longer than one month should be stored at temperatures between -20°C and 45°C (-4°F and 113°F), and protected from condensation. Extended, longer-term storage (more than a month) at temperatures outside the recommended range can result in degradation of product lifetime. Storage in areas where temperatures routinely approach or exceed 80°C (176°F) could result in a hazardous condition. Do not store Lunar Battery near heating equipment.

Ideally, a Lunar Battery should be stored at 60% state of charge (SOC) or less, subject to any applicable laws. Lunar Battery should not be stored for extended periods either at 100% SOC or 0% SOC since both conditions adversely impact battery life. Lunar Battery should not be stored unconnected for longer than six (6) months since battery service life likely will be adversely impacted.

The storage area should be protected from flooding.

Long-term storage areas should be compliant with the appropriate local fire and building code requirements.

The acceptable storage density of battery packs and storage height of battery packs will be defined by the local authority having jurisdiction (AHJ). Requirements and limits will be based upon a number of factors including the structural and fire protection characteristics of the storage area and recommendations for fire protection promulgated by the National Fire Protection Association (NFPA) and similar organizations. At the time of this writing, no Commodity Classification has been defined for lithium-ion cells or battery packs (see 2016 NFPA 13: Standard for the Installation of Sprinkler Systems). Until a Commodity Classification has been defined based on testing by NFPA or a similar organization, Lunar Energy recommends treating lithium-ion cells and batteries in packaging as equivalent to a Group A Plastic Commodity.

6. Installation Precautions

Elevated temperatures can result in reduced battery service life or a hazardous condition.

The allowed installation temperature range for Lunar Battery is between -20°C and 45°C (-4°F and 113°F). Installation in areas with ambient temperatures over 45°C (113°F) is not recommended as this can result in degradation of product lifetime or a hazardous condition.

Installation in areas where temperatures routinely approach or exceed the temperature limits specified in the installation manual is not permitted, as this could result in a hazardous condition. Do not install batteries near heating equipment.

The equipment is certified for indoor and outdoor installation. However, the equipment should be installed in a location that prevents damage from flooding. Ensure that no water sources are above or near the equipment, including downspouts, sprinklers, or faucets

Installation areas should be compliant with the appropriate local fire and building code requirements.

7. Handling, Storage, and Transportation of Damaged Lunar Energy Products

If a Lunar Energy System has been damaged, battery enclosure has been dented or compromised, it is possible that heating is occurring that may eventually lead to a fire. Damaged or opened cells/batteries can result in rapid heating due to exothermic reaction of constituent materials, the release of flammable vapors, and propagation of self-heating and thermal runaway reactions to neighboring cells.

If no smoke, flame, leakage of electrolyte, or signs of heat has been observed for one hour, the Lunar Energy System may be disconnected and moved into a safe location. To obtain specific instructions for evaluating, disconnecting, and preparing a damaged Lunar Energy System for transport, please Installer or Customer Support Team:

- (650) 535-1969: Installer Support
- (650) 547-6001: Customer Support

A damaged Lunar Energy System should be monitored during storage for evidence of smoke, flame, leakage of electrolyte, leakage of coolant, or signs of heat. If full-time monitoring of the system is not possible (for example, during extended storage), the system should be moved to a safe storage location.

A safe storage location for a damaged battery will be free of flammable materials, accessible only by trained professionals, and downwind of occupied structures. For example, a fenced, open yard may be an appropriate safe location. **DO NOT STORE DAMAGED Lunar Battery ADJACENT TO UNDAMAGED Lunar Battery.** It is possible that a damaged battery may sustain further damage during transportation, and may lead to a fire. To further reduce this risk, handle the damaged battery with extreme caution.

8. Disposal Procedures

Lunar Energy lithium-ion batteries do not contain heavy metals such as lead, cadmium, or mercury.

Lunar Battery should be disposed of or recycled in accordance with local, state, and federal regulations. Note that regulations regarding disposal of batteries vary by jurisdiction. In the United States, batteries are classified as Universal Waste, and in addition, many individual states have specific regulations regarding disposal of battery packs. For example, in California, all batteries must be taken to a Universal Waste handler or authorized recycling facility.

Lunar Battery contain recyclable materials. Lunar Energy strongly encourages recycling.

When disposing of a Lunar Energy System, please consult with local, state, and/or federal authorities on the appropriate methods for disposal and recycling.

9. Maintenance or Repair

Lunar Energy requests all maintenance, service, and repairs of Lunar Battery be performed by Lunar Energy approved service personnel or Lunar Energy authorized repair facilities. This includes all proactive and corrective maintenance over the lifetime of a Lunar Energy System. Improper service or repair by personnel not approved nor authorized by Lunar Energy could void the System Warranty, lead to failure of the Lunar Energy System, and potentially result in development of an unsafe condition and unexpected electrical events.

10. Transport Information

Lithium-ion batteries are regulated as Class 9 Miscellaneous dangerous goods (also known as “hazardous materials”) pursuant to the International Civil Aviation Organization (ICAO) Technical Instructions for the Safe Transport of Dangerous Goods by Air, International Air Transport Association (IATA) Dangerous Goods Regulations, the International Maritime Dangerous Goods (IMDG) Code, European Agreements concerning the International Carriage of Dangerous Goods by Rail (RID) and Road (ADR), and applicable national regulations such as the USA’s hazardous materials regulations (see 49 CFR 173.185). These regulations contain very specific packaging, labeling, marking, and documentation requirements. The regulations also require that individuals involved in the preparation of dangerous goods for transport be trained on how to properly package, label, mark and prepare shipping documents.

UN Number	3480
Proper Shipping Name	Lithium Ion Batteries
Hazard Classification	Class 9 Miscellaneous
Packing Group	N/A
Packing Instructions	965

NOTICE: The information and recommendations set forth are made in good faith and believed to be accurate as of the date of preparation. Lunar Energy, INC. makes no warranty, expressed or implied, with respect to this information.

Revision Log

Revision #	Date	Description
1.0 - Release	02/06/2026	ERG for Lunar System (LFP battery blocks)