CIS - Lithium Metal Battery: Altair® Single Gas and Altair® Pro Single Gas Detectors

CONTENT INFORMATION SHEET

1. Chemical Product and Company Identification

LABEL IDENTIFIER: Lithium Metal Battery: Altair® Single Gas Detector and Altair® Pro Single Gas Detector

PRODUCT IDENTIFIER: Battery: Altair® Single Gas Detector and Altair® Pro Single Gas Detector

COMPANY IDENTIFICATION: MSA Safety Incorporated
1000 Cranberry Woods Drive
Cranberry Township, PA 16066
CUSTOMER SERVICE: 1-800-MSA-2222 (8:30 a.m. – 5:00 p.m., USA local time)

2. Content Information

CONTENT: The attached information sheets are furnished to MSA by EEMB and SAFT for batteries used in Altair® Single Gas Detectors and Altair® Pro Single Gas Detectors. Each gas detector contains one battery produced by either EEMB or SAFT.

EEMB, Revision: January 1, 2019
SAFT, Revision: February 2019

3. Disclaimer

This document is not a Safety Data Sheet as defined by 29 CFR 1910.1200. This product has been determined to be an "article" according to the OSHA Hazard Communication Standard and is thereby excluded from any requirements of the standard.

The information provided herein is considered proprietary in nature and is provided only as information that may be necessary for material handling. It may not be used or disclosed in any other manner. Use of the product may have impacted its contents; and it is the user's responsibility to dispose of the product in accordance with local, state and federal laws and regulations.

The information provided herein has been compiled from sources believed to be reliable. However, MSA Safety Incorporated makes no warranty as to the accuracy, completeness or sufficiency of the information and in no event will MSA Safety Incorporated be responsible for loss or damage of any nature whatsoever resulting from use of this information.

Battery Information Sheet

Primary Li-SOCl$_2$ single cells and multi-cell battery packs

According to REACH regulation (EC 1907/2006, Art 31) and to OSHA regulation (29 CFR 1910.1200), batteries are **ARTICLES** with no intended release. As such, they are not covered by legal requirements to generate and supply an SDS or an MSDS.

This Battery Information Sheet is provided solely as information document for the purpose of assisting our customers.

1. IDENTIFICATION

1.1 Product

Lithium-thionyl dichloride primary unit cells and multi-cell battery systems composed of these cells

1.2 Supplier

Headquarters Address Phone/Fax	**Saft S.A.S.** 26 quai Charles Pasqua, 92300 LEVALLOIS-PERRET – France Phone / Fax : +33 1 58 63 16 00/+33 1 58 63 16 18
Factory Address Phone/Fax	**Saft Poitiers** Rue Georges Leclanché, BP 1039, 86060 POITIERS Cedex 9 – France +33 (0)5 49 55 48 48 /+33 (0)5 49 55 48 50
Factory Address Phone/Fax	**Saft Ltd.** River Drive, Tyne & Wear, SOUTH SHIELDS, NE33 2TR – United Kingdom +1 44 191 456 1451/+1 44 191 456 6383
Factory Address Phone/Fax	**Saft America Inc.** 313 Crescent Street, VALDESE, NC 28690 – USA +1 828 874 4111/+1 828 874 2431
Factory Address Phone/Fax	**Saft Batteries Co., Ltd.** Zhuhai Free Trade Zone, Lianfeng Road, ZHUHAI 519030, Guangdong Province – China +86 756 881 9318/+86 756 881 9328
Factory Address Phone/Fax	**Tadiran Batteries Ltd.** 34 Y. Rabin Avenue – KIRYAT EKRON 76950 - Israel +972 894 44374/+972 894 13066
Factory Address Phone/Fax	**Tadiran Batteries GmbH** Industriestrasse 22, D-63654 BÜDINGEN – Germany +49 (0)6 042 954 599/+49 (0)6 042 954 190

1.3 Emergency contact

For chemical emergency ONLY (in case of spill, leak, fire, exposure or accident) call CHEMTREC at:
International: +1-703-527-3887 for English
Within the USA: +1-800-424-9300

2. HAZARD IDENTIFICATION

The Li-$SOCl_2$ batteries described in this Battery Information Sheet are sealed units which are not hazardous under normal operating conditions in accordance with manufacturer's recommendations, as stated in the user's manual or other similar documentation. Under normal use, the battery integrity is maintained and the active components it contains are isolated from the outside.
In particular, the battery should not be submitted to any mechanical (opening, puncture, immersion), thermal (burning, heating to temperatures above the normal temperature range of the product) or electrical abuse (short-circuit, recharge, forced discharge), which will lead to the activation of safety valves and/or the rupture of the battery container.
Any accidental release of the inner components of the cell, or their combustion products could be highly hazardous. Battery content exposition to air humidity/liquid water may be followed by severe battery vent/explosion/fire, depending on the hazard causes and circumstances.

