

HOWELL ENERGY CO., LTD

MATERIAL SAFETY DATA SHEET

NAME: LIFEPO4 BATTERIES HW2018LFA3

1- IDENTIFICATION (of the product and the supplier)

1.1 Product: LiFePO4 battery

Models: HW-18500

Electrochemical system: Lithium Iron Phosphate Chemistry

Nominal voltage: 12Volts 39.6Wh

1.2 Supplier:

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2 - COMPOSITION/INFORMATION ON INGREDIENTS

Chemical composition	Molecular formula	CAS No.	(%)
Lithium Iron Phosphate	LiFePO4	15365-14-7	31
Graphite	C	7782-42-5	18
Copper	Cu	7440-50-8	12
Aluminium	Al	7429-90-5	8
Lithium Hexafluorophosphate	LiPF6	21324-40-3	4
Carbonate	-	-	8
Polypropylene	-	9003-07-0	19

3 – HAZARDS IDENTIFICATION

Under normal conditions of use, the solid electrode materials and liquid electrolyte they contain are non-reactive provided the battery integrity is maintained and seals remain intact. There is Risk of exposure only in cases of abuse (mechanical, thermal, electrical), which leads to the activation of the safety valve and/or the rupture of the battery container. Electrolyte leakage, electrode materials reaction with moisture/water or battery vent/explosion/fire may follow, depending upon the circumstances.

In case of excessive internal pressure and/or temperature Howell batteries are fitted with a safety vent for protection and/or rupture of the cell case.

1 – Nature of Special risks:

R14 Reacts with water.

R21 Harmful in contact with skin.

R22 Harmful if swallowed.

R41 Risk of serious damage to the eye.

R42/43 May cause sensitization by inhalation and skin contact.



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R43 May cause sensitization by skin contact.

2 – Safety advices:

S 2 Keep out of reach from children.

S 8 Keep away from moisture.

S22 Do not breathe dust.

S24 Avoid contact with skin.

S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical attention.

S36 Wear suitable gloves.

S45 In case of incident, seek medical attention

4 - FIRST AID MEASURES

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

In all cases, seek 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 soap for at least 15 minutes.

Do not apply greases or ointments.

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.

5 FIRE-FIGHTING MEASURES

Fire and explosion hazard: The batteries can leak and/or spout vaporized or decomposed and combustible electrolyte fumes in case of exposure above 80C resulting from inappropriate use, abuse, or from the environment. Possible formation of hydrogen fluoride (HF) and phosphorous oxides during fire. LiPF₆ salt contained in the electrolyte releases hydrogen fluoride (HF) in contact with water.

Extinguishing media: Suitable: Type D extinguishers, Co₂, Dry chemical or Foam

Extinguishers Not to be used: Spray or immerse in water

Special exposure hazards: Following cell overheating due to external source or d use, electrolyte leakage or battery container rupture may occur and release inner component/material in the environment..

Eye contact: The electrolyte solution contained in the battery is irritant to ocular tissues.

Skin contact: The electrolyte solution contained in the battery causes skin irritation.

Ingestion: The ingestion of electrolyte solution causes tissue damage to throat and gastro/respiratory tract.



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Inhalation: Contents of a leaking or ruptures battery can cause respiratory tract, mucus, membrane irritation and edema.

Special protective equipment: Use self-contained breathing apparatus to avoid breathing irritant fumes. Wear protective clothing and equipment to prevent body contact with electrolyte solution.

6 ACCIDENTAL RELEASE MEASURES

The material contained within the batteries would only be expelled under abusive conditions.

Soak under water or spray with copious amounts of water, place in approved container (after cooling if necessary) and dispose in accordance with local regulations.

7 -HANDLING AND STORAGE

The batteries should not be opened, destroyed nor incinerate 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 and brands. Do not mix new and used batteries. Keep batteries in non-conductive (i.e. plastic) trays.

Storage: Store in a cool (preferably below 20°C) and ventilated area away from moisture, sources of heat, open flames, food and drink. Keep adequate clearance between walls and batteries. Temperature above 65 °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: Follow manufacturer recommendations regarding maximum recommended currents and operating temperature range.

