# Safety Data Sheet
## Lithium Iron Phosphate Rechargeable Battery

## Section 1 – *Identification*

| | |
|---|---|
| **Product Identifier**:<br>Lithium Iron Phosphate<br>Rechargeable Battery<br>**Other Identifiers**:<br>Essential Lithium-Ion<br>"US 12V G24"<br>"US 24V GC2"<br>"US 48V GC2"<br>"US 48V 105"<br>**Product Use**:<br>Rechargeable Electrical Storage<br>**Uses Not Suitable**: N/A | **Distributed By**:<br>*U.S. Battery Manufacturing Company*<br>Primary Address:<br>1675 Sampson Ave. Corona, CA<br>92879 www.usbattery.com |
| **General Info:** 800-695-0945 (M-F, 7AM-4PM PST)<br>**Contact**: Health & Safety Department | **Emergency:** US & Canada: **800-424-9300**<br>(INFOTRAC) International: +1-352-323-3500 |

## Section 2 – *Hazards Identification*

**Hazard Statement** - Normal use of the product is safe and exposure to chemical ingredients is unlikely, however the product may represent a hazard if the integrity of the battery or contents are compromised through thermal, mechanical, or electrical abuse. Batteries may melt, ignite, and/or explode if misused, mishandled, or abused.

**Signal Word** - Danger

**Precautionary Statement** – Keep out of reach of children. To be installed by trained personnel using protective gloves, clothing, eye and face equipment.

**Response** – See Section 4

**OSHA Defined Hazards** – Not classified.

**Routes of Exposure:**

Normal use of the product is safe, however exposure to the chemicals contained within the product and/or the accidental release of product ingredients is potentially harmful. Release of internal chemicals can occur through combustion due to mechanical, thermal, or electrical abuse resulting in enclosure rupture. Inhalation, ingestion, skin, and eye contact may occur due to rupturing of the enclosure and/or venting release due to cell malfunction. If exposure to internal chemicals occurs, the chemicals are harmful if swallowed, may cause skin irritation, damage to organs such as bones and teeth through repeated exposure, damage to organs such as kidneys due to prolonged or repeated exposure by ingestion.

**Hazards not otherwise classified** – Improper use, handling, or storage of lithium ion batteries may result in a condition known as thermal runaway. This can result in fire and/or explosion.

| Physical | Health | | Environmental |
|---|---|---|---|
| Not classified | Acute toxicity, oral: | Category **4** | Not Classified |
| | Skin corrosion: | Category **2** | |
| | Eye damage: | Category **2A** | |
| | Specific target organ toxicity, repeated exposure: | Category **1 (bones, teeth)** | |
| | Specific target organ toxicity, repeated exposure (oral): | Category **2 (kidneys)** | |

**Label Elements**

## Section 3 – *Composition / Information on Ingredients*

### US 12V G24

| Chemical Composition | Chemical Formula | Weight (%) | CAS # |
|---|---|---|---|
| Lithium Iron Phosphate | $LiFePO_4$ | 16 - 20 | 15365-14-7 |
| Aluminum | Al | 3 - 5.5 | 7429-90-5 |
| Graphite | $C_{24}X_{12}$ | 5 - 8 | 7782-42-5 |
| Cold-rolled plate | Fe | 14.5 - 20 | 7439-89-6 |
| Copper | Cu | 6.5 - 10 | 7440-50-8 |
| Tin | Sn | 2 - 5 | 7440-31-5 |
| Polyethylene | (CH2CH2)n | 2 | 9002-88-4 |
| Acetylene black | $H_4C$ | 5 - 10 | 1333-86-4 |
| Phosphate(1-),hexafluoro-,lithium | LiPF6 | 10 - 15 | 21324-40-3 |
| Polypropylene | $(C_3H_6)n$ | 5 | 9003-07-0 |

