

MATERIAL SAFETY DATA SHEET

FILE NO.: 101511

NAME OF PRODUCT: High Power Lithium Iron Phosphate Battery

MSDS Revision Date: FEB 5, 2019

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: High Power Lithium Iron Phosphate Battery
SYNONYMS: LFP, Lithium Ion, LiFePO4
PRODUCT CODES: ETX and ETZ series

MANUFACTURER: EarthX, Inc.
CONTACT ADDRESS: P.O. Box 767
Windsor, CO 80550

EMERGENCY PHONE: 970 301 6227
OTHER CALLS: 970 674-8884

PRODUCT USE: Starter battery

SECTION 2: COMPOSITION/INFORMATION ON INGREDIENTS



As a factory sealed battery, exposure to hazardous ingredients is not expected with normal use.

<u>INGREDIENT:</u>	<u>%</u>	<u>CAS NO.</u>
Lithium Iron Phosphate	30-35	15365-14-7
Aluminum	9-12	7429-90-5
Copper	8-10	7440-50-8
Nickel	1.1	7440-02-0
Zinc	2	7440-66-6
Graphite	13-15	7782-42-5
Rubber	2-5	69028-37-1
Acrylonitrile butadiene styrene (ABS)	7-10	9003-56-9
Polypropylene	1-2	9003-07-0
Polyethylene	1-1	9002-88-4
Polychloroprene	1-2	184963-09-5
Electrolyte:		
Lithium hexafluoroarsenate	1-2	21324-40-3
Ethylene carbonate	4-5	96-49-1
Diethyl carbonate	8-9	105-58-8
Propylene Carbonate	.8	108-32-7

Weight of lithium metal per cell: 0g. There is no lithium metal in a rechargeable lithium-ion battery.

SECTION 2 NOTES: This battery is an article pursuant to 29 CFR 1910.1200 and, as such, is not subject to the OSHA Hazard Communication Standard requirement. The information contained in this Material Safety Data Sheet contains valuable information critical to the safe handling and proper use of the product. This MSDS should be retained and available for employees and other users of this product.

SECTION 3: HAZARDS IDENTIFICATION

Protective Clothing	NFPA Rating (USA)	EC Classification	WHMIS (Canada)	Transportation
Not required with normal use		Not Classified as Hazardous		See Section 14

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EMERGENCY OVERVIEW:

Not classified as dangerous or hazardous with normal use. The battery cells should not be opened or burned. Exposure to the ingredients contained within or their combustion products could be harmful. European Communities (EC): This product is not classified as hazardous according to Regulation (EC) No. 1272/2008. This product contains dangerous ingredients however, there is no expected release during use of the product and there is a barrier preventing exposure of the user and the environment.

ROUTES OF ENTRY:

These chemicals are contained in a sealed enclosure inside sealed cells. Risk of exposure occurs only if the cells within the battery are mechanically, thermally or electrically abused to the point of compromising the enclosure. If this occurs, exposure to the electrolyte solution contained within can occur by Inhalation, Ingestion, Eye contact and Skin contact.

POTENTIAL HEALTH EFFECTS:

EYES: Contact between the cell and the eye will not cause any harm. Eye contact with contents of an open cell can cause severe irritation or burns to the eye.

SKIN: Contact between the cell and skin will not cause any harm. Skin contact with contents of an open cell can cause severe irritation or burns to the skin.

INGESTION: Swallowing of materials from a sealed cell is not an expected route of exposure. Swallowing the contents of an open cell can cause serious chemical burns of mouth, esophagus, and gastrointestinal tract.

INHALATION: Inhalation of materials from a sealed cell is not an expected route of exposure. Vapors or mists from a ruptured cell may cause respiratory irritation.

ACUTE HEALTH HAZARDS: In the event that the cell(s) has been ruptured, the electrolyte solution contained within the cell(s) would be corrosive and can cause burns to skin and eyes.

