Safety Data Sheet

According to regulation (EG) No. 1907/2006, attachment II

This safety data sheet should be retained and accessible to users of the battery modules.
17.12.2024

1: Designation of the products and the company

Product identifier:
Product names: BP-LFP-1375S, BP-LFP-1375SD

Product description: Rechargeable, intelligent battery modules with cell assemblies of high-performance phospate-based lithium-ion cells.

Information about the manufacturer:
Bicker Elektronik GmbH
Ludwig-Auer-Strasse 23
86609 Donauwörth
Germany
Website: www.bicker.de
Phone: +49 906 70595-0

Contact person:
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Email: thomas.boehmer@bicker.de
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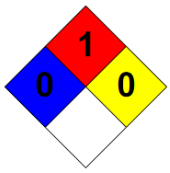
Emergency number:
Counseling center Giftnotruf München (poison emergency call munich): +49 89 19240
(24/7 emergency phone number)

2: Possible dangers

Classification of the substance or mixture:
Classification according to Regulation (EG) No. 1272/2008 (CLP):
Not classified as dangerous, if the product is used in accordance with the manufacturer's instructions.

NFPA classification (USA)	EG classification	WHMIS (Canada)	GHS hazard symbol
 Health hazard: 0 Fire hazard: 1 Reactivity hazard: 0	Not classified as dangerous	Not regulated b the WHMIS guidelines. Meets the definition of a „factory made article“ and therefore does not fall under the provisions of the Hazardous Products Act.	 GHS02 Keep away from open flames and heat sources; keep fireproof.

Protective clothing is not required under normal use.

Possible health hazards:
Mechanical damage to the batteries or improper use can cause violent reactions that endanger human health and the environment.

In particular, high risk potential exists when a battery module is exposed to temperatures in excess of +150°C (e.g., in contact with fire). Is this case, there may be a critical ignition of the battery cells (thermal runaway) – severe fires and bursting oft he battery module are possible in a row.

If cell damage occurs, the electrolyte solution in the cell is corrosive and can cause a burn of skin and eye:

- Vapors or mists escaping from a damaged cell can cause respiratory irritation.
- Ingestion of the contents of an open cell can cause severe chemical burns to the mouth, esophagus and gastrointestinal tract.
- Skin contact with the contents of an open cell can cause severe skin irritation or skin burns.
- Eye contact with the contents of an open cell can cause serious eye irritation or eye burns.
- Direct contact with leaked electrolyte may have a long-term carcinogenic effect.

Warning!
Never use chargers that are not intended for lithium-iron phosphate chemistry.

Do not short circuit. Do not mechanically damage (puncture, deform, disassemble, etc.). Do not heat or burn beyond the allowable temperature. Keep battery modules away from children and animals. Store batteries dry and ideally at room temperature (see also section 7).

The lithium battery modules are safe to use when handled properly under the parameters specified in the operating instructions. Improper treatment or conditions that result in improper operation may result in leaking and leakage of battery ingredients and decomposition products, and associated with severe health and environmental hazard reactions.

Basically, the contact with leaked battery components can pose a risk to health and the environment. It is therefore necessary to provide adequate body and respiratory protection when in contact with conspicuous batteries (leakage of contents, deformation, discoloration, dentures, etc.) (see section 8: Personal protective equipment). Battery packs may e.g. react very violently in combination with fire. In this case, battery components can be emitted with high risk potential.

Handling and operational safety:
The lithium battery modules should always be handled in accordance with the operating instructions. This applies in particular to compliance with the limits for maximum current load, charge and discharge firing voltages as well as mechanical and thermal loads.

The lithium battery modules may under no circumstances be modified or manipulated as this can lead to considerable safety risks. Charging methods tailored to lithium iron phosphate are to be used.

Danger!
As with other batteries, lithium batteries are considered to continue to pose a potential hazard in the supposedly discharged state, as they can supply a very high short-circuit current.

Too deep discharge leads to lasting damage. Deeply discharged battery modules may no longer be charged or operated. Deep discharge can occur, for example, during very long storage of a previously discharged to the discharge limit battery module.

Excessive charging voltages and overcharging should be avoided under all circumstances. They can lead directly to critical situations, but also have a negative impact on battery life.

