



Safety Data Sheet

Lithium Iron Phosphate Battery

Version : 1

Issue date : 14/04/2019

Section 1: Product and Company Identification

1.1 Product identifier:

Product Form: Article
Product name: BSL range – LiFePO4 Robot batteries

1.2 Relevant identified uses of the substance and uses advised against:

1.2.1 Identified uses: Cyclic use
1.2.2 Uses advised against: Automotive, motorcycle, commercial applications

1.3 Details of the supplier of the safety data sheet:

Supplier: BS BATTERY S.a.s
Address: 23 bis rue Edouard Nieuport
92150 Suresnes
France
Telephone: +33 1 83 62 45 55

1.4 Emergency telephone Number:

CHEMTREC (US, Canada & Mexico) 0086-1-800-424-9300
CHEMTREC (International) 0086-1-703-527-3887

Available outside office hours? YES ☐ NO ☒

Section 2: Hazard Identification

This is a product that fulfills a certain function in solid state with specific shape without discharging any chemical substance in its use and has no obligation to write MSDS. Since this document contains the precautions for safe handling related to its materials or chemical substances consisting of this product, please note that this overall information is irrelevant to this product.

2.1 Classification of the substance or mixture:

2.1.1 Classification according to Regulation (EC) No. 1272/2008 [CLP]:

Not classified

2.1.2 Additional information :

Classification of the substance or mixture.

Preparation Hazards and Classification: The product is a Lithium ion cell or battery and is therefore classified as an article and is not hazardous when used according to the recommendations of the manufacturer. The hazard is associated with the contents of the cell or battery. Under recommended use conditions, the electrode materials and liquid electrolyte are non-reactive provided that the cell or battery integrity remains and the seals remain intact. The potential for exposure should not exist unless the cell or battery leaks, is exposed to high temperatures or is mechanically, electrically or physically abused/damaged. If the cell or battery is



compromised and starts to leak, based upon the battery ingredients, the contents are classified as Hazardous.

Hazardous materials Information

Label (HMIS)

Health: Not available

Flammability: Not available

Physical Hazard: Not available

2.2 Label elements:

Hazard pictograms: Not applicable

Signal word: Not applicable

Hazard statement: Not applicable

Precautionary statements: Not applicable

Supplemental Hazard information

(EU) : Not applicable

2.3 Other hazards:

Appearance, Color and Odor: Solid object with no odor.

Primary Routes(s) of Exposure: These chemicals are contained in a sealed enclosure. Risk of exposure occurs only if the cell or pack is mechanically, thermally, electrically or physically 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 Effect(s):

Acute (short term):

If this cell or pack has been ruptured, the electrolyte solution contained within the cell would be corrosive and can cause burns to skin and eyes.

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.

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 to mouth, esophagus, and gastrointestinal tract.

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

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

Interactions with other chemicals: Immersion in high conductivity liquids may cause corrosion and breaching of the cell or battery enclosure. The electrolyte solution inside of the cells may react with alkaline (basic) materials and present a flammability hazard.

Potential Environmental Effects:

Not Available.

Section 3: Composition/Information on Ingredients**Further Information**

Because of the cell structure the dangerous ingredients will not be available if used properly.

Component	CAS No.	Weight (%)
LiFePO ₄	349632-76-4	33
Carbon (Graphite)	7440-11-0	15~25
Electrolyte (LiPF ₆ /EC/DMC/EMC)	21324-40-3 96-49-1 616-38-6 623-53-0	10~20
Steel	7439-89-6	15~20
Aluminum (Al)	7429-90-5	4
Copper (Cu)	7440-50-8	8
Hexafluoropropylene-Vinylidene- Fluoride Copolymer	9011-17-0	3
PP/PE/PET	-	2

Section 4: First-Aid Measures

In case of battery rupture or explosion, evacuate personnel from contaminated area and provide maximum ventilation to clear out corrosive fumes/gases and pungent odors.