CHRONIC HEALTH HAZARDS: See Section 11

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: Not applicable

SECTION 4: FIRST AID MEASURES

EYES: Contact with the contents of an opened cell can cause burns. If eye contact with contents of an open cell occurs, immediately flush the contaminated eye(s) with lukewarm, gently flowing water for at least 30 minutes while holding the eyelids open. Neutral saline solution may be used as soon as it is available. If necessary, continue flushing during transport to emergency care facility. Take care not to rinse contaminated water into the unaffected eye or onto face. Quickly transport victim to an emergency care facility.

SKIN: Contact with the contents of an opened cell can cause burns. If skin contact with contents of an open cell occurs, as quickly as possible remove contaminated clothing, shoes and leather goods. Immediately flush with lukewarm, gently flowing water for at least 30 minutes. If irritation or pain persists, seek medical attention. Completely decontaminate clothing, shoes and leather goods before reuse or discard.

INGESTION: Contact with the contents of an opened cell can cause burns. If ingestion of contents of an open cell occurs, NEVER give anything by mouth if victim is rapidly losing consciousness, or is unconscious or convulsing. Have victim rinse mouth thoroughly with water. DO NOT INDUCE VOMITING. If vomiting occurs naturally, have victim lean forward to reduce risk of aspiration. Have victim rinse mouth with water again. Quickly transport victim to an emergency care facility.

INHALATION: If contents of an opened cell are inhaled, remove source of contamination or move victim to fresh air. Obtain medical advice.

SECTION 5: FIRE-FIGHTING MEASURES

FLAMMABLE : Battery cells contain flammable liquid electrolyte that may vent, ignite and produce sparks when subjected to high temperatures (> 270°C (518°F)), when damaged or abused (e.g., mechanical damage or electrical overcharge). Burning cells can ignite other batteries in close proximity.

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NFPA HAZARD CLASSIFICATION

HEALTH: 0

FLAMMABILITY: 1

REACTIVITY: 0

OTHER:

EXTINGUISHING MEDIA: Small Fires - Dry chemical, CO2, water spray or regular foam.
Large Fires - Water spray, fog or regular foam.

SPECIAL FIRE FIGHTING PROCEDURES: The interaction of water or water vapor and exposed lithium hexafluorophosphate (Li PF6) may result in the generation of hydrogen and hydrogen fluoride (HF) gas. Wear positive pressure self-contained breathing apparatus (SCBA).

Structural firefighters' protective clothing will only provide limited protection. Fight fire from a safe distance.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Not applicable

HAZARDOUS DECOMPOSITION PRODUCTS: Not applicable

SECTION 6: ACCIDENTAL RELEASE MEASURES

ACCIDENTAL RELEASE MEASURES: As an immediate precautionary measure, isolate spill or leak area for at least 25 meters (75 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. Ventilate closed areas before entering.

SECTION 6 NOTES: Absorb spilled material with an inert absorbent (dry sand or earth). Scoop contaminated absorbent into an acceptable waste container. Collect all contaminated absorbent and dispose of according to directions in Section 13. Scrub the area with detergent and water; collect all contaminated wash water for proper disposal.

SECTION 7: HANDLING AND STORAGE

HANDLING AND STORAGE: Do not open, disassemble, crush or burn cell. Do not expose cell to temperatures outside the range of -40°C to 80°C. Store cell in a dry location. To minimize any adverse effects on battery performance it is recommended that the cells be kept at room temperature (25°C +/- 5°C). Elevated temperatures can result in shortened cell life. Keep out of reach of children.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

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

VENTILATION: Not necessary under normal conditions.

RESPIRATORY PROTECTION: Not necessary under normal conditions.

EYE PROTECTION: Not necessary under normal conditions. Wear safety glasses if handling an open or leaking cell.

SKIN PROTECTION: Not necessary under normal conditions. Wear neoprene or natural rubber gloves if handling an open or leaking cell.

OTHER PROTECTIVE CLOTHING OR EQUIPMENT: Not necessary under normal conditions.

WORK HYGIENIC PRACTICES: Do not eat, drink or smoke in work areas. Maintain good housekeeping.

EXPOSURE GUIDELINES: Airborne exposures to hazardous substances are not expected when product is used for its intended purpose.