Protection from charging:

Whenever lithium batteries are not the single power source in a circuit, the following measures recommended by Underwriters Laboratories are relevant. The cells should not be connected with an electrical power source that would increase the load through the cells. The electronic circuit shall include one of the following:

A. Two suitable diodes or the equivalent in series with the cells to prevent any reverse (charging) current. The second diode is used to provide protection in the event that one would fail. Quality control, or equivalent procedures, shall be established by the device manufacturer to check that the diode polarity is correct for each unit.

Or

B. A blocking diode or the equivalent to prevent any reverse (charging) current and a resistor to limit current in case of diode failure. The resistor should be sized to limit the reverse (charging) current to the maximum value according to the data sheet of the cell.

3. COMPOSITION, INFORMATION OR INGREDIENTS

Each unit cell consists of a hermetically sealed metallic can containing a number of chemicals and materials of construction of which the following are potentially hazardous upon release to air.

Component	CAS Number	EINECS/ELINCS	Content (wt. %)*
Lithium metal	7439-93-2	231-102-5	2-6
Thionyl dichloride	7719-09-7	231-748-8	18-47
Aluminium chloride	7446-70-0	231-208-1	1-5
Gallium chloride	13450-90-3	236-610-0	0-2
Lithium chloride	7447-41-8	231-212-3	1-2
Carbon	1333-86-4	215-609-9	2-5
PTFE	9002-84-0	N/A	0-1
Stainless steel, Nickel and inert material	N/A	N/A	remainder

** Quantities may vary with cell model*

4. FIRST AID MEASURES (not anticipated under normal use)

4.1 Electrolyte contact

EYE CONTACT: Immediately flush with plenty of water for at least 15 minutes and get medical attention.

SKIN CONTACT: Remove contaminated clothing and immediately flush with plenty of water for at least 15 minutes. In severe cases, get medical attention.

INHALATION: Contents of an opened cell may cause respiratory tract and mucus membrane irritation. Remove from exposure, rest and keep warm. Immediately inhale Cortisone spray. In severe cases, track medical surveillance for 48 hours.

INGESTION: Wash out mouth thoroughly with water and give plenty of water to drink. Get medical attention.

FURTHER TREATMENT: All cases of eye contamination, persistent skin irritation and casualties who have swallowed this substance or have breathed its vapours should be seen by a Doctor.

4.2 Lithium metal contact

EYE CONTACT: Immediately flush with large quantities of water for at least 15 minutes, with open eyelids, and get medical attention.

SKIN CONTACT: Remove particles of lithium from skin as quick as possible. Immediately flush with plenty of water for at least 15 minutes and get medical attention.

INHALATION/INGESTION: Contents of an opened cell may cause respiratory tract and mucus membrane irritation. Remove from exposure, rest and keep warm. Immediately inhale Cortisone spray. In severe cases, track medical surveillance for 48 hours.

5. FIRE FIGHTING MEASURES (not anticipated under normal use)

ESTINGUISHING MEDIA:

- During a fire with lithium batteries, using large amounts of cold water or water-based foam has some cooling effect and is effective to prevent fire expansion as long as the extent of the fire has not progressed to the point that the lithium metal they contain is exposed (as marked by appearance of deep red flames). Do not use warm or hot water.
- Lith-X Class D extinguishers are effective on fires involving only a few lithium batteries.
- Do not use CO_2 or Halon-type extinguishers.
- Do not use sand, dry powder or soda ash, graphite powder or fire blankets.
- **Use only class D metal extinguishers on raw lithium metal.**

SPECIAL FIRE FIGHTING PROCEDURES:

- Fire fighters should wear approved/certified positive pressure self-contained breathing apparatus.
- Full protective clothing is necessary to prevent potential body contact with electrolyte solution.
- During water spraying, caution is advised as burning pieces of lithium may be ejected from the fire.

