Safety Data Sheet

Document #: 990924 version 3.0

1. IDENTIFICATION

Product Name: Flux Power LiFT Pack

Synonyms: Sealed Lithium Ion Battery, Lithium Iron Phosphate Battery, Rechargeable Lithium Battery

Product Use: Vehicle Electrical System
Manufacturer/Supplier: Flux Power Inc.
Address:
2685 South Melrose Drive, Suite A
Vista, CA 92081 USA

General Information Number: 1-877-505-3589
Contact Person: Flux Power Inc.

Emergency number: CHEMTREC: 800-424-9300
(24hr Emergency Hazmat Response)

CAUTION

Lithium Ion Cells/Batteries are electrochemical storage devices. Subjecting them to mishandling or abuse conditions can result in fires, severe personal injury and death.

Do not charge, short circuit, puncture, incinerate, crush, immerse, force discharge or expose to temperatures above the declared operating temperature range of the product – possible risk of fire or rapid component disassembly. The rechargeable lithium-ion batteries described in this Safety Data Sheet are sealed units which are not hazardous when used according to the recommendations of the manufacturer.

Under normal conditions of use, the electrode materials and liquid electrolyte they contain are not exposed to the outside, provided the battery integrity is maintained and seals remain intact. Risk of exposure is only in case of abuse (mechanical, thermal, electrical) which leads to the activation of safety valves and/or the rupture of the battery container. Electrolyte leakage, contamination of electrode materials, mixture with moisture/water or battery vent/fire/rapid component disassembly may follow, depending upon the circumstances.

2. HAZARD(S) IDENTIFICATION

Acute Effects

EXPOSURE IS NOT EXPECTED FOR PRODUCT UNDER NORMAL CONDITIONS OF USE.

In the event of overcharging or damage to the unit, exposure to organic electrolyte solution/mist/vapor is possible. Exposure and/or contact with organic electrolyte solution/mist may lead to acute irritation of the skin, corneal damage of the eyes and irritation of the mucous membranes of the eyes and upper respiratory system, including lungs**.**

Chronic Effects

EXPOSURE IS NOT EXPECTED FOR PRODUCT UNDER NORMAL CONDITIONS OF USE.

In the event of overcharging or damage to the unit, exposure to organic electrolyte solution/mist/vapor is possible. Exposure and/or contact with organic electrolyte solution/mist/vapor may lead to acute irritation of the skin, corneal damage of the eyes and irritation of the mucous membranes of the eyes and upper respiratory system, including lungs.

Label Elements:
Organic Electrolyte
Lithium Hexafluorophosphate

Health and Physical	
	
Hazard Statements **Signal Word: DANGER** **H318** - Causes serious eye damage **H302** - Harmful if swallowed **H315** - Causes skin irritation **H372** - Causes damage to organs through prolonged or repeated exposure	***Precautionary Statements*** **P102** - Keep out of reach of children **P210** - Keep away from heat, hot surfaces, sparks, open flames, and other ignition sources. No smoking. **P280** - Wear protective gloves/protective clothing/eye protection/face protection **P361** - Take off immediately all contaminated clothing. **P332** + **P313** - If skin or eye irritation occurs: Get medical advice/attention **P223** - Do not allow contact with water

3. COMPOSITION / INFORMATION ON INGREDIENTS

INGREDIENTS (Chemical/Common Names):	**CAS No.:**	**% by Wt:**
Lithium Iron Phosphate ($LiFePO_4$)	15365-14-7	31
Polypropylene (plastic)	9003-07-0	19
Carbon Solids (amorphous carbon, graphite)	7782-42-5 1333-86-4	18
Copper Metal (copper)	7440-50-8	12
Aluminum Metal (Aluminum)	7429-90-5	8
Carbonate (Organic Solvents)	Mixture	8
Lithium Hexafluorophosphate (Lithium salt)	21324-40-3	<5%

4. FIRST AID MEASURES

Inhalation

EXPOSURE IS NOT EXPECTED FOR PRODUCT UNDER NORMAL CONDITIONS OF USE.
However, if organic electrolyte is released due to overcharging or abuse of the battery, remove exposed person to fresh air, as gas may be corrosive to respiratory tract. If breathing is difficult, oxygen may be administered. In severe cases obtain medical attention immediately.

Skin contact

EXPOSURE IS NOT EXPECTED FOR PRODUCT UNDER NORMAL CONDITIONS OF USE.
However, if organic electrolyte contacts skin, wash off skin for 30 minutes thoroughly with water. Remove contaminated clothing and wash before reuse. If irritation develops or in severe cases obtain medical attention immediately. Seek medical attention as soon as possible for all burns regardless of how minor they may appear initially.

