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MATERIAL SAFETY DATA SHEET

LITHIUM/THIONYL CHLORIDE ($Li\text{-}SOCl_2$)
NON-RECHARGEABLE BATTERY

1. PRODUCT IDENTIFICATION

Product: Rechargeable NO

Trade name: LITHIUM/THIONYL CHLORIDE ($Li\text{-}SOCl_2$)

Model:

ENERGY TYPE: ER10450, ER14250, ER14505, ER17335, ER26500, ER34615, ER341245

HIGH POWER TYPE: ER13460M, ER14250M, ER14335M ER17335M, ER18505M, ER20505M, ER26500M, ER34615M,

HIGH TEMPERATURE TYPE: ER10450S, ER14250S, ER14335S, ER14505S, ER17335S , ER26500S, ER34615S

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	R1 R2 R3 R4 R5 R6 R8	S1 S2 S3 S4 S5 S7 S8
Thionyl Chloride	$SOCl_2$	40	-104.5	Irritant, Corrosive Harmful	R1 R3 R4 R6 R7 R8	S1 S2 S47 S5 S6 S7 S8
Aluminum Chloride	$AlCl_3$	3	190	Irritant Corrosive	R1 R4 R6 R8	S1 S2 S3 S4 S5 S6 S7 S8

** slight variations depending from 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

United Nations: Packaging ICAO 903 for Air Transport
IMDG for Sea Transport

International conventions:

Air	IATA	Yes
Sea	IMDG	Yes
	RID (rail)	Yes

14.3. Other: in the USA Code of Federal Regulations
(49 CFR Ch. 1 § 173-185)

15. REGULATORY INFORMATION

The transport of lithium batteries is regulated by the United Nations as detailed in the "Model Regulations on the Transport of Goods Ref. ST/SG/AC.10/1 - Revision 11 - 1999." The lithium batteries are complied with S.P.A45 The Lithium Thionyl chloride cells and the battery packs may not be restricted for transport.

Individual Lithium Thionyl chloride cells with less than 1.0 gram of lithium metal content are not restricted for transport.

UN Manual of Test and Criteria Part Ⅲ Sub section 38.3 is met.

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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