3: Composition, information on ingredients

Chemical composition of the high-performance phosphate-based lithium-ion cells installed in the battery modules:

Cell component	Chemical name	CAS No.	EINECS	Concentration area in elektrolyte (w/w %)	Mass range in cell (g/g %)
Elektrolyte salt	Lithiumhexafluorophosphat	21324-40-3	244-334-7	10-20	1-5
Elektrolyte solution	Contains one or more of the following: ethylene carbonate, propylene carbonate, diethyl carbonate,/ dimethyl carbonateethyl methyl carbonate	 96-49-1 108-32-7 105-58-8 616-38-6 623-53-0	 202-510-0 203-572-1 203-311-1 210-478-4 Not listed	80-90	10-20

Note: Lithium batteries are products that do not release any substance when used properly.

4: First aid measures

Lithium battery modules are not hazardous if handled and stored properly.

If cell damage occurs, the electrolyte solution in the cell is corrosive and can cause skin and eye burns. Following are the first-aid measures recommended by the cell manufacturer when in contact with the electrolyte solution that has leaked out of the batteries:

Inhalation:
Vapors or mists escaping from a damaged cell can cause respiratory irritation. When inhaling the contents of an open cell, remove the source of contamination or remove the affected person to fresh air. Seek medical help.

Eye contact:
Contact with the contents of an opened cell can cause severe burns or eye irritation. If eye contact occurs with the contents of an opened cell, immediately rinse the contaminated eye (s) with a lukewarm, slightly flowing stream of water for at least 30 minutes. Keep eyelids open. Neutral saline may be used as soon as available. If necessary, further rinse the eyes during transport to the emergency supply station. Take care that contaminated water is not flushed to the naked eye or face. Immediately transfer the affected person to an emergency care center.

Skin contact:
Contact with the contents of an opened cell can cause burns. If skin contact occurs with the contents of an open cell, remove contaminated clothing, shoes and leather parts. Rinse immediately with lukewarm, low-flow water for at least 30 minutes. Seek medical attention if irritation symptoms or pain persist. Thoroughly wash or dispose of clothing, shoes and leather goods before reuse.

Swallow:
Contact with the contents of an opened cell can cause severe chemical burns to the mouth, esophagus and gastrointestinal tract. If you swallow the contents of an open cell, DO NOT deliver anything by mouth if the subject becomes unconscious, unconscious, or has seizures. Rinse mouth thoroughly with water. DO NOT INDUCE VOMITING. In case of spontaneous vomiting, place the affected person in a forward bent position to reduce the risk of suffocation. Rinse mouth again with water. Immediately transfer the affected person to an emergency care center.

Burns:
If burns are caused, they should be treated accordingly. It is strongly advised to contact a doctor.

5: Fire-fighting measures

Fires of lithium batteries can basically be combated with water.
There are no additional or special extinguishing agents available. Ambient fires of the batteries are to be combated with conventional extinguishing agents. The fire of a battery can't be considered separately from the surrounding fire.
The cooling effect of water effectively inhibits the spread of fire to battery cells that have not yet reached the critical temperature for thermal runaway.

The battery module may release toxic fumes when burned or exposed to fire. Damage to the jacket can release dangerous fumes that contain extremely hazardous HF (hydrofluoric acid). The fumes can cause serious health damage by inhalation. For adequate ventilation care must therefore be taken.

Extinguishing media recommended by the manufacturer of the batteries used:
Small fires: dry chemicals, CO2, water spray or commercial foam.
Large fires: splashing water, fogging or commercial foam. Remove container for disposed batteries from the fire area if this is possible without danger.

Specific dangers of the used battery cells arising from the chemical:
Water in reaction with released lithium hexafluorophosphate (Li PF6) can lead to the formation of hydrogen or hydrogen fluoride gas (HF). Contact with battery electrolyte can irritate skin, eyes and mucous membranes. A fire causes irritating, corrosive and / or toxic gases. Inhaled vapors can cause dizziness or suffocation.

Recommended precautions for the fire department and special protective equipment recommended by the manufacturer of the batteries used:
Wear a self-contained breathing apparatus.
The protective clothing of the firefighting personnel offers only limited protection. Fight the fire from a safe distance.

6: Accidental release measures

With damage to the battery casing of a cell electrolyte may leak.

