

## Material Safety Data Sheet

### Lithium Iron Phosphate Battery

#### SECTION 1: PRODUCT AND COMPANY INFORMATION

**PRODUCT NAME:** Lithium Iron Phosphate Battery  
**COMMON NAME:** LiFePO<sub>4</sub> Battery, LFP Battery  
**MANUFACTURER:** Higher Wire Inc.  
1321 W McKinley St  
Phoenix AZ 85007  
480-442-2007  
[www.higherwire.com](http://www.higherwire.com)  
**CHEMICAL NAME:** Lithium Iron Phosphate  
**CHEMICAL FAMILY:** Lithium Ion  
**CHEMICAL FORMULA:** LiFePO<sub>4</sub>

#### SECTION 2: COMPOSITION/INGREDIENTS INFORMATION

Chemical Name	CAS#	Content (%)	Classification
Lithium iron phosphate (LiFePO <sub>4</sub> )	15365-14-7	25-30%	Eye, skin, respiratory irritant
Graphite	7440-44-0	13-16%	Eye, skin, respiratory irritant
Aluminum	7429-90-5	6-7%	Inert
Copper	7440-50-8	9-15%	Inert
Electrolyte		18-22%	Mixture: Flammable; reactive; Eye, skin, respiratory irritant
Ethylene carbonate	96-49-1		
Dimethyl carbonate	616-38-6		
Ethyl methyl carbonate	623-53-0		
Lithium hexafluorophosphate	21324-40-3		

#### SECTION 3: HAZARDS IDENTIFICATION

Not dangerous with normal use. The battery is sealed and designed to withstand normal operating temperatures and pressures. Under normal use, there is no danger of ignition, explosion or chemical leakage. The materials within the battery will only present a hazard should if the battery is disassembled, incinerated, exposed to extreme temperatures or pressures, or abused mechanically, thermally or electrically. Abuse of any kind may result in fire or explosion, which may release hydrogen fluoride gas.

**CAUTION:** Do not disassemble, open, puncture or crush the battery. Do not expose the battery to open flame or extreme temperatures. Do not short circuit, over-charge or over-discharge the battery.

**Potential Health Effects:** Exposure to the ingredients contained within or their combustion products could be harmful. Exposure to electrolyte solutions contained within the battery cell may occur by inhalation, eye contact, skin contact and ingestion.

**Eyes:** Contact between the battery and eye will not cause any harm. Eye contact with the contents of a ruptured battery can cause severe irritation to the eye.

**Skin:** Contact between the battery and skin will not cause any harm. Skin contact with positive and negative terminals of high voltages may cause burns to the skin. Skin contact with a ruptured battery can cause skin irritation.

**Ingestion:** Swallowing of material from a sealed battery is not an expected route of exposure. Swallowing mists from a ruptured battery may cause respiratory irritation, chemical burns of the mouth and gastrointestinal tract irritation.

**Inhalation:** Inhalation of material from a sealed battery is not an expected route of exposure. Vapors or mists from a ruptured battery may cause respiratory irritation.

#### **SECTION 4: FIRST AID MEASURES**

Normal safe handling of this battery will not result in any ill health effects. In the event of exposure to materials contained within the battery, medical observation should be performed for at least 48 hours.

**Eyes:** Wash affected eye(s) with lukewarm water for at least 15 minutes, lifting upper and lower eyelids occasionally. Rinse with saline solution if possible. Seek medical attention.

**Skin:** Wash affected area with lukewarm water for at least 15 minutes. If irritation or pain persists, seek medical attention.

**Ingestion:** Move to fresh air and remove source of contamination from area. Do not induce vomiting. Rinse the mouth with water if the person is conscious. Seek medical attention.

**Inhalation:** Move to fresh air and remove source of contamination from area. If breathing difficulties persist, seek medical attention.

**CAUTION:** In all cases if irritation persists, seek medical assistance immediately.

#### **SECTION 5: FIRE-FIGHTING MEASURES**

**Extinguishing Media:** Use dry chemical powder, carbon dioxide, or foam for extinguishing fires involving Lithium Iron Phosphate (LiFePO<sub>4</sub>) batteries. For large fires, water spray fog or regular foam may also be used. Avoid pouring water on the battery as it may spread the fire or react with the battery.

**Fire Fighting Procedure:** Put on fully protective gear, including self-contained breathing apparatus, goggles, fireproofing jacket and gloves.

**Unusual Fire and Explosion Hazards:** Lithium Iron Phosphate (LiFePO<sub>4</sub>) batteries are not prone to thermal runaway and do not generate flammable gases. However, if the battery is exposed to excessive heat, fire or over voltage condition it may cause a leak, fire, hazardous vapors and hazardous decomposition products. Damaged or opened cells or batteries can result in rapid heating and the release of flammable vapors.

#### **SECTION 6: ACCIDENTAL RELEASE MEASURES**

In case of battery damage or electrolyte leakage, handle with caution. Wear proper personal protection equipment (PPE) to address the incident, including gloves, safety goggles or full-face mask, and protective clothing per Section 8. Avoid direct contact with skin or eyes. Clean up the spillage using

appropriate protective equipment and dispose of the damaged battery in accordance with local regulations.