Eye contact

EXPOSURE IS NOT EXPECTED FOR PRODUCT UNDER NORMAL CONDITIONS OF USE.
However, if organic electrolyte enters eyes, thoroughly flush eyes with water for a minimum of 15 minutes. Gas is corrosive and may damage cornea. Obtain medical attention immediately.

Ingestion

EXPOSURE IS NOT EXPECTED FOR PRODUCT UNDER NORMAL CONDITIONS OF USE.
However, if internal components are ingested, rinse out mouth thoroughly with water and give plenty of water to drink. Do not induce vomiting. Obtain medical attention immediately.

5. FIRE FIGHTING MEASURES

Flash Point	Not applicable unless individual components exposed.
Auto ignition Temperature	This battery will not self-ignite. Any fire will be caused from an external source.
Flammable Limits in Air, % by volume	Not applicable unless individual components exposed.
Fire Extinguishing Media	Fire extinguishers that use dry chemical, foam, CO_2 or water are appropriate. If using water, apply generous amounts of water spray, or water-based foam to cool down burning Li-ion cells and batteries and prevent fire propagation.
Special Fire Fighting Procedures	Use positive pressure, self-contained breathing apparatus. Wear protective clothing to prevent potential body contact with the electrolyte solution or its by-products. Water will react with the electrolyte to form Hydrogen Fluoride gas, which also reacts with water to form hydrofluoric acid. When using water, generous amounts are recommended to prevent fire propagation.
Unusual Fire and Explosion Hazard	The sealed battery is not considered flammable or explosive, but it will vent, burn, and potentially rupture if involved in a fire. The organic electrolyte reacts with moisture/water or excessive heat to produce hydrogen fluoride (HF) a flammable corrosive gas, so using a lot of water is recommended if extinguishing a fire. Decomposition products may include metal oxides/oxides.
Fire Hazard	Not considered flammable but may burn at high temperatures. Vapors from a damaged battery may be flammable.
Stability	The sealed battery is considered stable.
Conditions to avoid (materials to avoid)	Sparks and other sources of ignition, high temperature, over charging.
Hazardous Decomposition Products	Carbon monoxide, carbon dioxide, phosphorous oxides, hydrogen fluoride
Hazardous Polymerization	Will not occur.

6: ACCIDENTAL RELEASE MEASURES

Protective Measures to be Taken if Material is Released or Spilled	If battery is not physically damaged but vents gas, remove personnel from area until fumes dissipate. Once fumes have cleared, load the battery into an approved container for disposal or shipment to manufacturer for repair. If battery is damaged and electrolyte is leaking, remove personnel until fumes dissipate, then clean up using PPE. Cover the battery or spilled substances with an absorbing material, place in approved sealed container and dispose of in accordance with applicable local, state and federal regulations.
Waste Disposal Method	Dispose of in accordance with applicable local, state and federal regulations.

7. HANDLING AND STORAGE

Handling	This product is a sealed battery, normal handling hazards are minimal unless the battery is severely damaged. If the battery is damaged: Wash hands and other exposed areas with soap and water. Do not get in eyes, on skin, or on clothing. Do not breathe dust, vapors, spray from inner battery components. Keep away from heat, sparks, open flames, and hot surfaces. No smoking. Use appropriate personal protective equipment (PPE).

Storage Store in a cool (preferably below 30°C/85°F) and ventilated area, away from moisture, sources of heat, open flames, food and drink, strong acids, strong bases, strong oxidizers. Avoid contact of internal battery components with acids, aldehydes, carbamate compounds, and peroxides. Keep adequate clearance between walls and batteries. Temperature above 70°C/106°F may result in battery leakage and rupture. Keep batteries in original packaging until use and do not expose them to unnecessary or excessive handling.

Recommended storage range: 15°C/60°F – 30°C/85F. Cells may experience storage temperatures from 45°C/113°F to 60°C/140°F for a total not exceeding 7 Days. Never store cells above 60°C/140°F.

Other Follow Manufacturers Recommendations regarding maximum recommended currents and operating temperature range. Do not overcharge beyond the recommended upper charging voltage limit. Applying pressure or deforming the battery may lead to disassembly followed by eye, skin and throat irritation.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE IS NOT EXPECTED FOR PRODUCT UNDER NORMAL CONDITIONS OF USE.