## US 24V GC2 & US 48V GC2

| Chemical Composition | Chemical Formula | Weight (%) | CAS # |
|---|---|---|---|
| Lithium Iron Phosphate | $LiFePO_4$ | 29.7 | 15365-14-7 |
| Aluminum | Al | 20.8 | 7429-90-5 |
| Graphite | $C_{24}X_{12}$ | 16.7 | 7782-42-5 |
| Ethylene Carbonate | $C_3H_4O_3$ | 13 | 96-49-1 |
| Copper | Cu | 10 | 7440-50-8 |
| Dimethyl Carbonate | $C_3H_6O_3$ | 5.8 | 616-38-6 |
| Polypropylene | $(C_3H_6)n$ | 1.3 | 9003-07-0 |
| Acetylene black | $H_4C$ | 1.2 | 1333-86-4 |
| Polyvinylidene Fluoride (PVDF) | $(CH_2\text{-}CF_2)n$ | 1.5 | 24937-79-9 |

## US 48V 105

| Chemical Composition | Chemical Formula | Weight (%) | CAS # |
|---|---|---|---|
| Lithium Iron Phosphate | $LiFePO_4$ | 49 | 15365-14-7 |
| Aluminum | Al | 6 | 7429-90-5 |
| Graphite | $C_{24}X_{12}$ | 24 | 7782-42-5 |
| Copper | Cu | 13 | 7440-50-8 |
| Polypropylene | $(C_3H_6)n$ | 5 | 9003-07-0 |
| Phosphate(1-),hexafluoro,lithium | LiPF6 | 3 | 24937-79-9 |

## Section 4 – *First-Aid Measures*

| | |
|---|---|
| Following **inhalation** | Provide fresh air and seek medical attention. If not breathing, give artificial respiration. If breathing is difficult, give oxygen |
| Following **skin** contact | Remove contaminated clothing and wash skin with soap and water. If a chemical burn occurs or if irritation persists, seek medical attention. |
| Following **eye** contact | Flush immediately with large amounts of water for at least 15 minutes while keeping eyelids open. Seek medical attention. |
| Following **ingestion** | Seek medical attention immediately. Do not induce vomiting or give food/drink. |

## Section 5 – *Fire Fighting Measures*

| | |
|---|---|
| Suitable extinguishing media | ABC fire extinguisher, water, dry chemical, $CO_2$ or foam.<br>Excess/flooding water can cool reaction, slowing the fire propagation to other cells. Only use water in case of large fires or when large volumes of water are available. |
| Unsuitable extinguishing media | Do not use small quantities of water, only when large volumes are available. When using water, continuously spray until fire is extinguished. |
| Specific hazards | Battery cells may vey rupture or vent when exposed to heat or over-voltage conditions. This could result in the release of corrosive and/or flammable materials. During fire, gases released may include carbon oxides, hydrogen, hydrogen fluoride (HF), metal oxides. |
| Special protective equipment & precautions | Avoid breathing vapors. Use positive pressure self-contained breathing apparatus (SCBA) and protective clothing.<br>Avoid all ignition sources. Do **not** allow metallic articles to simultaneously contact negative & positive terminals of a battery.<br>If batteries are on charge, shut off power to charging equipment; but note that parallel-connected batteries may still pose risk of electric shock even when charging equipment is shut down. |

## Section 6 – *Accidental Release Measures*

| | |
|---|---|
| Personal precautions & protective equipment | Evacuate unnecessary personnel. Remove all sources of ignition. Avoid contact with contents of ruptured module and/or cells. Do not breathe fumes. Provide adequate ventilation. Wear PPE. |

| | |
|---|---|
| Emergency procedure, containment, & cleanup | Upon spillage: Contain any liquids with sand or similar, store in a labeled container, dispose as hazardous waste. See section 13 for disposal information. |
| Environmental precautions | Dispose of as a hazardous waste in accordance with applicable regulations.<br>Do not discharge to sewer, landfill, or waterways. Must be managed in accordance with applicable regulations. |