- It is permissible to use any class of extinguishing medium, specified above, on these batteries or their packing material. Cool exterior of batteries if exposed to fire to prevent rupture.
- If the cells or batteries are not located at the center of the fire, copious amounts of water may be supplied using a diffuser type nozzle so that the cells remain cool during the fire containment and extinction. A sprinkler system should be suitable for this purpose, the critical factor being that the lithium cells do not experience temperatures above the melting point of lithium (180°C).
- Small amounts of water should never be used such as the volumes contained within portable fire extinguishers. Standard dry powder extinguishers are ineffective. It should be kept in mind that a hazard of hydrogen formation exists whenever hot lithium metal comes into contact with water.

6. ACCIDENTAL RELEASE MEASURES (not anticipated under normal use)

INDIVIDUAL PRECAUTIONS: Evacuate the employees from area until fumes dissipate. In case of electrolyte leakage from a cell or battery, do not inhale vapors or touch liquid with bare hands. In case of skin or eye contact, inhalation or ingestion, follow the measured described in section 12.

ENVIRONMENTAL PRECAUTION: Avoid sewage, surface water and underground water contamination. Avoid ground and atmosphere contamination.

WAYS OF CLEANING: With protective glasses and gloves, use absorbent material (sand, earth, chalk ($CaCO_3$) or lime (CaO) powder or Vermiculite) to absorb any exuded material. Seal leaking battery (unless hot) and contaminated absorbent material tight in plastic bag, and dispose of as hazardous waste in accordance with local regulations. Electrolyte traces may be wiped off dryly using household paper. Rinse with water afterwards.

7. HANDLING AND STORAGE

IMPORTANT NOTICE: Lithium-thionyle chloride batteries are not rechargeable and should not be tentatively charged or recharged. Manufacturer's recommendations should be followed regarding maximum current and operating

temperature range. Applying pressure or deforming the battery may lead to disassembly and cause eye, skin and throat irritation.

STORAGE: Store in a cool, regulated (preferably below 21°C and in any case below 30°C), dry and ventilated area, away from possible sources of heat, open flames, food and drink. Avoid exposure to direct sunlight for long periods. Temperatures above 100°C (or higher for High Temperatures cells and batteries such as the LSH20-150 cell- refer to individual data sheets for maximum temperatures) may cause leakage and rupture, and result in shortened battery service life. Keep proper clearance space between batteries and walls. Since short circuit can cause burn hazard, leakage or explosion hazard, keep batteries in original packaging until use and do not mix them.

HANDLING:

- Do not open the battery system.
- Do not crush or pierce the cells.
- Do not short (+) or (-) terminal with conductors.
- Do not reverse the polarity.
- Do not submit to excessive mechanical stress.
- Do not mix batteries of different types or mix new and old ones together.
- Do not use the unit without its electronic management system.

- Do not expose the unit to water or condensation.
- Do not directly heat, solder or throw into fire. Such unsuitable use can cause leakage or spout vaporized electrolyte fumes and may cause fire or explosion.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION* (not anticipated under normal use)

	**Respiratory protection**	In all fire situations, use self-contained breathing apparatus
	**Hand protection**	In case of leakage wear protective gloves
	**Eye protection**	Safety glasses are mandatory during handling
	**Other**	In the event of leakage or ruptured cells, wear a rubber apron and protective clothes.

**AFNOR pictograms*

Occupational exposure standard:

Compound	8 hour TWA	15 min TWA	SK
Sulfur Dioxide	1 ppm	1 ppm	-
Hydrogen chloride	1 ppm	5 ppm	-

9. PHYSICAL AND CHEMICAL PROPERTIES

The lithium-thionyl chloride cell or battery described by this Battery Information Sheet is a sealed unit when offered for sale. It is a manufactured "article" and does not expose the user to hazardous chemicals when used in accordance with manufacturer specifications.

Appearance – Cylindrical shape
Odour – If leaking, gives off a pungent corrosive odour

Flash point – Not applicable	Flammability – Not applicable
Boiling Point – Not applicable	Melting Point – Not applicable
Vapor Pressure – Not applicable	Vapor Density – Not applicable
pH – Not applicable	Specific Gravity – Not applicable
Solubility (in water) – Not applicable	Solubility (other) – Not applicable

10. STABILITY AND REACTIVITY

The battery system is stable when handled and stored according to section 4.

MATERIALS TO AVOID: Oxidizing agents, bases, water. Avoid electrolyte contact with aluminium or zinc.