OELs **Graphite (7782-42-5)**		
USA ACGIH	ACGIH TWA (mg/m³)	2 mg/m³ (all forms except graphite fibers-respirable particulate matter)
USA NIOSH	NIOSH REL (TWA) (mg/m³)	2.5 mg/m³ (natural-respirable dust)
USA IDLH	US IDLH (mg/m³)	1250 mg/m³ (Graphite (natural))
USA OSHA	OSHA PEL (TWA) (mg/m³)	15 mg/m³ (synthetic-total dust) 5 mg/m³ (synthetic-respirable fraction)
Copper (7440-50-8)		
USA ACGIH	ACGIH TWA (mg/m³)	0.2 mg/m³ (fume)
USA NIOSH	NIOSH REL (TWA) (mg/m³)	1 mg/m³ (dust and mist) 0.1 mg/m³ (fume)
USA IDLH	US IDLH (mg/m³)	100 mg/m³ (dust, fume and mist)
USA OSHA	OSHA PEL (TWA) (mg/m³)	0.1 mg/m³ (fume) 1 mg/m³ (dust and mist)
Aluminum (7429-90-5)		
USA ACGIH	ACGIH TWA (mg/m³)	1 mg/m³ (respirable particulate matter)
USA ACGIH	ACGIH chemical category	Not Classifiable as a Human Carcinogen
USA NIOSH	NIOSH REL (TWA) (mg/m³)	10 mg/m³ (total dust) 5 mg/m³ (respirable dust)
USA OSHA	OSHA PEL (TWA) (mg/m³)	15 mg/m³ (total dust) 5 mg/m³ (respirable fraction)

Respiratory Protection (NIOSH/MSHA approved):

NONE REQUIRED FOR NORMAL HANDLING OF THE FINISHED PRODUCT.

If necessary, to handle damaged product where exposure to the organic electrolyte or vented gas is a possibility, respiratory protection is required.

Skin Protection:

NONE REQUIRED FOR NORMAL HANDLING OF THE FINISHED PRODUCT.

If necessary, to handle damaged product where exposure to the organic electrolyte is a possibility, PVC gauntlet-type gloves with rough finish are recommended along with a chemically resistant apron.

Eye Protection:

NONE REQUIRED FOR NORMAL HANDLING OF THE FINISHED PRODUCT.

If necessary, to handle damage product where exposure to the organic electrolyte is a possibility, chemical splash goggles and a face shield are recommended.

Other Protection: Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Ensure adequate ventilation, especially in confined areas. Ensure all national/local regulations are observed. Safety footwear meeting the ANSI Z 41.1 requirements is recommended when it is necessary to handle the finished product. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking and/or smoking. Routinely was work clothing and protective equipment to remove contaminants.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance and Odor	Solid metal rectangular prism, rectangular pouch or solid container, containing mixed metal oxides, carbon
Odor Threshold	Solids and organic electrolyte. Metallic odor.
pH	Not applicable.
Boiling Point	Not applicable
Melting Point	Not applicable unless individual components exposed. Cell Plastic container – 320^{o}F/160^{o}C Steel pack container – 2760^{o}F/1515^{o}C
Specific Gravity (H2O = 1)	Not applicable unless individual components exposed.
Flash Point	Not applicable
Evaporation Rate	Not applicable
(Butyl Acetate = 1)	Not applicable unless individual components exposed.
Vapor Pressure (mm Hg @ 20 deg C)	Not applicable unless individual components exposed.
Flammability	Not applicable
Upper/lower flammability	Not applicable.
or explosive limits	Not applicable.
Vapor Pressure	Not applicable unless individual components exposed.
Vapor Density	Not applicable.
(Air = 1)	Not applicable unless individual components exposed.
Relative Density	Not applicable unless individual components exposed.
Solubility	Not applicable
% **Volatile by Weight Partition coefficient (n-octanol/water)**	Not applicable
Auto-ignition temperature Decomposition temperature	Not applicable
Viscosity	Not applicable

10. STABILITY AND REACTIVITY

Reactivity	The battery is sealed and stable, however if the electrolyte is exposed it will react with water to form hydrogen fluoride, a corrosive and flammable gas.
Chemical Stability	The sealed battery is considered stable under recommended storage and handling procedures (see section 7).
Conditions to avoid	Sparks and other sources of ignition, high temperatures above 60°C/140°F, over charging.
Incompatibility (materials to avoid)	Organic electrolyte – reacts with water to produce hydrogen fluoride.
Hazardous Decomposition Products	Carbon monoxide, carbon dioxide, phosphorous oxides
Hazardous Polymerization	Will not occur.