In all case, seek immediate medical attention,

Eye contact: Flush with plenty of water (eyelids-held open) for at least 15 minutes

Skin contact: Remove all contaminated clothing and flush affected areas with plenty of water and sop for at least 15minutes.

Ingestion: Dilute by giving plenty of water and get immediate medical attention.
Assure that the victim does not aspirate vomited material by use of positional drainage.
Assure that mucus does not obstruct the airway.

Do not give anything by mouth to an unconscious person

Inhalation: Remove to fresh air and ventilate the contaminated area.
Give oxygen or artificial respiration if needed.

Section 5: Fire-Fighting Measures**Extinguishing media:**

- When the scale of the fire is small, use a HFC (hydrofluorocarbon) clean-agent fire extinguisher or alcohol resistant foam fire extinguishers. (In case of battery overheating, wear protective gear and immerse heated battery in water)



- In case of large fire, use large amount of water to extinguish.

Special hazards arising from the substance or mixture:

- Flammable gas leaks before ignition and then the product ignites.

Advice for firefighters:

- The ignited battery has a high temperature, so there is a risk of additional ignition even if the fire is extinguished at early stage. Sprinkle a large amount of water until the battery temperature drops to normal temperature.
- If the battery is ignited in multi-stacked condition, multi-stack should be disassembled and then extinguished so that heat is not transferred between batteries
- In the event of a battery fire, cool it by spraying water directly on the battery.
- When handling a overheated battery, wear heat-resistant protective equipment.

Section 6: Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures for

non-emergency personnel :

Protective equipment : Use personal protective equipment, see Section 8

Emergency procedures :

- In case of cell damage, possible release of dangerous substances and a flammable gas mixture.
- Eliminate all ignition sources.
- Please note that materials and conditions to avoid.
- Battery may emit electrolyte if charging or discharging rates exceed manufacturer's recommendations or if pack has been breached.
- Move battery to well ventilated area to prevent gas accumulation.

For emergency responders

- Eliminate all ignition sources.
- Please note that materials and conditions to avoid.
- Move battery to well ventilated area to prevent gas accumulation.

6.2 Environmental precautions :

- Avoid release to the environment.
- Prevent entry into waterways, sewers, basements or confined areas.

6.3 Methods and material for containment and cleaning up for

containment : Not available

For cleaning up :

- Cover with Dry earth, Dry sand or other non-combustible material and put on the plastic sheet to minimize spreading or contact with rain.
- Move battery to well ventilated area to prevent gas accumulation.
- Dispose in accordance with applicable local, state and federal regulations.

Other information: Not available

6.4 Reference to other sections

- See also sections 8 and 13 of the Safety Data Sheet.



Section 7: Handling and Storage

The batteries should not be opened destroyed nor incinerated since they may leak or rupture and release in the environment the ingredients they contain.

Handling	Do not crush, pierce, short (+) and (-) battery terminals with conductive (i.e.metal) goods. Do not directly heat or solder. Do not throw into fire. Do not mix batteries of different types. Do not mix new and used batteries. Keep batteries in non-conductive (i.e. plastic) trays.
Storage	Store in a cool (preferably below 30°C) and ventilated area away from moisture, sources of heat, open flames, food and drink. Keep adequate clearance between walls and batteries. Temperature above 90°C may result in battery leakage and rupture. Since short circuit can cause burn, leakage and rupture hazard, keep batteries in original packaging until use and do not jumble them.
Other	Manufacturer recommendations regarding maximum recommended currents and operating temperature range. Applying pressure on deforming the battery may lead to disassembly followed by eye, skin and throat irritation.

Section 8: Exposure Controls/Personal Protection

Respiratory protection:	Not necessary under normal use. In case of battery rupture, use self-contained full-face respiratory equipment with type ABEK filter.
Hand protection:	Not necessary under normal use. Use 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.