Applying pressure or deforming the battery may lead to disassembly followed by eye, skin and throat irritation.

8 - EXPOSURE CONTROLS/PERSONAL PROTECTION

Respiratory protection: Not 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 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



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9.1 **Appearance:** (Physical shape and color as supplied)

9.2 **Temperature range:**

	Continuous	Occasional
In storage during	+ 30°C max	-40/+ 70°C
discharge during	- 30/+ 70°C	-40/+ 70°C
during charge	0/+ 50°C	0/+ 50°C

10 STABILITY AND REACTIVITY

Conditions to avoid: Heat above 70C 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 TOXOLOGICAL INFORMATION

Inhalation, skin contact and eye contact are possible when the battery is opened. Exposure to internal contents, the corrosive fumes will be very irritating to skin, eyes and mucous membranes. Overexposure can cause symptoms of non-fibroid lung injury and membrane irritation.

12 ECOLOGICAL INFORMATION

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

13 DISPOSAL CONSIDERATIONS

Dispose in accordance with applicable regulations, which vary from country to country. The batteries should have their terminals insulated and be preferably wrapped in individual plastic bags prior to disposal.

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

13.2 Recycling: Send to authorized recycling facilities.

14 - TRANSPORT INFORMATION

proper shipping name: Lithium Ion Batteries.

Lithium ion battery packs are of a type that is eligible for exemption from requirements for transport as class 9 hazardous materials or dangerous goods under most national and international regulations. The batteries have a lithium-equivalent content of less than 1.5grams per cell and less than



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8.0 grams per battery or battery pack, as well as Watt-hour rating of no more than 20Wh per cells and no more than 100Wh per battery or battery pack, in addition, the batteries are of a type that has been demonstrated to pass each applicable test (T.1 through T8) under the UN manual of tests and criteria (ST/SG/AC 10/11 Rev 4), Part III, Subsection 38.3.

To qualify for exemption, the batteries may be subject to certain requirements. For example, under the Dangerous Goods Regulations (59th Edition, 2018) of the International Air Transport Association (IATA), exempt batteries must be transported in accordance with Section II of Packing Instruction 965, 966, or 967 (Depending upon whether they are shipped alone, or with or in equipment). See also, e.g. Special Provision 188 of the International Maritime Dangerous Goods (IMDG) Code (2008 Edition) and of the U.S. Department of Transportation (DOT) regulation at 49 C.F.R. § 172.102.

In certain limited circumstances, such as if the batteries have been damaged such that they have the potential of producing a dangerous evolution of heat, fire or short circuit, they are forbidden from transport by air. See IATA Dangerous Goods Regulations (59th Edition, 2018). General Requirements of Packaging Instructions 965, 966 and 967. Waste lithium batteries and lithium batteries being shipped for recycling or disposal are also prohibited from air transport unless approved by the appropriate national authority of the state of origin and the state of the operator. See IATA Dangerous Goods Regulations (59th Edition 2018), General Requirements of Packaging Instructions 965.

15 - REGULATION INFORMATION

The transport of rechargeable Lithium Ion batteries is regulated by various bodies (IATA, IMO, ADR, US- DOT) that follow the United Nations "Recommendations on the Transport of Dangerous Goods, Model Regulations, 13

Revised edition – 2003 – Ref. STSG/AC.10/1 Rev. Depending on their lithium metal equivalent weight content, design, and ability to pass safety tests defined by the UN in the

"Recommendations on the Transport of Dangerous Goods – Manual of Tests and Criteria –

Revised edition – 2002 – Ref. Ref. STSG/AC.10/11 Rev. 3 Amendment 1

<<Lithium Batteries>>", the Lithium Iron Phosphate cells and the battery packs may or may not be assigned to the UN No 3480 Class-9, that is restricted for transport.

Individual Lithium Iron Phosphate cells and battery packs with respectively less than 1.5 and 8 grams of Equivalent Lithium metal content that pass the UN-defined safety tests, are not restricted for transport (1.0 Ah of declared nominal capacity = 0.3 gram of Li equivalent weight content).

16 - OTHER INFORMATION/DISCLAIMER

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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