



MATERIAL SAFETY DATA SHEET

Lithium-ion Rechargeable battery

Model: IES 18650 3.7V 4400mAh 16.28Wh

Prepared by	Approved by
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Jan. 3rd, 2017	Jan. 3rd, 2017



Material Safety Data Sheet

Section 1-Chemical Product and Company Identification

Product Identification

Lithium-ion Rechargeable Battery

Model:	IES 18650 3.7V 4400mAh 16.28Wh
Nominal Voltage:	3.7V
Nominal Capacity:	4.4Ah
Equivalent Lithium content:	16.28Wh
Testing Period:	Dec. 27th, 2016 to Jan, 3rd, 2017

Manufacturer

ICON ENERGY SYSTEM (SHEN ZHEN) Co., Ltd.

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Section 2-Composition/Information on Ingredients

Portion	Material name	Concentration range (wt %)
Positive electrode	Lithium transition metal oxidate ($\text{Li}[\text{M}]_m[\text{O}]_n * 2$)	20~60
Positive electrode's base	Aluminum	1~10
Negative electrode	Carbon	10~30
Negative electrode's base	Copper	1~15
Electrolyte	Organic electrolyte principally involves ester carbonate	5~25
Outer case	Aluminum, iron, aluminum laminated plastic	1~30

Section 3-Hazards Identification

Health Hazards (Acute and Chronic)

These chemicals are contained in a sealed can. Risk of exposure occurs only if the battery is mechanically or electrically abused. Contact of electrolyte and extruded lithium with skin and eyes should be avoided.

Sign/Symptoms of Exposure

A shorted battery can cause thermal and chemical burns upon contact with the skin. May be a reproductive hazard.

Section 4-First-aid Measures

Eye

Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.

Skin

Remove contaminated clothes and rinse skin with plenty of water or shower for 15 minutes. Get medical aid.

Inhalation

Remove from exposure and move to fresh air immediately. Use oxygen if available.

Ingestion

Give at least 2 glasses of milk or water. Induce vomiting unless patient is unconscious. Call a physician.

Section 5-Fire Fighting Measures

Flash Point: N/A.



Auto-Ignition Temperature: N/A.

Extinguishing Media: Water, CO₂.

Special Fire-Fighting Procedures

Self-contained breathing apparatus

Unusual Fire and Explosion Hazards

Cell may vent when subjected to excessive heat-exposing battery contents.

Hazardous Combustion Products

Carbon monoxide, carbon dioxide, lithium oxide fumes

Section 6-Accidental Release Measures

Steps to be Taken in Case Material is Released or Spilled

If the battery material is released, remove personnel from area until fumes dissipate. Provide maximum ventilation to clear out hazardous gases. Wipe it up with a cloth, and dispose of it in a plastic bag and put into a steel can. The preferred response is to leave the area and allow the battery to cool and vapors to dissipate. Provide maximum ventilation. Avoid skin and eye contact or inhalation of vapors. Remove spilled liquid with absorbent and incinerate.

Waste Disposal Method

It is recommended to discharge the battery to the end, to use up the metal lithium inside the battery, and to bury the discharged battery in soil.

Section 7-Handling and Storage

The battery should not be opened, destroyed or incinerate, since they may leak or rupture and release to the environment the ingredients that they contain in the hermetically sealed container.

Do not short circuit terminals, or over charge the battery, forced over-discharge, throw to fire. Do not crush or puncture the battery, or immerse in liquids.

Precautions to be taken in handling and storing

Avoid mechanical or electrical abuse. Store preferably in cool, dry and ventilated area, which is subject to little temperature change. Store at high temperatures should be avoided.

Do not place the battery near heating equipment, nor expose to direct sunlight for long periods.

Other Precautions

The battery may explode or cause burns, if disassembled, crushed or exposed to fire or high temperatures. Do not short or install with incorrect polarity.

Section 8-Exposure Controls/Personal Protection

Respiratory Protection

In case of battery venting, provide as much ventilation as possible. Avoid confined areas with venting cell cores. Respiratory Protection is not necessary under conditions of normal use.

Ventilation

Not necessary under conditions of normal use.

Protective Gloves

Not necessary under conditions of normal use.

Other Protective Clothing or Equipment

Not necessary under conditions of normal use.

Personal Protection is recommended for venting battery

Respiratory Protection, Protective Gloves, Protective Clothing and safety glass with side shields

Section 9-Physical and Chemical Properties

Appearance characters: Silvery-white, prismatic, odorless, solid battery

Chemical Uses: Digital electronic products

Section 10- Stability and Reactivity

Stability

Stable

Conditions to Avoid

File NO./Rev.:MSDS001/A0



Heating, mechanical abuse and electrical abuse

Hazardous Decomposition Products

N/A

Hazardous Polymerization

N/A

If leaked, it is forbidden to contact with strong oxidizers, mineral acids, strong alkalis, halogenated hydrocarbons.

Section 11-Toxicological 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-fibrotic lung injury and membrane irritation.