Section 9: Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Appearance

Description : Solid

Color : Not available

Odor : Odorless

Odor threshold : Not available

pH : Not available

Melting point/freezing point : Not available

Initial boiling point and boiling range : Not available

Flash point : Not available

Evaporation rate : Not available



Flammability (solid, gas) : Not available

Upper/lower flammability or explosive limits : Not available

Vapor pressure : Not available

Solubility (ies) : insoluble.

Vapor density : Not available

Relative density (water=1) : 1.12g/cc

Partition coefficient: n-octanol/water : Not available

Auto ignition temperature : Not available

Decomposition temperature : Not available

Viscosity : Not available

Explosive properties : Not available

Oxidizing properties : Not available

Molecular weight : Not available

9.2 Other information

Not available

Section 10: Stability and Reactivity

10.1 Reactivity

- Stable at ambient temperature.

10.2 Chemical stability

- There is no hazard when the measures for handling and storage are followed.
- Stable under normal temperatures and pressures.

10.3 Possibility of hazardous reactions

- Will not occur under normal conditions.
- In case of cell damage, possible release of dangerous substances and a flammable gas mixture.
- Containers may explode when heated.
- Fire may produce irritating and/or toxic gases.
- Some liquids produce vapors that may cause dizziness or suffocation.
- Inhalation of material may be harmful.

10.4 Conditions to avoid

- Keep away from heat/sparks/open flames/hot surfaces. No smoking.
- Friction, heat, sparks or flames
- Dusts or shavings from borings, turnings, cuttings, etc.
- Do not exceed manufacturer's recommendation for charging or use battery for an application for which it was not specifically designed.
- Do not electrically short.



10.5 Incompatible materials

- Avoid contact with acids and oxidizers.
- Keep away from any possible contact with water, because of violent reaction and possible flash fire.
- Handle under inert gas. Protect from moisture.
- Combustibles, reducing agents

10.6 Hazardous decomposition products

- None under normal conditions.
- Corrosive and/or toxic fume
- Material may produce irritating and highly toxic gases from decomposition by heat and combustion during burning.
- Irritating and/or toxic gases

Section 11: Toxicological Information

There is no available data on the product itself. The information of the internal cell materials is as follows.

Lithium Iron Phosphate– LiFePO₄

Acute toxicity: No applicable data.

Local effects: Unknown.

Sensitization: The nervous system of respiratory organs may be stimulated sensitively.

Chronic toxicity/Long term toxicity: No applicable data.

Skin causticity: Although it is very rare, the rash of the skin and allergic erythema may result.

Aluminum

Local effects: Aluminum itself has no toxicity. When it goes into a wound, dermatitis may be caused.

Chronic toxicity/Long term toxicity: By the long-term inhalation of coarse particulate or fume, it is possible to cause a lung damage (aluminum lungs).

Graphite

Acute toxicity: Unknown.

Local effects: When it goes into one's eyes, it stimulates one's eyes; conjunctivitis, thickening of corneal epithelium or edematous inflammation palpebra may be caused.

Chronic toxicity/Long term toxicity: Long-term inhalation may become a cause of a lung disease or tracheal disease.

Garcinogenicity: Graphite is not recognized as a cause of cancer by research organizations and natural toxic substance research organizations of cancer.

Copper

Acute toxicity: 60-100mg sized coarse particulate causes a gastrointestinal disturbance with nausea and inflammation. TDLo, hypodermic - Rabbit 375mg/kg

Local effects:

Coarse particulate stimulates a nose and a tracheal. When it goes into one's eyes, the symptom of the reddening and the pain is caused.

Sensitization: Sensitization of the skin may be caused by long-term or repetitive contact.



- Reproductive effects: TDLo, oral - Rat 152mg/kg

Organic Electrolyte

- Acute toxicity: LD50, oral - Rat 2,000mg/kg or more
- Local effects: Unknown.
- Skin irritation study: Rabbit – Mild
- eye irritation study: Rabbit - Very severe

Section 12: Ecological Information

When properly used or disposed, the LiFePO₄ batteries do not present environmental hazard.