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SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Sealed plastic or carbon fiber case

ODOR: Odorless

PHYSICAL STATE: Solid

pH AS SUPPLIED: Not applicable

BOILING POINT: Not applicable

MELTING POINT: Not applicable

FREEZING POINT: Not applicable

VAPOR PRESSURE (mmHg): Not applicable

VAPOR DENSITY (AIR = 1): Not applicable

SPECIFIC GRAVITY (H₂O = 1): Not applicable

EVAPORATION RATE: Not applicable

BASIS (=1): Not applicable

SOLUBILITY IN WATER: Insoluble

PERCENT SOLIDS BY WEIGHT: 88-92%

PERCENT VOLATILE BY WT: 8-12%

SECTION 10: STABILITY AND REACTIVITY

STABILITY: Stable

CONDITIONS TO AVOID (STABILITY): Avoid exposing the battery to fire or temperatures above 80°C. Do not disassemble, crush, short or install with incorrect polarity. Avoid mechanical or electrical abuse.

INCOMPATIBILITY (MATERIAL TO AVOID): Do not immerse in seawater or other high conductivity liquids.

HAZARDOUS DECOMPOSITION OR BY-PRODUCTS: This material may release toxic fumes if burned or exposed to fire. Breaching of the cell enclosure may lead to generation of hazardous fumes which may include HF (hydrofluoric acid).

SECTION 11: TOXICOLOGICAL INFORMATION

TOXICOLOGICAL INFORMATION: Risk of irritation occurs only if the cells are mechanically, thermally or electrically abused to the point of compromising the cell enclosure and battery case. If this occurs, irritation to the skin, eyes and respiratory tract may occur. Normal safe handling of this product will not result in exposure to substances that are considered human carcinogens by IARC (International Agency for Research on Cancer), ACGIH (American Conference of Governmental Industrial Hygienists, OSHA or NTP (National Toxicology Program).

SECTION 12: ECOLOGICAL INFORMATION

ECOLOGICAL INFORMATION: Solid from the cells released into the natural environment will slowly degrade but may release harmful substances. The plastic case and cells should be disposed or recycled according to local regulations.

SECTION 13: DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Plastic and cell recycling is encouraged. Do NOT dump on the ground or into any body of water. Store material for disposal as indicated in Section 7 Handling and Storage.

USA: Dispose of in accordance with local, state and federal laws and regulations.

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Canada: Dispose of in accordance with local, provincial and federal laws and regulations.

EU: Waste must be disposed of in accordance with relevant EC Directives and national, regional and local environmental control regulations. For disposal within the EC, the appropriate code according to the European Waste Catalogue (EWC) should be used.

RCRA HAZARD CLASS: Not applicable

SECTION 14: TRANSPORT INFORMATION

EarthX battery systems are designed to comply with all applicable shipping regulations as prescribed by industry and legal standards which includes compliance with the UN Recommendations on the Transport of Dangerous Goods; IATA Dangerous Goods Regulations and applicable U.S. DOT regulations for the safe transport of lithium-ion batteries and the International Maritime Dangerous Goods Code. Each of the listed batteries systems (and their cells) in Section 1 have passed the UN Manual of Tests and Criteria Part III Subsection 38.3, which is required by all of the directives listed above.

EarthX lithium-ion batteries are classified and regulated as Class 9 dangerous goods (also known as "hazardous materials" in the United States) by the International Civil Aviation Organization (ICAO), International Air Transport Association (IATA), International Maritime Organization (IMO) and many government agencies such as the U.S. Department of Transportation (DOT). These organizations and agencies publish regulations that contain detailed packaging, marking, labeling, documentation, and training requirements that must be followed when offering (shipping) EarthX batteries for transportation. However, small cells and batteries are not subject to certain provisions of the regulations (e.g. Class 9 labeling and UN specification packaging) if they meet specific requirements. The regulations are based on the UN Recommendations on the Transport of Dangerous Goods Model Regulations and the UN Manual of Tests and Criteria. These regulations also apply to shipments of cells and batteries that are packed with or contained in equipment. Failure to comply with these regulations can result in substantial civil or criminal penalties.