## SECTION 7: HANDLING AND STORAGE

**Handling:** Avoid short-circuiting the battery or exposing it to high temperatures or open flames. Do not disassemble or modify the battery. Keep the battery away from children and pets. Do not expose batteries to direct sun light for a prolonged time. Do not expose batteries to temperatures outside the range of 0°F to 150°F (-20°C to 65°C).

**Storage:** Store the battery in a cool, dry, and well-ventilated area, ideally at 70°F to 80°F (20°C to 25°C). Prolonged exposure to extreme temperatures may reduce the life of the batteries and result in venting flammable liquid and/or gasses. Keep the battery away from direct sunlight, heat sources, flammable materials and sparks or open flames. Store the battery in its original packaging or a non-conductive container. Do not stack or crush the batteries.

## SECTION 8: EXPOSURE CONTROLS AND PERSONAL PROTECTION

**Engineering Controls:** Ensure adequate ventilation in areas where the batteries are stored or used. Avoid exposure to high temperatures.

**Personal Protective Equipment (PPE):** PPE is not required under normal use. In case of battery or cell rupture, use the following:

- Wear gloves, safety goggles, and protective clothing when handling damaged batteries or electrolyte.
- Use respiratory protection if exposure to battery gases or electrolyte vapor is likely.

## SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

**Appearance:** Solid battery

**Odor:** None

**Melting Point:** Typically, above 300°C (572°F). Plastic casing may melt at 200°C (392°F) or lower.

**Solubility:** Insoluble in water

## SECTION 10: STABILITY AND REACTIVITY

**Stability:** Stable under normal operating conditions.

**Incompatibilities:** Strong oxidizing agents and acids.

**Hazardous Decomposition Products:** This product may emit toxic fumes if burned or exposed to fire. Cells may release

**Possibility of Hazardous Reactions:** Not available

## SECTION 11: TOXICOLOGICAL INFORMATION

This product is non-toxic under normal operating conditions.

## SECTION 12: ECOLOGICAL INFORMATION

Not applicable

## **SECTION 13: DISPOSAL**

Batteries should be returned to a certified recycling center for end-of-life recycling. Batteries can be returned to the manufacturer for recycling. Observe local, state, and national regulations. Batteries should be discharged fully prior to disposal, and the electrodes covered with tape.

## **SECTION 14: TRANSPORTATION**

This lithium iron phosphate battery pack and manufacturer's packaging meet the testing requirements of United Nations recommendations on the transport of dangerous goods.

If manufacturer's packaging is unavailable, the following general guidelines should be followed. Always follow proper shipping regulations based on transportation method and location.

- Protect the lithium battery pack so as to prevent short circuits, including against contact with conductive materials within the same packaging that could lead to short circuit. Batteries must be packed in inner packaging's that completely enclose them individually.
- To provide protection from damage or compression to the batteries, the inner packaging's must be placed in a strong rigid outer packaging
- The packaging shall be adequate to avoid mechanical damage during transport, handling and stacking. The materials and pack design shall be chosen so as to prevent the development of unintentional electrical conduction, corrosion of the terminals and ingress of moisture.
- The package must be handled with care and that a flammability hazard exists if the package is damaged

The following regulations are cited and considered for transportation:

- The UN Recommendations on the Transport of Dangerous Goods Model Regulations and the Manual of Tests and Criteria (UN 38.3)
  - Classification number: UN3480
  - Shipping name/description: Lithium ion batteries
- The International Civil Aviation Organization (ICAO) Technical Instructions
- The International Air Transport Association (IATA) Dangerous Goods Regulations
  - If contained in equipment: Section II of PI967
  - If packed with equipment: Section II of PI966
  - When shipped alone: Section II of PI965
  - If more than two pieces per carton: Section IB of P1965
- The International Maritime Dangerous Goods (IMDG) Code
- The Office of Hazardous Materials Safety within the US Department of Transportation's (DOT) Research and Special Programs Administration (RSPA)

This product is properly classified, described, packaged, marked and labeled and are in proper condition for transportation according to all the applicable international and national governmental regulations, not limited to the above mentioned. We further certify that the enclosed products have been tested and fulfilled the requirements and conditions in accordance with UN Recommendations on the Transport of Dangerous Goods Model Regulations.

## **SECTION 15: REGULATORY INFORMATION**

This product is considered non-hazardous for OSHA hazard communication standard (29 CFR 1910.1200).

## **SECTION 16: OTHER INFORMATION**

This MSDS provides basic safety information for Lithium Iron Phosphate (LiFePO<sub>4</sub>) batteries manufactured by Higher Wire Inc. The information in this document is accurate and reliable as of the date of release. No representation, warranty or guarantee is made to the accuracy, reliability, or completeness of the information provided herein. This information relates to this product only and may not be valid when used in combination with any other materials.

Additional information is available by contacting Higher Wire Inc. at the information provided in Section 1.