CONDITIONS TO AVOID: Do not heat above 100°C (or higher (150°C) for High Temperatures cells and batteries such as the LSH20-150 cell- refer to individual data sheets for maximum temperatures) or incinerate. Do not disassemble, crush, pierce, short, charge or recharge. Avoid mechanical or electrical abuse.

HAZARDOUS DECOMPOSITION PRODUCTS: Hydrogen (H_2) as well as lithium oxide (Li_2O) and lithium hydroxide (LiOH) dust are produced in case of reaction of lithium metal with water (hydrolysis).
Chlorine (Cl_2), sulfur dioxide (SO_2) and disulfur dichloride (S_2Cl_2) are produced in case of thermal decomposition of thionyl dichloride above 100°C. Hydrochloric acid (HCl) and sulfur dioxide (SO_2) are produced in case of reaction of thionyl dichloride with water at room temperature.
Hydrochloric acid (HCl) fumes, lithium oxide (Li_2O), lithium hydroxide (LiOH) and aluminium hydroxide ($Al(OH)_3$) dust are produced in case of reaction of lithium tetrachloroaluminate ($LiAlCl_4$) with water.

11. TOXICOLOGICAL INFORMATION

There is no risk, unless the battery ruptures. In the event of accidental exposure to internal contents, corrosive fumes will cause severe skin, eye and mucous membrane irritation. Medical conditions are generally aggravated by exposure to battery internal contents: eczema, skin allergies, lung injuries, asthma and other respiratory disorders may occur. Overexposure may cause symptoms of non-fibrotic lung injury and ingestion can cause tissue damage to throat and gastro-respiratory tract.

12. ECOLOGICAL INFORMATION

The batteries do not contain mercury, cadmium or other heavy metals.

Eco-toxicity	None known if used/disposed of correctly.
Mammalian affects	None known if used/disposed of correctly.
Bioaccumulation potential	None known if used/disposed of correctly.
Environmental fate	None known if used/disposed of correctly.

13. DISPOSAL CONSIDERATIONS

Batteries do not contain hazardous materials according to EC Directives 91/157/EEC, 93/86/EEC, and 2002/95/EC (RoHS) Directive). Battery recycling is either mandatory or recommended: The European Directive 2006/66/EC has been implemented by most EC member states.
Dispose of in accordance with local laws and regulations. Store material for disposal as indicated in Section 4. A disposal service is offered upon request by Tadiran Batteries.
Do not incinerate, or subject cells to temperatures in excess of 100°C (or 150°C for LSH20-150 cells and the battery packs assembled from them). Such abuse can result in loss of seal, electrolyte leakage and/or violent disassembly with risk of material projections.

For additional information a Technical Notice is available upon request.

See the section on “Sustainability & Environment” on https://www.saftbatteries.com/about-us/environmental-responsibility

The recycling of batteries must only be conducted by fully trained personnel of licensed recyclers. Attempting to dismantle batteries or modules into individual cells may lead to serious injuries or death due to high electrical voltage and/or energy.

14. TRANSPORTATION INFORMATION

Note: when manufacturing a new battery pack, one must assure that it has fulfilled the tests according to the UN Model Regulations, Manuel of Tests and Criteria, Part III, subsection 38.3.

14.1 United Nations Class

For the single cell batteries and multi-cell battery packs that are non-restricted to transport (non-assigned to the Miscellaneous Class 9), use lithium batteries inside label.

For the single cell batteries and multi-cell battery packs which are restricted to transport (assigned to Class 9), use Class 9 Miscellaneous Dangerous Goods and UN Identification Number Labels.

In all cases, refer to the product transport certificate issued by the manufacturer.

UN Numbers:	3090	LITHIUM METAL BATTERIES: Shipment of cells and batteries *in bulk*
	3091	LITHIUM METAL BATTERIES CONTAINED IN EQUIPMENT or LITHIUM METAL BATTERIES PACKED WITH EQUIPMENT: Cells and batteries *contained in equipment* or *packed with it*
Shipping name	LITHIUM METAL BATTERIES	
Hazard Classification:	9	
	Depending on their lithium metal content, some single cells and small multi-cell battery packs may be non-assigned to Class 9. Refer to Transport Certificate.	
Packaging:	Group II	

14.2 International agreements

By Air International:	IATA/ICAO: UN 3090 or UN3091
By Sea International:	IMDG: UN 3090 or UN 3091
European road transportation:	ADR
European rail transportation:	RID

15. REGULATORY INFORMATION

Regulations specifically applicable to the product:

- ACGIH and OSHA: see exposure limits of the internal components of the battery in section 14.
- IATA/ICAO (air transportation): UN 3090 or UN 3091.
- IMDG (sea transportation) : UN 3090 or UN 3091.
- Transportation within the US-DOT, 49 Code of Federal Regulations
- UK regulatory references: Classified under CHIP.
- Battery Directive (2006/66/EC): see section 9

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, neither exhaustively nor perfect reliability can be granted. Information does not imply implicit or specific warranty of it.