11. TOXICOLOGICAL INFORMATION

EXPOSURE IS NOT EXPECTED FOR PRODUCT UNDER NORMAL CONDITIONS OF USE.

Organic electrolyte – reacts with moisture/water to produce hydrofluoric acid in trace quantities. Hydrofluoric acid is extremely corrosive and toxic. In severe exposures it acts as a systemic poison and causes severe burns. The reaction may be delayed. Any contact with this material, even minor, requires immediate medical attention.

ROUTES AND METHODS OF ENTRY

Inhalation	In the event of overcharging or damage to the unit, exposure to organic electrolyte solution/mist is possible. Extreme exposures to the organic electrolyte can be severely corrosive to the respiratory tract and may cause sore throat, coughing, labored breathing and lung congestion/inflammation. Overcharging or seepage of electrolyte from broken batteries may present inhalation exposure in a confined area.
Skin Contact	In the event of overcharging or damage to the unit, exposure to organic electrolyte solution/mist is possible. Extreme exposures to the organic electrolyte can be corrosive to the skin. Skin contact can cause serious skin burns which may not be immediately apparent or painful. Symptoms may be delayed 8 hours or longer. The fluoride ion readily penetrates the skin causing destruction of deep tissue layers and even bone
Skin Absorption	In the event of overcharging or damage to the unit, exposure to organic electrolyte solution/mist is possible. Extreme exposures to the organic electrolyte can be absorbed through the skin.
Eye Contact	In the event of overcharging or damage to the unit, exposure to organic electrolyte solution/mist is possible. Extreme exposures to the organic electrolyte can be corrosive to the eyes and can cause severe irritation, burns, and cornea damage. Symptoms of redness, pain, blurred vision, and permanent eye damage may occur.
Ingestion	In the event of overcharging or damage to the unit, exposure to organic electrolyte solution/mist is possible. Extreme exposures to the organic electrolyte can be corrosive and may cause sore throat, abdominal pain, diarrhea, vomiting, severe burns of the digestive tract, and kidney dysfunction. Hands contaminated by contact with internal components of a battery can also cause ingestion of mixed metal oxides and carbon solids. Hands should be washed thoroughly prior to eating, drinking, or smoking.

SIGNS AND SYMPTONS OF OVEREXPOSURE

Acute Effects	In the event of overcharging or damage to the unit, exposure to organic electrolyte solution/mist is possible. Exposure and/or contact with organic electrolyte solution/mist may lead to acute irritation of the skin, corneal damage of the eyes and irritation of the mucous membranes of the eyes and upper respiratory system, including lungs.
Chronic Effects	In the event of overcharging or damage to the unit, exposure to organic electrolyte solution/mist is possible. Contact with the organic electrolyte may lead to skin burns/ulceration, scarring of the cornea, and chronic respiratory conditions. Extreme exposures – intake of more than 6 mg of fluorine per day may result in fluorosis, bone and joint damage. Hypocalcemia and hypomagnesemia can occur from absorption of fluoride ion into blood stream.

POTENTIAL TO CAUSE CANCER

California Proposition 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require warning under the statute – Carbon Black and lead (from wire insulation as it ages). Wash hands after handling.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE

Contact with or exposure to the organic electrolyte may aggravate skin diseases such as eczema and contact dermatitis, respiratory disorders such as lung injuries and asthma, and kidney function.

Toxicological Data

Constituents	**Species**	**Test Results**
Copper (CAS 7440-50-8)		
Acute		
Dermal		
LD50	Rat	> 2000 mg/kg, 24 hours
Inhalation		
LC50	Rat	> 2.77 mg/l, 4 hours
Oral		
LD50	Rat	481 mg/kg
Aluminum (CAS 7429-90-5)		
Acute		
Inhalation		
LC50	Rat	> 0.888 mg/l, 4 hours
Carbon Solids (CAS 7782-42-5)		
Acute		
Inhalation		
LC50	Rat	> 2000 mg/m3, 4 hours
Oral		
LD50	Rat	> 1000 mg/kg
Lithium hexafluorophosphate (CAS 21324-40-3)		
Acute		
Dermal		
LD50	Rabbit	275 mg/kg
Oral		
LD50	Rat	1702 mg/kg
Mixture		
Oral		1041.67 mg/kg

12. ECOLOGICAL INFORMATION

Mammalian effects	None known if used/disposed of correctly.
Eco-toxicity	None known if used/disposed of correctly.
Bioaccumulation potential	None known if used/disposed of correctly.
Environmental fate	None known if used/disposed of correctly.
Mobility in Soil	None known if used/disposed of correctly.

