

MINAMOTO BATTERY (HK) LTD.

Flat A-6, 8/F., Mai Hing Industrial Building, 16-18 Hing Yip Street, Kwun Tong, Kowloon, Hong Kong.
Tel: (852) 2793 4790 Fax: (852) 2793 4932 E-mail: info@minamoto.com

MATERIAL SAFETY DATA SHEET

Section 1 – Identification

Manufacturer

Name of Company : Minamoto Battery (HK) Ltd.
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16-18 Hing Yip Street, Kwun Tong, Kowloon, Hong Kong
Department : Lithium Battery Development & Engineering Dept.
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Ref. No. : UH001264
Issued : 01 Jan 2018

Product Name: LITHIUM THIONYL CHLORIDE BATTERIES (Lithium metal Batteries)
Model: ER17335M

2. Composition and information about the ingredients

Active materials

	Weight grams
Lithium (Li)	0.60
Carbon Black (C)	0.62
Thionyl chloride (SOCL2)	5.9
Aluminum Chloride (AlCl3)	0.64
Lithium Chloride (LiCl)	0.13

Passive materials

		Weight grams
Base Metal	Steel	8.3
Others	Plastic	0.7
	Glass fiber	0.4

3. Hazards identification

The lithium-thionyl chloride batteries are not hazardous when used according to the recommendations of the manufacturer. But if the design of the circuit doesn't forecast all the necessary cares to prevent the inversion of polarity in the assembly of the battery or the battery packs, there is the risk of dangers due to the explosion of the battery. Define with care the assembling process to assure that accidental short circuit does not happen. Do not expose the batteries to temperatures above 100°C.

If the battery loses its integrity and sealing, due to break or damages (mechanical, thermal or electrical), leakage, explosion or fire may follow. In this case there is the risk of release of chemical materials as defined in the paragraph 2 (active materials) of this safety sheet. Here below are shown the nature of special risks and the advices of caution.

Nature of special risks

R14/15 (reacts with water and yields flammable gases)

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- R21 (harmful in contact with skin)
- R22 (harmful if swallowed)
- R35 (causes severe burns)
- R41 (risk of serious damage to the eye)
- R42/43 (may cause irritations by inhalation and skin contact)

Safety advices

- S2 (keep out of reach from children)
- S8 (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 protective clothing)
- S37 (wear suitable gloves)
- S43 (in case of fire use extinguisher type D. DO NOT USE WATER)
- S45 (in case of incident or indisposition seek medical attention)

4. First aid measures

Only in case of contact with internal components of the battery:

Skin contact: flush with plenty of water

Eye contact: flush with plenty of water (eyelids held open)

Inhalation: breathe fresh air and give oxygen or artificial respiration by specialist people

Ingestion: drink much water and consult a doctor

5. Fire-fighting measures

Extinguishing media:	extinguishers type D, Lith-X, DO NOT USE WATER in case of battery leakage
Special hazards:	Irritating vapor.
Special protective equipment:	wear protective clothing, use self-contained breathing apparatus with filtered cartridge type ABEK

6. Accidental release measures

In case of break of a battery, all the people must go away from the place where the incident happened and come back only after the dissolution of the irritating gas.

Broken batteries or battery packs must be covered with sodium carbonate (Na₂CO₃) or dry sand, place them in approved container and dispose in accordance with local regulation. For the eventual handling use gloves in Vitonâ.

7. Handling and storage

7.1 Handling:

- Do not recharge
- Do not use different types and brands of batteries or with different state charge
- Avoid short circuit
- Use desk of work electrically insulated
- Avoid to work over wet surface
- Use plastic caliber to valuate the dimensions of a Lithium battery or to insulate the metallic surface of the battery
- Do not have rings on the fingers; otherwise wear insulating gloves
- Do not cut in the same time both the terminals of a battery: it could be a short circuit trough the shears
- Keep the batteries in non-conductive trays (i.e. plastic, wood or carton)
- Do not solder directly on the battery
- Do not disassemble the batteries, do not throw them in the fire, do not hole, do not overheat or plunge into water

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7.2 Storage:

- Store the Lithium cells in a cool, dry and ventilated area far from fires and heating sources.
- It is recommended the use of a non-combustible structure, keep adequate clearance between walls and batteries.
- The maximum temperature suggested for the storage is +30°C
- Higher temperatures are allow but cause an increase in the self discharge of the battery and speed up the process of passivation
- In any case, never go over 100 °C, as the batteries can break and cause a leakage
- Arrange adequate protections to avoid possible hurts to the batteries
- Keep the batteries in their original packages till when they are used
- Do not expose the batteries directly to the sun light
- Do not put an higher number of cartons one on another (respect what indicated)
- If in the same place are storage batteries with a total capacity > 50,000 Ah, it is suggested to install an alarm for smoke and gas

8. Exposure controls/personal protection

If the battery is integral, storage and handle with care, there is any dangers.

It is suggested to handle the batteries in a ventilated place, to don't smoke, eat or drink during the assembling.

