Material Safety Data Sheet

(IP_LiFe_MSDS1401-A2-Transportation, Date of Issue: 2-Jan-2014)

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1. Product and Company Identification

[Product]

1.1 Product Name: IPBT Lithium-Iron Phosphate Battery (Shorai LFX Powersports Batteries)

1.2 System: Rechargeable Lithium-ion Polymer Battery

[Company]

1.3 Company Name: Shorai Inc.

1.4 Company Address: 845 Stewart Drive, Suite D, Sunnyvale, CA 94085 USA

1.5 Emergency Telephone Number: +1 408 720 8821

2. Composition Information on Components

Ingredient	CAS Number	Percent of Content	Classification & Hazard labeling
Lithium Iron Phosphate	15365-14-7	30-33%	Eye, Skin, Respiratory irritant
Carbon, as Graphite	7440-44-0	15-17%	Eye, Skin, Respiratory irritant
Aluminum metal	7429-90-5	5-7%	Inert
Copper metal	7440-50-8	7-9%	Inert
Electrolyte		15-20%	Mixture (flammable; reactive;
Ethylene carbonate	96-49-1		sensitizer; eye, skin,
Dimethyl carbonate	616-38-6		respiratory irritant.)
Ethyl methyl carbonate	623-53-0		
Li-Hexafluorophosphate	21324-40-3		

The materials contained in the battery may only become a hazard if the battery or the cell is disintegrated or if the battery is physically or electrically abused.
As manufactured, there is no metallic lithium in the lithium-ion battery.

3. Physical and Chemical Properties

3.1 Physical :

The rechargeable Li-Ion polymer batteries described in this Material 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 solid electrode materials and Gel electrolyte they contain are non-reactive provided the battery integrity is maintained and seals remain intact.

3.2 Chemical :

Classification of dangerous substances contained into the product as per directive 67/548/EEC

1 – Nature of special risks :

R 14 Reacts with water.

R 21 Harmful in contact with skin.

R 22 Harmful if swallowed.

R 41 Risk of serious damage to the eye.

R 42/43 May cause sensitization by inhalation and skin contact.

R 43 May cause sensitization by skin contact.

2 – Safety advices :

S 2 Keep out of reach from children.

S 8 Keep away from moisture.

S 22 Do not breathe dust.

S 24 Avoid contact with skin.

S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical attention.

S 36 Wear suitable protective clothing.

S 37 Wear suitable gloves.

S 45 In case of accident, seek medical attention.

R 42/43 May cause sensitization by inhalation and skin contact.

R 43 May cause sensitization by skin contact.

4. Emergency and First Aid Information

In case of contacting the materials from a damaged or ruptured cell or battery:

Eye contact: Washing immediately with plenty of water and soap or for at least 15 minutes. Get medical attention.

Skin Contact: Washing immediately with water and soap.

Inhalation of Vented Gas: Remove to fresh air. Get medical attention.

Ingestion: Get medical attention immediately.

5. Fire and Explosion Data

Extinguishing Media: Dry chemicals, water.

Fire-Fighting Procedures:

Use self-contained breathing apparatus and protective clothing.

Unusual Fire and Explosion Hazards:

Toxic gases (HF, PF_6) will be formed if cells or battery are involved in a fire. Cells or battery may flame or leak potentially hazardous organic vapors if exposed to excessive heat, fire or over-voltage conditions. Damaged or opened cells or batteries may result in rapid heat and the release of flammable vapors.

6. Accidental release measures

The material contained within the batteries would only be expelled under abusive conditions. Using shovel or broom, cover battery or spilled substances with dry sand or vermiculite, place in approved container (after cooling if necessary) and dispose in accordance with local regulations.

7. Storage and Handling / Use

7.1 Do not store batteries in a manner that allow s terminals to short circuit.

7.2 Do not place batteries near heating sources, nor exposed to direct sunlight for long periods.

Elevated temperatures can result in reduced battery service life.

7.3 Charging Battery

Use only approved chargers and procedures. Improperly charging a cell or battery may cause the cell or battery to flame or damage.

7.4 Battery Disassembly

Never disassemble a battery.

Should a battery unintentionally be crushed, thus releasing its contents, rubber gloves must be used to handle all battery components. Avoid inhalation of any vapors that may be emitted.

7.5 Battery Short Circuit

Do not short-circuit a battery. A short circuit can result in over-heating of the terminals and provide an ignition source.

More than a momentary short circuit will generally reduce the cell or battery service life and can lead to ignition of surrounding materials or materials within the cell or battery if the seal integrity is damaged.

Extended short-circuiting creates high temperature in the cell and at the terminals. Physical contact to high temperatures can cause skin burns. In addition, extended short-circuit may cause the cell or battery to flame.