## Section 7 – *Handling & Storage*

| | |
|---|---|
| Precautions for **safe handling** | DANGER: DO NOT OPEN, DISASSEMBLE, CRUSH, PUNCTURE, OR BURN.<br>Do not handle near heat or flames. Avoid contact with internal components. Remove metallic components such as watches or jewelry when handling batteries. Protect containers from physical damage to avoid leaks or spills. Do not allow conductive materials to touch battery terminals as short-circuit may occur, causing fire.<br>There is risk of electric shock from charging equipment & strings of connected batteries, whether being charged or not. Shut off power to chargers whenever not in use and before detachment of any circuit connections. Ventilate charging space. Prohibit smoking and avoid creation of flames & sparks nearby. Wear face & eye protection when near charging batteries.<br>Follow recommended maximum charging currents & operating temperature range.<br>Do not overcharge beyond recommended upper charging voltage limit. |
| Conditions for **safe storage** | Store batteries under roof in cool, dry, well-ventilated areas away from incompatible materials & activities that may create flames, spark, or heat. Store on smooth, impervious surfaces provided with measures for liquid containment in the event of electrolyte spill. Keep away from metallic objects that could bridge battery terminals creating short-circuits. Protect terminals from short circuit.<br>Keep out of reach of children. Store according to local regulations. |

## Section 8 – *Exposure Controls / Personal Protection*

| | *Ingredient* | *CASRN* | *Type* | *Value* |
|---|---|---|---|---|
| Control parameters | Aluminum (Al) | 7429-90-5 | OSHA PEL-TWA | 15 mg/m$^3$ (dust)<br>5 mg/m$^3$ (resp.) |
| | | | NIOSH REL-TWA | 10 mg/m$^3$ (dust)<br>5 mg/m$^3$ (resp.) |
| | Copper (Cu) | 7440-50-8 | OSHA PEL-TWA | 1 mg/m$^3$ (dust)<br>0.1 mg/m$^3$ (fume) |
| | | | NIOSH REL-TWA | 1 mg/m$^3$ (dust)<br>0.1 mg/m$^3$ (fume) |
| | Lithium, Hexafluorophosphate | 21324-40-3 | OSHA TWA | 2.5 mg/m$^3$ |

| | | | | |
|---|---|---|---|---|
| | Carbon Black | 1333-86-4 | OSHA TWA | 3.5 mg/m$^3$ |
| Engineering controls | Not needed under normal conditions. Keep away from heat and flame. Store and handle in well-ventilated areas if leakage occurs. | | | |
| Individual protection measures | Wear protective clothing, including eye protection, when charging or handling batteries. If battery case is damaged, use gloves, clothing & boots. If necessary to handle damaged product (where exposure to electrolyte is a possibility), chemical splash goggles & face shield are recommended. | | | |

## Section 9 – *Physical & Chemical Properties*

| | |
|---|---|
| (a) Appearance | Solid, red color, plastic module, internal cells prismatic |
| (b) Odor | Odorless |
| (c) Odor threshold | N/A |
| (d) pH | N/A |
| (e) Melting point, Freezing point | N/A |
| (f) Initial boiling point & boiling range | N/A |
| (g) Flash point | N/A |
| (h) Evaporation rate | N/A |
| (i) Flammability (solid, gas) | N/A |
| (j) Upper/lower flammability/explosive limits | N/A |
| (k) Vapor pressure (mm Hg @ 20°C) | N/A |
| (l) Vapor density | N/A |
| (m) Relative density (i.e., specific gravity) | N/A |
| (n) Solubility | Insoluble |
| (o) Partition coefficient: | N/A |
| (p) Auto-ignition temperature | N/A |
| (q) Decomposition temperature | N/A |
| (r) Viscosity | N/A |

## Section 10 – *Stability and Reactivity*

| | |
|---|---|
| Reactivity/Stability | Stable and non-reactive under normal conditions at ambient temperature. |
| Conditions to avoid | Ignition sources. Mechanical, physical, or electrical abuse. Temperatures above 140F |
| Incompatible materials | Contact with combustibles or organic material may cause fire/explosion. May react violently with strong reducing agents, metals, sulfur trioxide gas, strong oxidizers, & water. |

| | |
|---|---|
| Hazardous decomposition products | Product decomposition may emit toxic fumes and gases including metallic oxides, hydrogen fluoride, and carbon oxides. See section 5. |

## Section 11– *ToxicologicalInformation*

Under normal conditions/use, exposure to toxic material is not expected. The following information is provided for exposure that may occur due to container breakage or under extreme conditions such as fire.

