

MSDS FOR LITHIUM THIONYL CHLORIDE BATTERY (ICE BATTERY)

MANUFACTURED BY MATHEWS ASSOCIATES, INC.



# MATERIAL SAFETY DATA SHEET

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## Section 1 – IDENTIFICATION

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Product Name:

**LITHIUM THIONYL CHLORIDE  
CELLS AND BATTERIES**

**Hermetically-Sealed Lithium Thionyl Chloride Batteries**

All Electrochem 100, 150, 150/165MR, 180/180MR, 200/200MR series, QTC, MWD and VHT cells

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## Section 2 – COMPOSITION/INFORMATION ON INGREDIENTS

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Thionyl Chloride 7719-09-7	OSHA: 1.0 ppm (5.0 mg/m <sup>3</sup> ) ceiling ACGIH: 1.0 ppm (5.0 mg/m <sup>3</sup> ) ceiling
Lithium 7439-93-2	TLV/PEL N/A
Carbon 1333-86-4	ACGIH: 3.5 mg/m <sup>3</sup> TLV/TWA

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## Section 3 – HAZARDS IDENTIFICATION

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**\*\*DANGER\*\*** INTERNAL CONTENTS ARE EXTREMELY HAZARDOUS. LEAKING FLUID IS CORROSIVE. BATTERY MAY BE EXPLOSIVE AT HIGHER TEMPERATURES.

Do not expose to temperatures above the maximum rated temperature as specified by the manufacturer due to leak hazard.

### If cell or battery leaks or vents

**Primary Routes of Entry:** Inhalation

**Carcinogenicity:** Not listed by NTP, IARC, or regulated by OSHA.

**Health Hazards:** **Acute** – Vapors are very irritating to skin, eyes, and mucous membranes. Inhalation of thionyl chloride may result in pulmonary edema.

**Chronic** – Overexposure can cause symptoms of non-fibrotic lung injury

**Signs and Symptoms of Exposure:** Eye and mucous membrane irritation.

**Medical Conditions Generally Aggravated by Exposure:** Asthma, other respiratory disorders, skin allergies, and eczema.

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## Section 4 – FIRST AID MEASURES

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**Eye Contact:** Flush with running water for at least 15 minutes. Hold eyelids apart. Seek immediate medical attention. Contact results in acidic burns.

**Skin Contact:** Rinse with large amounts of running water. Avoid hot water and rubbing skin. If burns develop, seek medical attention. Contact results in acidic burns.

**Inhalation:** Remove to fresh air. If breathing is difficult, administer oxygen. If not breathing, give artificial respiration. May result in pulmonary edema.

**Ingestion:** Drink copious amounts of water (or milk if available). Do not induce vomiting. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON. Immediately seek medical attention.

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## Section 5 – FIRE FIGHTING MEASURES

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**Flash Point:** N/A

**Auto-Ignition Temp:** N/A

**Flammable Limits:** N/A

**Danger - Do not use water**

**Extinguisher Media:** Lith-X powder, Class D fire extinguisher, Dry Lithium Chloride, Graphite Powder, Pyrene G-1.

**Special Fire Fighting Procedures:** Cover with Lith-X powder, Class D fire extinguisher, dry lithium chloride, or graphite powder. DO NOT USE WATER, moist sand, CO<sub>2</sub>, Class ABC, or soda ash extinguisher. Wear protective breathing apparatus; a positive pressure Self Contained Breathing Apparatus (SCBA), or Air Purifying Respirator (APR).

**Unusual Fire and Explosion Hazards:** Do not short circuit, recharge, over discharge (discharge below 0.0 Volts), puncture, crush or expose to temperatures above the maximum rated temperature as specified by the manufacturer. Cell may leak, vent, or explode. If a bright white flame is present, lithium content is exposed and on fire; use a Class D fire extinguisher, Do not use water.

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## Section 6 – ACCIDENTAL RELEASE MEASURES

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**Accidental Releases:** Do not breathe vapors or touch liquid with bare hands (see section 4).

**Waste Disposal Methods:** Evacuate area. If possible, a trained person should attempt to stop or contain the leak by neutralizing spill with soda lime or baking soda. A NIOSH Approved Acid Gas Filter Mask or Self-Contained Breathing Apparatus should be worn. Seal leaking battery and soda lime or baking soda in a plastic bag and dispose of as hazardous waste.

**Other:** Follow North American Emergency Response Guide (NAERG) #138 for cells involved in an accident, cells that have vented, or have exploded.

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## Section 7 – HANDLING & STORAGE

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**Storage:** Cells should be stored at room temperature, approx. 21°C (70°F). Do not store batteries in high humidity environments for long periods. High Temperature storage will degrade performance.