Avoid reversing cell polarity within a battery assembly. Reversing cell polarity may cause the cell or battery to flame or to emit gases.

7.6 Mixed Batteries and Types

Avoid to use old and new cells or cells of different sizes; different chemistry or types in the same battery assembly.

8. Exposure Controls/Personal Protection

Respiratory protection : N*ot necessary under normal use.* In case of battery rupture, use self-contained full-face respiratory equipment.

Hand protection : *Not necessary under normal use.* Use Viton rubber gloves if handling a leaking or ruptured battery.

Eye protection : *Not necessary under normal use.* Wear safety goggles or glasses with side shields if handling a leaking or ruptured battery**.**

Skin protection : *Not necessary under normal use*. Use rubber apron and protective working in case of handling of a ruptured battery.

9. Physical and Chemical Properties

9.1 Appearance : (Physical shape and color as supplied) Metal squares, hermetically sealed and fitted with an external plastic box.

9.2 Temperature range :

Discharge: -20- + 60°C

Charging: -0- +45°C

Storage: -20- + 45°C(for less than 1 month) ;-20- + 35°C(for less than 6 month)

9.3 Specific energy : ≈ 135 Wh/kg (Note : Wh = Nominal voltage x Rated Ah as defined in IEC standard N° 285. kg = Average battery weight)

9.4 Specific pulse power : ≈ 300 Wh/kg

9.5 Mechanical resistance : As defined in relevant IEC standard

9.6 Other :

10. Stability and Reactivity

Conditions to avoid : Heat above 70°C or incinerate. Deform, mutilate, crush, pierce, disassemble. Short circuit. Prolonged exposure to humid conditions.

Materials to avoid : N/A.

Hazardous decomposition products : Corrosive/Irritant Hydrogen fluoride (HF) is produced in case of reaction of *lithium hexafluorophosphate(LiPF6)* with water. Combustible vapors and formation of Hydrogen fluoride (HF) and phosphorous oxides during fire.

11. Toxicological Information

IPBT rechargeable Li-Ion polymer batteries do not contain toxic materials.

12. Ecological Information

When properly used or disposed IPBT rechargeable Li-Ion polymer batteries do not present environmental hazard.

13. Disposal Procedures

IPBT Li-ion Polymer cells and batteries contain no toxic metals, only naturally occurring trace elements. It is advisable to consult with local authorities as disposal regulations may vary dependent on location.

14. Transportation

This document refers to the Lithium-ion Polymer Cells of not more than 20 Watt-hour and Batteries of not more than 100 Watt-hour. Cells or batteries are of the type proven to meet the requirements of each test in the UN Manual of Test and Criteria, Part III, Subsection 38.3.

The Lithium-ion Polymer cells and batteries are manufactured under Quality Management Program ISO 9001:2008 [assessed by Sira Certification Service (UK); Certificate No. 115010.].

The Lithium-ion cells and batteries are packaged as below :

1. the cells or batteries are with individual package to avoid short-circuit;
2. the export packing is marked with a Lithium-ion battery handling Label, and must be quarantined, inspected and repacked if damaged.

They are packaged in compliance with the **Section II** requirement of shipping as **"Not Restricted"** Dangerous Goods, per INTERNATIONAL CIVIL AVATION ORGANISATION (ICAO) and the INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA) **DGR 55th** edition [2014] :

A. **Section II** of Packing Instruction (PI) 965 (under UN3480 Lithium-ion Batteries) - each export carton contains not more than 8 cells; or
B. **Section II** of Packing Instruction (PI) 965 (under UN3480 Lithium-ion Batteries) - each export carton contains not more than 2 batteries; or
C. **Section II** of Packing Instruction (PI) 966 (under UN3481 Lithium-ion Batteries, packed with equipment) - each export carton is of gross weight not more than 5 Kgs; or
D. **Section II** of Packing Instruction (PI) 967 (under UN3481 Lithium-ion Batteries, contained in equipment) - each export carton is of gross weight not more than 5 Kgs.

They do not contain any prototype, heavy, recalled and/or defective batteries.

15. Regulation information

The products referenced herein are "articles" under 29 CFR 1910.1200(c) and are not subject to OSHA's requirements for material safety data sheets under its Hazard Communication Standard, 29 CFR 1910.1200.

16. Other Information

The information contained herein is based on the data available to us and believed to be correct. However, Intellect Battery Co., Ltd. makes no warranty, expressed or implied. Users should consider the data only as a supplement to other information gathered by them and must make independent determinations of the suitability and completeness of information from all sources to assure proper use and disposal of these materials and the safety and health of employees and customers.