Acute Toxicity:

- Copper (CAS 7440-50-8)
    - Oral LD50 >2500mg/kg bw (rat)
    - Dermal LD50 >2000 mg/kg bw (rat)
    - Inhalation LC50 = 1.03 mg/L/4 h (rat)
- Aluminum (CAS #: 7429-90-5)
    - Oral LD50 >15900 mg/kg bw (rat)
    - Inhalation LC50 > 0.888 mg/L/4 h (rat)
- Carbon Black (CAS #: 1333-86-4)
    - Oral LD50 >8000 mg/kg bw (rat)
    - Dermal LD50 >3000 mg/kg bw (rat)

Skin corrosion/irritation - Non-irritating to the skin under normal conditions

Serious eye damage/irritation - No eye irritation under normal conditions

Respiratory or skin sensitization - No information available.

Germ cell mutagenicity No information available.

Carcinogenicity Risk of exposure occurs only if the battery enclosure is compromised.

Reproductive toxicity Risk of exposure occurs only if the battery enclosure is compromised.

STOT-single exposure No information available.

STOT-repeated exposure No information available.

Aspiration hazard No information available.

## Section 12- *Ecological Information*

| | |
|---|---|
| Ecotoxicity | Not classified as environmentally hazardous. However, the potential for large or frequent spills may have a harmful effect. |
| Persistence & Degradability | Product contains inorganic compounds which are not biodegradable. |

| | |
|---|---|
| Bioaccumulative Potential | No data available. |
| Mobility in Soil | Not mobile in soil |
| Other adverse effects | No data available |

## Section 13- *DisposalConsiderations*

| | |
|---|---|
| Reclamation / Recycle | Recycle and dispose of material waste to an approved waste disposal facility in accordance with local, state, and federal requirements. Do not release to sewer or waterways. Following local, State/Provincial, and Federal/National regulations applicable to end-of-life characteristics will be the responsibility of the end-user. |

## Section 14 – *TransportInformation*

**Transportation Details:** All batteries have passed UN38.3 testing. Due to the watt-hour capacity of the batteries, they are classified as dangerous goods. Although not assigned a packing group, packaging material for lithium batteries (modules) must meet packaging requirements outlined in 49 CFR 173.185(b)

**Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code:** N/A

**Air Transport**: Goods are packaged according to 965 section 1A of IARA DGR for transportation**: CARGO AIRCRAFT ONLY**. Must be transported at a state of charge (SOC) of 30% of design capacity or lower.

**Sea Transport:** Goods are packaged according to the special provision 188 of IMDG. IMO-IMDG Code [P903]

| | |
|---|---|
| UN number | UN3480 |
| Proper shipping name | Lithium ion batteries |
| Transport hazard class | Class 9, Miscellaneous |
| Packing group | N/A |
| Environmental hazards marine pollutant | No |
| Special precautions for user | N/A |
| Packing Sign |   |

## Section 15- ***Regulatory Information***

| | |
|---|---|
| US Federal | This product is an article pursuant to 29 CFR 1910.1200 and, as such, is not subject to the OSHA hazard communication standard requirement. |
| Canada | This is not a controlled product under WHMIS. This product meets the definition of a "manufactured article" and is not subject to the regulations of the Hazardous Products Act. All ingredients in the product are listed, as required, on the DSL/NDSL. This product does not contain any NPRI Substances. |
| Europe | Under normal use, this product is not classified as hazardous according to: Regulation (EC) No 1272/2008 Directive 67/548/EEC Directive 1999/45/EC |
| TSCA | All ingredients in the product are listed on the TSCA inventory. |
| SARA Title III | N/A |

## Section 16 - ***Other Information***

SDS originally prepared: 11 August 2023.

SDS last revised: 05 May 2024

**Disclaimer**

This Safety Data Sheet is based upon information available at the time of preparation. Information was obtained from sources that we believe are reliable but are beyond our purview; we make no warranty with respect to such information. It is the obligation of each user of this product to determine the suitability of this product and comply with the requirements of all applicable laws regarding handling, storage, use and disposal of this product; *U.S. Battery Manufacturing Company* assumes no responsibility (and disclaims liability) in any way connected with improper use.