Persistence/degradability: do not bury or throw out into the environment.

Section 13: Disposal Considerations

Dispose in accordance with applicable regulations which vary from country to country. (In more countries, the thrashing of used batteries is forbidden, and the end-users are invited to dispose them properly, eventually through not-for-profit organizations, mandated by local governments or organized on a voluntary basis by professionals).

Lithium-Ion batteries should have their terminals insulated and be preferably wrapped in plastic bags prior to disposal.

13.1 Incineration: Incineration should never be performed by battery users but eventually by trained professionals in authorized facilities with proper gas and fumes treatment.

13.2 Recycling: Send to authorized recycling facilities, eventually through licensed waste carrier.

Section 14: Transport Information

The product is classified as dangerous goods under the current edition of ICAO & IATA dangerous goods regulations and according Section IA or IB PI965 of all applicable carriers. The product is safe for air transportation and regulated by ICAO & IATA DGR.

SHIPPING BY SEA or BY ROAD (≤100Wh)

14.1 UN Number : 3480

14.2 UN Proper shipping name : LITHIUM ION BATTERIES

14.3 Transport Hazard class : -

14.4 Packing group : -

14.5 Environmental hazards : No

14.6 ADR, IMDG Transport: SP188

SHIPPING BY SEA or BY ROAD (>100Wh)

14.1 UN Number : 3480

14.2 UN Proper shipping name : LITHIUM ION BATTERIES

14.3 Transport Hazard class : 9

14.4 Packing group : II

14.5 Environmental hazards : No

14.6 IMDG Transport : P903



SHIPPING BY AIR

14.1 UN Number : 3480

14.2 UN Proper shipping name : LITHIUM ION BATTERIES

14.3 Transport Hazard class : 9

14.4 Packing group : II

14.5 Environmental hazards : No

14.6 IATA Transport : PI 965-Section IB ($\leq 100\text{Wh}$) or PI 965-Section IA ($> 100\text{Wh}$)

Section 15: Regulatory Information

《Classification, Labeling and Packaging Regulation》

《REACH (EC)1907/2006》

《Dangerous Goods Regulation》

《Recommendations on Transport of Dangerous Goods Model Regulations》

《International Maritime Dangerous Goods》

《Technical Instructions for the Safe Transport of Dangerous Goods》

《Classification and code of dangerous goods》

《Occupational Safety and Health Act》 (OSHA)

《Toxic Substances Control Act》 (TSCA)

《Consumer Product Safety Act》 (CPSA)

《Federal Environmental Pollution Control Act》 (FEPCA)

《The Oil Pollution Act》 (OPA)

《Resource Conservation and Recovery Act》 (RCRA)

《Safety Drinking Water Act》 (CWA)

《Code of Federal Regulations》 (CFR)

In accordance with all Federal, State and local laws

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 as of the date compiled. However, no representation, warranty (either expressed or implied) or guarantee is made to the accuracy, reliability or completeness of the information contained herein.

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BS BATTERY does not accept liability for any loss or damage that may occur, whether direct, indirect, incidental or consequential, from the use of this information.

REFERENCE

Chemical substances information: Japan Advanced Information center of Safety and Health International
Chemical Safety Cards (ICSCs):

International Occupational Safety and Health Information Centre (CIS)

2002 TLVs and BEIs: American Conference of Governmental Industrial Hygienists (ACGIH) New
Dangerous Goods Best Practice 008-in the 51st Edition IATA DGR(2010)(with effect from 01 January 2010)



GB/T 16483-2008 Safety data sheet for chemical products Content and order of sections ISO
11014:2009(E) Safety data sheet for chemical products –Content and order of sections IMDG Code –
2008 Edition: International Maritime Organization (IMO)

RTECS(CD-ROM)

MSDS of raw materials prepared by the manufactures First

Prepared and approved by BS BATTERY S.a.s