Recommended personal protection measures by the manufacturer of the batteries used:
As an immediate precaution, insulate the spill area or leakage area for at least 25 m in all directions. Keep away from unauthorized persons. Stop the wind. Avoid low lying areas. Ventilate closed areas before entering.
Direct contact with escaped electrolyte is to be avoided in any case. Just use the situation adapted personal protective equipment. When handling an open or leaking cell, the manufacturer of the batteries recommends wearing the following protective equipment: neoprene or natural rubber gloves, goggles and respiratory protection.

Environmental precautions:
Avoid soil contamination and penetration of material into drains and waterways.

Containment:
Stop the loss of substances, if this is without risk. Contain spilled liquid with dry sand or earth. Clean the affected area immediately.

Recommended cleaning methods by the manufacturer of the batteries used:
Absorb spilled material with an inert, absorbent sorbent (dry sand or earth). Shovel contaminated sorbent into a suitable waste container. Collect all contaminated sorbent and dispose of properly. Scrub the affected area with detergent and water; Collect contaminated wash water and dispose of properly.

7: Handling and storage

Handling:
The battery modules are to be used in accordance with the operating instructions. Do not open, disassemble, crush or burn the battery modules. Do not expose to temperatures exceeding + 55 °C.

Storage:
Store the battery modules in a dry place, ideally at room temperature (25 ° C +/- 5 ° C). Increased temperatures can shorten the life of the battery modules. Keep out of reach of children and animals (e.g. rats or mice). High temperature fluctuations in the storage area should be avoided, for example storage next to heaters. Battery modules do not permanently expose to solar radiation. Protect from moisture and water.

8: Exposure controls / personal protection

Lithium battery modules are products from which no hazardous substances are released under normal and wise conditions of use.

Recommended technical precautions:
Use local exhaust ventilation or other technical measures to control dust, mist, smoke and vapor sources.

Personal security:
In the immediate work area an eyewash and ideally a safety shower should be available.
Under normal conditions, no protective clothing is required. When handling an open or leaking cell is recommended by the manufacturer of the batteries used to carry the following protective equipment: gloves made from neoprene or natural rubber, safety glasses and respirators.

Hygiene measures:
Do not eat, drink or smoke in work areas. Ensure order and cleanliness.

9: Physical and chemical properties

Physical and chemical properties of the batteries used according to the manufacturer's instructions:

Physical condition:	Solid	**Vapor pressure (mm Hg at 20°C):**	not applicable
Appearance:	Cell	**Vapor density:**	not applicable
pH:	not applicable	**Water solution:**	insoluble
Relativ density:	No information	**Oil water distribution coefficient:**	not applicable
Boiling point:	not applicable	**Odor:**	odorless
Melting point:	not applicable	**Odor threshold:**	not applicable
Viscosity:	not applicable	**Evaporation rate:**	not applicable
Oxidation properties:	not applicable	**Self-ignition temperature (°C):**	not applicable
Flash point and method (°C):	not applicable	**Flammability limits (%):**	not applicable

10: Stability and reactivity

Contact of the battery module with fire or very high temperatures above + 80 °C is a risk of bursting of the battery module. Do not disassemble, crush, short circuit or connect with twisted polarity. Avoid mechanical and electrical abuse. Do not immerse in salt water or other high conductivity liquids.

The battery module may release toxic fumes when burned or exposed to fire. Damage to the jacket can release dangerous fumes that contain extremely hazardous HF (hydrofluoric acid).

11: Toxicological information

There is no danger when used as intended. Mechanical, thermal or electrical abuse can cause severe irritation and burns to the skin, eyes and respiratory tract.

When used the battery module as intended, the user is not exposed to any substances, listed as being carcinogenic to humans by the IARC (International Cancer Research Center), the American Conference of Governmental Industrial Hygienists (ACGIH), OSHA or the National Toxicology Program (NTP).

Direct contact with leaked electrolyte can have a long-term carcinogenic effect.

12: Environmental information

Proper use and proper disposal (see section 13) are not expected to have a negative environmental impact.

Further information according to the manufacturer of the high-performance battery cells used:

Ecotoxicity:	No information
Mobiliy:	No information
Persistence and degradability:	Not immediately biodegradable
Bioaccumulation potential:	No information
Other adverse effects:	Undamaged cells are slowly degraded when released into the environment and can release harmful or toxic substances. The cells must be disposed of or recycled in accordance with local regulations and must not be released or thrown away in the water or on land.