This information relates to the specific products designated and may not be valid for such products used in combination with any other materials or in any process. It is the user's responsibility to satisfy himself as to the suitability and completeness of this information for his particular use.

Saft does not accept liability for any loss or damage that may occur, whether direct, indirect, incidental or consequential, from the use of this battery information sheet provided as a service to our customers. Saft does not offer warranty against patent infringement.

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MATERIAL SAFETY DATA SHEET

Reference No. 190103B

LITHIUM/THIONYL CHLORIDE (Li-$SOCl_2$) NON-RECHARGEABLE BATTERY

1. PRODUCT IDENTIFICATION

Product: Rechargeable? NO
Trade name: LITHIUM/THIONYL CHLORIDE (Li-$SOCl_2$)
Model: ER17335-FT

Electrochemical system:

Electrodes:	Negative Electrode:	Lithium metal (Li)
	Positive Electrode:	Thionyl Chloride ($SOCl_2$)
Electrolyte:	Lithium perchlorate	
Nominal Voltage:	3.6 Volt	

2. COMPOSITION.

No More Than 4% Lithium Is Contained.

3. HAZARD DATA

3.1 Physical:

The Lithium-Thionyl Chloride batteries described in this Material Safety Data Sheet are sealed units which are not hazardous when used according to the recommendations of the manufacturer.

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

Classification of Dangerous Substances Contained into the Product as per Directive

Substance	Chemical Symbol	Content * (%)	Melting Point °C	Indication of Danger	Special Risk	Safety Advice
Metal Lithium	Li	4	180.5	Corrosive Flammable	R14/15 R21 R22 R35 R41 R42/43	S2 S8 S45
Thionyl Chloride	$SOCl_2$	40	-104.5	Irritant, Corrosive Harmful	R14 R22 R35 R41 R42/43	S2 S8 S24 S26 S36 S37 S45
Aluminum Chloride	$AlCl_3$	3	190	Irritant Corrosive	R14 R22 R37 R41 R43	S2 S8 S22 S24 S26 S36

** slight variations depending on cell type.*

1. Name of Special Risks:

R14/15	Reacts with water and yields flammable gases
R21	Harmful in contact with skin
R22	Harmful us swallowed
R35	Causes severe burns
R41	Risk of serious damage to the eye
R42/43	May cause sensitization by inhalation and skin contact
R43	May cause sensitization by skin contact

2. 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
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 clear out corrosive fumes/gases and pungent odour.

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 15 minutes.**
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 battery can spout vaporized or decomposed electrolyte fumes in case of exposure above 100°C resulting from un-appropriate use or the environment. Risk of explosion is increased if the melting point of lithium (180°C) is exceeded. Hydrogen coming from the decomposition of lithium metal with water is flammable.
Extinguishing media:	*Suitable*: Type D extinguishers, Lith-X Water may be used only to keep battery cool. *Not to be used:* Water in case of battery rupture or explosion (detectable by the pungent odour).
Special exposure hazards:	Following cell overheating due to external source or due to un-proper 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 corrosive to all ocular tissues. **Skin contact:** The electrolyte solution contained in the battery corrosive and causes skin irritation and burns. **Ingestion:** The ingestion of electrolyte solution causes tissue damage to throat and gastro/respiratory tract. **Inhalation:** Contents of a leaking or ruptured 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.

Using shovel or broom, cover battery or spilled substances with dry sand or, preferably, sodium carbonate (Na_2CO_3) or 1:1 mixture of soda ash and slaked slime. Keep away from water, rain, snow. 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 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 and brands. Do not mix new and used batteries. Keep batteries in non-conductive, i.e. plastic, trays.
Storage	Store in ad 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 100°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	**Lithium-Thionyl Chloride batteries are NOT rechargeable** and should not be tentatively charged.

Follow Manufacturers 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.

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 Viton 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.**

9. Physical And Chemical Properties

9.1 Appearance (Physical shape and color as supplied:)

Small metal cylinders, hermetically sealed and fitted with an external plastic sleeve.