If the Watt-hour rating of the battery is not more than 100 Wh, this lithium ion battery is not subject to other provisions of ADR, RID, ADN and IMDG-Code if shipped in compliance with Special Provision 188. Effective January 1, 2013 this lithium ion battery can be shipped by air in accordance with ICAO-TI or IATA-DGR, Section II or Section IB, Packing Instructions (PI) 965 (Lithium Ion Batteries), PI 966 (Lithium Ion Batteries, packed with equipment) and PI 967 (Lithium Ion Batteries, contained in equipment) as appropriate.

Air, Sea and Surface Classification - UN 3480, Lithium Ion batteries
UN 3481, Lithium Ion batteries, contained in equipment
UN 3481, Lithium Ion batteries, packed with equipment

UN3480 Lithium Ion Batteries: PI965
Section IA batteries more than 100Wh.
Section IB batteries less than 100Wh.
Section II batteries less than 100Wh.

UN3481 Lithium Ion Batteries contained in Equipment: PI967
Section I batteries more than 100Wh.
Section II batteries less than 100Wh.

UN3481 Lithium Ion Batteries packed with equipment: PI966
Section I batteries more than 100Wh.
Section II batteries less than 100Wh.

For more information concerning shipping, testing, marking and packaging can be obtained at <https://www.dgdeclaration.com/iata-lithium-battery-regulations-2017>.

UN DOT 38.3 TRANSPORTATION CERTIFICATE

Concerning the transport according to the dangerous goods regulations of the different transport modes as in force since January, 1st 2003 and changes effective from 2015.

WE HEREWITH CERTIFY THAT EACH BATTERY OF THIS TYPE IS PROVED TO MEET THE REQUIREMENTS OF EACH APPLICABLE TEST IN THE UN MANUAL OF TESTS AND CRITERIA, PART III, SUB-SECTION 38.3, REV. 5, AMEND. 2

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PERFORMED TESTS	RESULTS
38.3.4.1 Test 1: Altitude Simulation	passed
38.3.4.2 Test 2: Thermal Test	passed
38.3.4.3 Test 3: Vibration	passed
38.3.4.4 Test 4: Shock	passed
38.3.4.5 Test 5: External Short Circuit	passed
38.3.4.6 Test 6: Impact/Crush	passed
38.3.4.7 Test 7: Overcharge	passed
38.3.4.8 Test 8: Forced Discharge	passed

SECTION 15: REGULATORY INFORMATION

U.S. FEDERAL REGULATIONS

TSCA (TOXIC SUBSTANCE CONTROL ACT): All ingredients in the product are listed on the TSCA inventory.

CERCLA (COMPREHENSIVE RESPONSE COMPENSATION, AND LIABILITY ACT): None

SARA TITLE III (SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT): None

311/312 HAZARD CATEGORIES: None

313 REPORTABLE INGREDIENTS: None

STATE REGULATIONS: CA Prop 65; This product does not contain chemicals known to the State of California to cause cancer or reproductive toxicity.

INTERNATIONAL REGULATIONS:

Canada; This product has been classified in accordance with the hazard criteria of the *Controlled Products Regulations* and the SDS contains all the information required by the *Controlled Products Regulations*.

EU; This product is not classified as hazardous according to Regulation (EC) No. 1272/2008.

SECTION 16: OTHER INFORMATION

This information has been compiled from sources considered to be dependable and is, to the best of our knowledge and belief, accurate and reliable. However, no representation, warranty (either or implied) or guarantee is made to the accuracy, reliability or completeness of the information contained herein. This information relates to the specific materials designated and may not be valid for such material used in combination with any other materials or in any process. It is the user's responsibility to satisfy himself as to the suitability and completeness of this information for his particular use. EarthX, Inc. does not accept liability for any loss or damage that may occur, whether direct, indirect, incidental or consequential, from the use of this information.

DISCLAIMER: The information and recommendations set forth are believed to be accurate at the date of preparation.