13: Disposal considerations

Used battery modules have to be returned at the point of sale or in a special disposal system (industry, trade). Return is free. The battery modules must not be disposed of with household waste and must be collected separately from any further waste. The battery modules must not enter the sewage system or water bodies and not be buried in the ground. The used battery modules must also be treated in accordance with section 7 "Handling and storage". They should preferably be given in a discharged condition and in a plastic bag or in their original packaging for disposal.

When transporting used battery modules, observe the transport instructions in section 12.

14: Notes on transport

The battery modules have been designed to comply with all applicable industrial and regulatory standards, including the UN Dangerous Goods Transport Regulations, the IATA Dangerous Goods Regulations, and the US Department of Transportation regulations for the safe transportation of lithium-ion cells and the International Law of the sea for dangerous goods.

The maximum transport temperature corresponds to the maximum storage temperature of + 55 °C.

The battery modules have an energy content of less than 100Wh, therefore simplifying special regulations of dangerous goods law can be applied:

Land transport (ADR/RID)
14.1. UN-Number: UN 3480 / UN 3481
14.2. UN proper shipping name: Lithium ion batteries
14.3. Transport hazard class: 9
Classification code: M4
Special provisions: 188 230 310 348 636 656
Packaging provisions: P903 P903a P903b
Transport category: 2
Tunnel restriction code: E
Packing instructions: P903 / P903a / P903B

Sea transport (IMDG / AND)
14.1. UN-Number: UN 3480 / UN 3481
14.2. UN proper shipping name: Lithium ion batteries
14.3. Transport hazard class: 9
Classification code: M4
Special provisions: 188 230 310 957
Packaging provisions: P903
EMS: F-A, S-I
Packing instructions: P903
Packing instructions (for Inland waterway): P903 / P903a / P903b

Air transport (IATA)
14.1. UN-Number: UN 3480 / UN 3481
14.2. UN-proper shipping name: Lithium ion batteries
14.3. Transport hazard class: 9
Net Weight per package: Cargo 35kg
Special provision: A88, A99, A154, A164, A183, A 201, A206, A331, A802
IATA-Packaging provision - Cargo: 965
Packing instructions: P965 / P966 / P967
CAO-Cargo Aircraft Only!

The energy content of the battery pack in Wh is stated on the rating plate of the respective battery module.

Lithium battery modules are subject to the following dangerous goods regulations: Class 9

- **UN 3480: LITHIUM ION BATTERIES**
- **UN 3481: LITHIUM ION BATTERIES IN EQUIPMENTS or LITHIUM ION BATTERIES, PACKED WITH EQUIPMENT**

Packaging group: II

Transport of damaged or defective battery modules

Defective or damaged battery modules are moreover subject to the stricter transport special regulation 376. These reach all the way to packaging in an aluminum box with vermiculite filling or a complete transport ban.

Air transport of waste batteries

Waste batteries and batteries transported for purposes of recycling or disposal are excluded from air freight unless authorized by the competent national authorities of the country of origin and the country of the executing company. (IATA DGR SV A183)

Batteries for disposal and recycling (road/rail/sea)

Lithium batteries may be transported for disposal and recycling in accordance with ADR SV 230 and SV 188, as applicable, or, if they have a gross mass of 500 g or less, according to ADR SV 636 b.

Transport of used battery modules

When transporting used, intact and undamaged battery modules, the regulations for new batteries can usually be applied. However, for the transport of used - but not damaged - batteries, please also refer to the corresponding special regulations (636) or packing instructions (P903a and P903b / ADR).

Transport of prototypes

Prototype lithium-ion batteries have to be transported according to ADR/RID/IMDG code SP 310, P910 and IATA DGR SP A 88, P910.

15: Legislation

The battery modules are subject to the scope of the respective national implementation of the European Battery Directive 2006/66 / EC. This contains regulations, inter alia for the placing on the market, the collection, the treatment and the recycling of batteries.

The battery modules are provided with the "Separate collection symbol" (crossed-out wheeled bin) and the battery system identification with Li-Ion.

16: Other informations

The instructions help to comply with legal requirements but do not replace them.

The above information has been complied to the best of our knowledge and belief. They do not constitute an assurance of properties. Applicable laws and regulations have to be observed by the distributors and users of the product on their own responsibility.

Bicker Elektronik GmbH excludes any liability!