13. DISPOSAL CONSIDERATIONS (UNITED STATES)

Waste disposal method	Recycle and dispose of in accordance with applicable local, state and federal regulations. Landfill of spent Li-Ion Batteries is not recommended
Hazardous waste code	The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

Contaminated packaging Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. TRANSPORT INFORMATION

Li-ion cells and batteries must conform to 49 CFR173.185 when shipping in the United States. Only trained personnel certified in packing, shipping, and documenting Dangerous Goods may prepare batteries for transport.

Regulatory Bodies:	DOT, IMDG, IATA, RID
UN number	UN 3480
Shipping name	Lithium Ion Batteries
Hazard classification	Hazard class 9 (miscellaneous)
Packing group	This UN-number is not assigned a packing group.
CAS	Not applicable
EmS No.	FA-SI
Marine pollutant	No
DOT ERG	147
Additional Information	Damaged and/or vented batteries may only be shipped when placed in a special container using special packaging. If a battery is damaged refer to local regulations and requirements and follow all appropriate procedures. Contact the manufacturer if you require assistance.

15. REGULATORY INFORMATION

All components are on the U.S. EPA TSCA Inventory list.

TSCA Status: All ingredients contained in this product. Carbon black has been identified by the International Agency for Research on Cancer (IARC) as a possible carcinogenic to humans (Group 2B).

California Proposition 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require warning under the statute - Carbon Black, lead (in wire insulation).

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not Regulated

OSHA Specifically Regulated Substances (29 CFR 1910.0002-1050)

Not Regulated

CERCLA Hazardous Substance List (40 CFR 302.4)

Cooper (CAS 7440-50-8)	LISTED
Methyl Butyrate (CAS 623-42-7)	LISTED

Superfund Amendments and Reauthorization Act of 1986

Hazardous categories	Immediate Hazard – No Delayed Hazard – No Fire Hazard – No Pressure Hazard – No Reactivity Hazard – No
SARA 302 Extremely hazardous substance	Not listed
SARA 311/312 Hazardous Chemical	Health hazard - Specific target organ toxicity (single or repeated exposure), Health hazard - Skin corrosion or Irritation, Health hazard - Acute toxicity (any route of exposure), Health hazard - Serious eye damage or eye irritation

SARA 313 (TRI Reporting)

Chemical Name	**CAS Number**	**% by weight**
Aluminum	7429-90-5	10-25

Copper	7440-50-8	1-15

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated

Safe Drinking Water Act (SDWA)

Not regulated

US State Regulations

US. Massachusetts RTK – Substance List

Aluminum (CAS 7429-90-5)
Carbon Solids (CAS 7782-42-5)
Copper (CAS 7440-50-8)
Methyl Butyrate (CAS 623-42-7)

US New Jersey Worker and Community Right-to-know Act

Aluminum (CAS 7429-90-5)
Carbon Solids (CAS 7782-42-5)
Copper (CAS 7440-50-8)
Methyl Butyrate (CAS 623-42-7)

US Pennsylvania Worker and Community Right-to-know Law

Aluminum (CAS 7429-90-5)
Carbon Solids (CAS 7782-42-5)
Copper (CAS 7440-50-8)
Methyl Butyrate (CAS 623-42-7)

US Rhode Island RTK

Aluminum (CAS 7429-90-5)
Copper (CAS 7440-50-8)

International Inventories

Country(s) or Region	Inventory Name	On inventory (yes/no)*
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

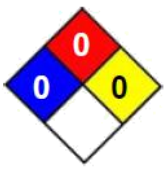
* A “Yes” indicates this product complies with the inventory requirements administered by the governing country(s).

A “No” indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. OTHER INFORMATION

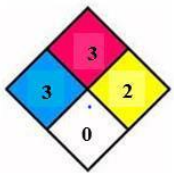
Issue Date: 01/20/2020
Revision Date: 07/23/2020
Version #: 02
Further information: NFPA Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3=Serious 4 = Severe

NFPA ratings



HMIS rating: Organic Electrolyte

EC Classification



Transportation

List of abbreviations

Disclaimer

None

LD50: Lethal Dose. 50%
TWA: Time weighted average

This information is provided without warranty. The information is believed to be correct. This information should be used to make independent determination of the methods to safeguard workers and the environment.

2685 South Melrose Drive
Vista, CA 92081
www.fluxpower.com