Section 12 Ecological Information

Lithium-ion batteries do not contain heavy metals as defined by the European directives 2006/66/EC Article 21.

Mercury has not been “intentionally introduced (as distinguished from mercury that may be incidentally present in other materials)” in the sense of the U.S.A. “Mercury-Containing and Rechargeable Battery Management Act”

(May 13 1996).

The Regulation on Mercury Content Limitation for Batteries promulgated on 1997-12-31 by the China authorities including the State Administration of Light Industry and the State Environmental Protection Administration defines ‘low mercury’ as ‘mercury content by weight in battery as less than 0.025%’, and ‘mercury free’ as ‘mercury content by weight in battery as less than 0.0001%’. And therefore: Icon Energy System lithium-ion batteries belong to the category of mercury-free battery (mercury content lower than 0.0001%).

When promptly used or disposed the battery does not present environmental hazard. When disposed, keep away from water, rain and snow.

Section 13-Disposal Considerations

USA: Lithium-ion batteries are classified by the federal government as non-hazardous waste and are safe for disposal in the normal municipal waste stream. These batteries, however, do contain recyclable materials and are accepted for recycling by the Rechargeable Battery Recycling Corporation's (RPBC) Battery Recycling Program. Please go to the RPRC website at www.rbrbc.org for additional information.

In the European Union, manufacturing, handling and disposal of batteries is regulated on the basis of the DIRECTIVE 2006/66/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 6 September 2006 on batteries and accumulators and waste batteries and accumulators and repealing Directive 91/157/EEC. Customers find detailed information on disposal in their specific countries using the web site of the European Portable Batteries Association (http://www.epbaeurope.net/legislation_national.html).

Importers and users outside EU should consider the local law and rules.

In order to avoid short circuit and heating, used lithium-ion batteries should never be stored or transported in bulk. Proper measures against short circuit are:

- Storage of batteries in original packaging
- Coverage of the terminals
- Embedding in dry sand



Section 14-Regulatory Information

Marking consideration:	European Union: According to Directive 2006/66/EC, the batteries have to be marked with the crossed wheel bin symbol. Lithium-ion batteries, which contain electronic modules (e.g. PCM) and which are subjected to the EMC directive 93/97/EEC, must be CE approved and must wear the CE marking. According to Dangerous Goods Regulations (see 15.) battery packs have to be marked with the Watt-hour rating.
International safety standards:	The basis cells are approved according to UL 1642
Water hazard class:	(according to German Federal Water Management Act) Non-water pollution according to VwVwS Appendix 1 (No. 1443 and 766)

Section 15-Transport Information

This report applies to by sea, by air and by land;
The Li-ion Battery (model: IES 18650 3.7V 4400mAh 16.28Wh) tested according to the requirements of the 5th revised edition of the UN manual of tests and Criteria, Part III, subsection 38.3;
Lithium-ion battery was 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;
The Lithium-ion Battery according to Section IA of Packing Instruction 965 or Section I of Packing Instruction 966-967 of the 2017 IATA Dangerous Goods regulations 58th Edition may be transported and applicable U.S.DOT regulations for the safe transport of Li-ion Battery.
More information concerning shipping, testing, marking and packaging can be obtained from label master at <http://www.labelmaster.com/>.
The packaging shall be adequate to avoid mechanical damage during transport, handling and stacking. The materials and pack design shall be chosen so as to prevent the development of unintentional electrical conduction, corrosion of the terminals and ingress of moisture.
The package must be handled with care and that a flammability hazard exists if the package is damaged;
Each package must be labeled with a Li-ion Battery handling label or in addition to the Class 9 hazard label.
With regard to transport, the following regulations are cited and considered:
- The International Civil Aviation Organization (ICAO) Technical Instructions.
- The International Air transport Association (IATA) Dangerous Goods Regulations.
UN number of lithium-ion battery: UN3480 or UN3481;
UN Proper shipping name/Description (technical name): Lithium-ion batteries or Lithium-ion batteries contained in equipment or Lithium-ion batteries packed with equipment;
UN Classification (Transport hazard class): Non Dangerous;
Marine pollutant (Y/N): N;
- The International Maritime Dangerous Goods (IMDG) Code.
For lithium-ion batteries by sea, provided that packaging is strong and prevent the products from short-circuit.
UN number of lithium-ion battery: UN3480 or UN3481;
UN Proper shipping name/Description (technical name): Lithium-ion batteries or Lithium-ion batteries contained in equipment or Lithium-ion batteries packed with equipment;
UN Classification (Transport hazard class): Dangerous;
Marine pollutant (Y/N): Y;
Special Provision: International maritime dangerous goods code (IMDG) 188, 230, 310, 348, 957;
- The US Hazardous Materials Regulation (HMR) pursuant to a final rule issued by RSPA
- The Office of Hazardous Materials Safety within the US Department of Transportations' (DOT) Research



and Special Programs Administration (RSPA)

Section 16-Other Information

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