

Material Safety Data Sheet for LiFePO₄ Battery Pack

Section 1 Chemical Product and Company Identification

Product information:

Trade name: LiFePO₄ Battery Pack

Model: BAT6001

Manufacture information:

Manufacturer: BAK INTERNATIONAL (TIANJIN) LIMITED

Address: No.6 Huaxin Street, Technical Industrial Park, Beichen District, Tianjin

Telephone: +86-022-58833145

Section 2 Hazards Identification

The lithium ion batteries are not hazardous when used according to the instructions of manufacturer under normal conditions. In case of abuse, there's risk of rupture, fire, heat, leakage of internal components, which could cause casualty loss. Abuses include but not limited to the following cases: charged for a long time, short circuited, put into fire, whacked with hard object, punctured with acute object, crushed, and broken.

Section 3 Composition/Information on Ingredients

Chemical name	Molecular formula	CAS No.	Weight Percentage/% (about)
LiFePO ₄	LiFePO ₄	15365-14-7	30
Carbon (graphite, acetylene black)	C	7440-44-0	15
Aluminum	Al	7429-90-5	9
Copper	Cu	7440-50-8	7.5
Lithium hexafluorophosphate	LiPF ₆	21324-40-3	2
Organic carbonate	—	108-32-7	11
Plastic	—	100801-67-0	14
Nickel, PVDF, others	—	7440-02-0	11
Protection board	—	—	3
Heat shrinkage film	Poly Vinyl Chloride	75-01-4	0.5

Section 4 First-aid Measures

The lithium ion cells/batteries are not hazardous with eye and skin contact under normal circumstance. In case of fire or rupture, internal hazardous substance leaking and hazardous substance formed, following measures should be taken if body parts contact with these substance:

Eye: Check for and remove any contact lenses. Immediately flush with plenty of clean water for at least 15 minutes, seek medical assistance;

Skin: Immediately flush with plenty of clean water for 15 minutes; seek medical assistance if severe;

Inhalation: If inhaled, remove to fresh air immediately, seek medical assistance, and ventilate the contaminated area;

Ingestion: Rinse mouth with clean water immediately, induce vomit under the direction of expert, and seek medical assistance.

Section 5 Fire-fighting Measures

Extinguish with water, dry powder extinguishers, sands, earth. Combustion products and decomposed products by contact of water or air with internal substance include: carbon monoxide, carbon dioxide, hydrogen fluoride, phosphorus fluoride.

Section 6 Accidental Release Measures

When leakage of cells/batteries happens, liquid could be absorbed with sands, earth or other inert substance, and the contaminated area should be ventilated meantime.

Section 7 Handling and Storage

Don't handle and store cells/batteries with metalwork. Stored and used far away from heat, sparks, open flame, or other ignition sources, and under room temperature ($<30^{\circ}\text{C}$) in ventilating and dehumidifying environments.

Section 8 Exposure Controls/Personal Protection

There is no need for protect under normal conditions. In engineering aspect, ventilation equipment should be installed. Gas mask, blinkers, gloves enduring chemical erosion and exposure suit are required when dealing with fire and leakage.

Section 9 Physical and Chemical Properties

Cells/Batteries are not single chemical material; there are no specific physical and chemical properties such as melting point and boiling point.

Section 10 Stability and Reactivity

Cells/Batteries are safe under normal conditions. The following substance might appear after catching fire or leakage: organic carbonate, hydrogen fluoride, carbon monoxide, carbon dioxide, phosphorus fluoride.

Section 11 Toxicological Information

Cells/batteries are not hazardous when used properly. If the cells/batteries catch fire or the internal substance leaks, combustion products and decomposed products might have irritation and toxicity to skin, eye and respiratory systems. Toxicity data of some substance are listed following:

Hydrogen fluoride:

Extremely toxic. May be fatal if inhaled or ingested. Readily absorbed through the skin - skin contact may be fatal. Possible mutagen. LCLo: 50 ppm/30m (human beings), LC50: 1276 ppm/1h (rats).