9.2 Temperature range:

	Temperature range
In storage	+30°C max
During discharge	-55~+85 °C

9.3. Specific energy: 430Wh/Kg

9.4 Specific instant power: 65W/Kg

10. Stability and Reactivity

Conditions to avoid	Heat above 100 °C or incinerate. Deform, mutilate, crush, pierce, disassemble, recharge. Short circuit. Prolonged exposure to humid conditions.
Materials to avoid:	Oxidizing agents, alkalis, water. Avoid electrolyte contact with aluminum or zinc.
Hazardous decomposition products:	Hydrogen (H_2) as well as lithium oxide (Li_2O) and lithium hydroxide (LiOH) dust is produced in case of reaction of *lithium metal* with water. Chlorine (Cl_2), sulfur dioxide (SO_2) and disulfur dichloride (S_2Cl_2) are produced in case of thermal decomposition of *thionyl chloride* above 140°C. Hydrochloric acid (HCl) and sulfur dioxide (SO_2) are produced in case of reaction of *thionyl chloride* with water at room temperature. Hydrochloric acid (HCl) fumes, lithium oxide, (Li_2O), lithium hydroxide (LiOH) and aluminum hydroxide ($Al(OH)_3$) dust are produced in case of reaction of *lithium thetrachloroaluminate* with water.

11. Toxilogical Information

The Lithium-Thionyl chloride batteries do not contain toxic materials.

12. Ecological Information

When properly used or disposed, the Lithium-Thionyl chloride batteries do not resent environmental hazard.

13. Disposal Considerations.

Dispose in accordance with applicable regulations which vary from country to country.

(In most countries, the thrashing of used batteries is forbidden and the end-users are invited to dispose them properly, eventually through non profit organizations, mandated by local governments or organized on a voluntary basis by professionals).

Lithium batteries should have their terminals insulated 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 Landfilling: According to the proper laws and regulations in different countries or areas, the battery should be buried deeply in the specified place.

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

14. Transportation Information

Based on IATA dangerous goods regulation 60th Effective 1 January 2019, packing instruction 968 Section IB, the consignment is fully described by proper shipping name and packed, marked and in proper condition for carriage by air/sea. According to the current edition of the IATA 60th Effective 1 January 2019, Dangerous goods regulations and all applicable carrier and government regulations and the battery can be shipped by air/sea.

We also acknowledge that we may be liable for damage resulting from any blunder or omission and we further agree that any air carrier involved in the carriage of this consignment may rely upon this certification.

1.Lithium metal cells and batteries must be placed in inner packagings that completely enclose the cell or battery then placed in an outer packaging .The completed package for the cells or batteries must meet the Packing Group II performance standard.

2.cells and batteries are protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit;

3.Lithium batteries with a mass of 12kg or greater and having a strong, impact-resistant outer casing or assembliesof such battery may be transported when packed in strong outer packagings or protective enclosures.The packagings need not meet the requirements of Section 6 of these reguliations. The packagings must be approved by the appropriate authority of the State of origin. A copy of the document of approval must accompany the consignment.

4.Quantity per package shall not exceed 2.5kg (Air) .

5.each consignment are accompanied with a document such as an air waybill with an indication that:

- the package contains lithium metal cells or batteries;
- the package are handled with care and that a flammability hazard exists if the package is damaged;
- special procedures are followed in the event the package is damaged, to include inspection and repacking if necessary; and a telephone number for additional information.

Recommendations on the transport of dangerous goods-Model Regulations 6th revised edition,IATA Special Provision A154,A164 and IMDG Special Provision 188.

6.Each package are labelled with the Class 9 hazard label (Figure 7.3.X).

15. UN Class:

Even classified as Lithium metal batteries (UN3090),2019 IATA Dangerous Goods Regulations 60th edition Packing Instruction 968 Section IB is applied. The product is handled as Dangerous Goods by meeting the following requirements.(1)

Lithium metal cells and batteries offered for transport are not subject to other additional requirements of the UN Regulations if they meet the following(1)(3)

1. for cells ,the lithium content is no more than 1 gram
2. for batteries, the lithium content is no more than 2 grams
3. each cell or battery is of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria Part Ⅲ subsection 38.3.

Regulatory Information

IATA Dangerous Goods Regulations 60th Edition Effective 1 January 2019.

ICAO Technical Instructions for the safe transport of dangerous goods by air.

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.

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