9. Physical and chemical properties

N/A

10. Stability and reactivity

10.1 Conditions to avoid:

Do not expose at temperature higher than 100°C.

Avoid short circuit, crush, and exposition to heat sources.

Do not disassemble the batteries or the battery packs, do not throw them in the fire, do not perforate them, do not overheat or wet them.

10.2 Material to avoid:

Water, oxidizing agents, alkalis.

11. Toxicological information

The rupture of lithium-thionyl chloride batteries can develop the following substances:

- Hydrogen (H₂), lithium Oxide (Li₂O) & lithium Hydroxide (LiOH) if lithium metal reacts with water.
- Chlorine (Cl₂), sulfur dioxide (SO₂) and disulfur dichloride (S₂Cl₂) if the thionyl chloride go above 140.5°C
- Hydrochloric acid (HCl) and sulfur dioxide (SO₂) in case of reaction of thionyl chloride with wate
- Hydrochloric acid (HCl), lithium oxide (Li₂O), lithium hydroxide (LiOH) and aluminium hydroxide (Al(OH)₃) in case of reaction of lithium tetrachloroaluminate with water.

12. Ecological information

When properly used or disposed, the lithium-thionyl chloride batteries do not present environmental hazard.

13. Disposal consideration

For the disposal apply to specialized organization.

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14. Transport information

UN Dangerous Goods List

UN No.	Name & Description	Class or Division	Special Provision	Packing Instruction
3090	Lithium Metal Batteries	9	188	
			230	P903
			310	P908
			376	P909
			377	P910
			384	

Sea Transportation

All lithium metal cells shipping from Minamoto (HK) Ltd. and their packing condition conform to the following regulations and meet the requirements; therefore they can be shipped as exemption from Class 9 Dangerous goods.

Outline of IMO-IMDG Code 2014 SP188

- * For a lithium metal cell, the lithium content is not more than 1g.
- * Each cell is of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria 6th revised edition Amendment 2, Part III, subsection 38.3.
- * Cells shall be packed in inner packagings that completely enclose the cell.
- * Each package shall be capable of withstanding a 1.2m drop test in any orientation without damage to cells contained therein, without shifting of the contents so as to allow battery to battery contact and without release of contents.
- * Package shall not exceed 30kg gross mass.
- * The specified information shall be indicated on each package.
- * Each cell shall be manufactured under quality program specified by the United Nations.

Air Transportation

For air transportation, it is necessary to comply with IATA DGR 59th Edition (Dangerous Goods Regulations, 59th Edition)

Dangerous Goods List on IATA DGR

UN No.	Proper Shipping Name/Description	Class or Division	Packing Instruction	Passenger Aircraft	Cargo Aircraft	S.P.
3090	Lithium Metal Batteries	9	PI968 (Section IA)	Forbidden	Max Net Qty /Package 35kg	A88
			PI968 (Section IB)	Forbidden	Max Net Qty /Package 2.5kg	A99 A154
			PI968 (Section II)	Forbidden	Max Net Qty /Package 2.5kg & Single package for single consignment	A164 A183 A201 A206

As Minamoto ER17555M battery contains lithium metals less than 1.0g, Packing Instruction 969/970 can be applicable to the products this battery model is assembled into.

When Minamoto ER17555M battery is contained in equipment or packed with equipment, it is classified into UN3091. ER17555M battery supplied by us meets the battery requirements to be excluded from dangerous goods regulation.

For the details of indication on package and document required for transportation, please refer to IATA DGR 59th Edition (Dangerous Goods Regulations, 59th Edition).

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Related regulation, issued documents

- * International Air Transport Association (IATA): Dangerous Goods Regulations, 59th Edition
- * International Civil Aviation Organization (ICAO): Technical Instructions for the Safe Transport of Dangerous Goods by Air, 2017-2018 Edition
- * International Maritime Organization (IMO): International Maritime Dangerous Goods (IMDG) Code, 2016 Edition
- * U.S. Department of Transportation (DOT) 49 CFR
- * UN(SP188): UN(United Nations): Recommendations on the Transport of Dangerous Goods: Model Regulations 19th revised edition

15. Regulation information

The transport of lithium batteries is regulated by ONU as described in the

“Recommendations of the Transport of Dangerous Goods ref.ST/SG/AC.10/1-Ed.-11-2000”.

Depending on their lithium metal content (quantity higher than 1g), the batteries may or may not be assigned to the transport restrictions, following the rules defined in the ONU document “Recommendations of the Transport of Dangerous Goods”.

16. Other information

The lithium-thionyl chloride batteries or battery packs must be handle by specialize people.

They must be kept out of reach from children.

They must be used following the Technical Specifications, without exceed the values defined.

Do not assemble by one self a serial of batteries, but request the finished battery to the supplier, who will provide for install protection components (diodes, etc..)

The information contained in this sheet is based on the present knowledge and the conditions of use.

For every use not in conformity to the safety sheet or for the use in combination with any other material or in any other process the user is the responsible.