Carbon (graphite acetylene black):

Be lightly hazardous in case of skin contact (irritant), ingestion and inhalation. Chronic damage to upper respiratory tract and cardiovascular system is caused.

Copper:

Dust may cause respiratory irritation.

LD50: 3.5 mg/kg (mouse).

Aluminum:

There is no hazard.

Steel:

Dust may be harmful to respiratory system.

LD50: 30 mg/kg (rat).

Section 12 Ecological Information

There is no influence to ecology and environment when used properly.

Section 13 Disposal

Deserted cells couldn't be treated as ordinary trash. Be put to garbage box which recycle batteries after being placed into plastic bags or be dealt as special trash. Couldn't be thrown into fire or placed in high temperature. Couldn't be dissected, pierced, crushed or treated similarly. The package and plastic box used for containing cells could be treated as ordinary trash. Best way is recycling.

Section 14 Transport Information

For the international transport of lithium batteries, they must comply with these regulations: the International Maritime Dangerous Goods (IMDG) Code by International Maritime Organization (IMO), Dangerous Goods Regulations (DGR) by International Air Transport Association (IATA) and Technical Instructions for the Safe Transport of Dangerous Goods by Air (TI) by International Civil Aviation Organization (ICAO). These regulations are based on the UN Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria.

Lithium batteries which meet the requirements of UN38.3 (UN Manual of Tests and Criteria, Part III, subsection 38.3) could be transported by air and by sea as ordinary goods, otherwise should be transported according to Class 9, Packing Group 1 hazardous goods.

According to "Dangerous Goods Regulations" made by IATA, lithium batteries transport condition should accords with "packing instruction 965 part 2" (or "packing instruction 966 part 2" or "packing instruction 967 part 2") or "special provision 188 of IMO-IMDG Code". And they should be complied since 1 January 2010.

1. For lithium ion batteries, UN ID number is 3480. For lithium ion batteries contained in equipment or lithium ion batteries packed with equipment, UN ID number is 3481.
2. The consignment should be fully described by proper shipping name and packed, marked and in proper condition for carriage by air. The consignment is not classified as dangerous under the current edition of the IATA 51th Effective, Dangerous goods regulation and all applicable carrier and government regulations.
3. For transported by air, Lithium-ion Cells/Batteries shipped as "Not Restricted" Cargo: Must comply with Part 2 of PI965-PI967 accordingly; For cells, the Watt-hour rating should not be more than 20Wh; For batteries, the Watt-hour rating should not be more than 100Wh. Watt- hour rating must be marked on the outside of the battery case (marked by manufacturer). (Except those manufactured before 1 January 2010, which may be transported without this marking until 31 December 2010).
4. Each consignment must be accompanied with a document such as an air waybill with an indication. For those Lithium ion cells/ batteries contained in equipment, the equipment must be equipped with an

effective means of preventing accidental activation. The telephone number for additional information for BAK cells is 86-22-86986601.

5. Quantity per package shall not exceed 10 kg.

6. Each package must be capable of withstanding a 1.2m drop test in any orientation without damage of cells or batteries contained therein.

7. Lithium batteries which meet the requirements of A154 could be transported by air, and the batteries manufactured by BAK meet these requirements. (A154 Lithium batteries identified by the manufacturer as being defective for safety reasons, or that have been damaged, that have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport.)

8. Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to short circuit.

Section 15 Regulatory Information

There is a regulation on lithium batteries management.

Section 16 Other Information

This information is not effective to all the battery packs manufactured by BAK. This information comes from reliable sources, but no warranty is made to the completeness and accuracy of information contained. BAK doesn't assume responsibility for any damage or loss because of misuse of battery packs. Users should grasp the correct use method and be responsible for the use of battery pack.

Prepared: 尚随军/2013.07.15

Verified:

Approved: 郑荣鹏/2013.07.16