**Precautions:** Do not short circuit or expose to temperatures above the maximum rated temperature as specified by the manufacturer. Do not recharge, over discharge, puncture or crush.

**Other Conditions:** Do not store cells in high humidity environments for long periods of time.

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## Section 8 – EXPOSURE CONTROLS / PERSONAL PROTECTION

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### When handling internal components:

**Respiratory Protection:** NIOSH Approved Acid Gas Filter Mask, or Self-Contained Breathing Apparatus.

**Protective Gloves:** Nitrile or PVC, Gloves should be 15 ml (0.015 in), or thicker.

**Eye Protection:** Chemical Worker Safety Glasses or face shield.

**Ventilation To Be Used:** Negative pressure chemical fume hood.

**Other Protective Clothing & Equipment:** Chemical Laboratory Safety Glasses, Protective Apron, Acid Resistant Protective Clothing, and face shield.

**Hygienic Work Practices:** Use good chemical hygiene practice. Do not eat or drink when handling contents. Avoid unnecessary contact.

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## Section 9 – PHYSICAL/CHEMICAL CHARACTERISTICS

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<b>Boiling Point:</b>	Thionyl Chloride: 77°C
<b>Vapor Pressure:</b>	Thionyl Chloride: 92mm @ 20 °C
<b>Vapor Density:</b>	Thionyl Chloride: 4.1
<b>Solubility in Water:</b>	Thionyl Chloride: Decomposes violently on contact with water.
<b>Specific Gravity:</b>	Thionyl Chloride: 1.63
<b>Melting Point:</b>	Thionyl Chloride: -105 °C
<b>Evaporation Rate:</b>	N/A
<b>Water Reactive:</b>	Thionyl Chloride hydrolyzes to form SO <sub>2</sub> and HCl gasses and strongly acidic wastewater.
<b>Appearance &amp; Odor:</b>	Thionyl Chloride – Colorless to pale yellow; sharp, pungent odor.

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## Section 10 – STABILITY & REACTIVITY

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**Stability:** Stable      **Incompatibility:** N/A      **Hazardous Polymerization:** Will not occur.

**Conditions to Avoid:** Temperatures above the maximum rated temperature as specified by the manufacturer due to leak hazard. High humidity for extended periods.

**Hazardous Decomposition Products:** Sulfur Dioxide (g), Hydrogen Chloride (g), Hydrogen (g)

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## Section 11 – TOXICOLOGICAL INFORMATION

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### Acute Toxicity:

#### Thionyl Chloride

<b>LC<sub>50</sub></b> (Inhalation):	1274 ppm (rat 1-hr)
<b>LD<sub>50</sub>:</b>	N/A
<b>Eye Effects:</b>	Corrosive
<b>Skin Effects:</b>	Corrosive

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## Section 12 – ECOLOGICAL INFORMATION

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**Aquatic Toxicity:** Do not let internal components enter marine environments. Avoid releases into waterways, wastewater or groundwater.

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## Section 13 – DISPOSAL CONSIDERATIONS

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**Proper Shipping Name:** Waste Lithium Batteries

**UN Number:** 3090

**Hazard Classification:** Class 9 (Misc.)

**Packing Group:** II

**Labels Required:** MISCELLANEOUS, HAZARDOUS WASTE

**Waste Disposal Code:** D003

**Other:** All lithium thionyl chloride batteries should be disposed of by a certified hazardous waste disposal facility. Contact Electrochem-Canton for recommended disposal facilities.

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## Section 14 – TRANSPORT INFORMATION

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### US DOT (per CFR 172.101) and IATA/ICAO

**Proper Shipping Name:** Lithium Batteries

**UN Number:** UN 3090 (UN 3091 for Lithium Batteries in Equipment)

**Hazard Classification:** Class 9 (Misc.)

**Packing Group:** II

**Labels Required:** MISCELLANEOUS HAZARD CLASS 9

**Other:** CARGO AIRCRAFT ONLY

**Non-Hazardous Batteries:** If the batteries contain less than 1.0 grams of lithium or lithium alloy per battery pack they are not restricted for shipping purposes by ground or air. If single cells contain less than 0.5 grams of lithium or lithium alloy, they are not restricted for shipping by ground or air.

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## Section 15 – REGULATORY INFORMATION

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**OSHA Status:** This product is considered an “Article” and the internal component (thionyl chloride) is hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29 CFR 1920.1200.

**Shipping Requirements:** Lithium batteries and cells are subject to the shipping requirements and exceptions under 49 CFR 173.185. All lithium/thionyl chloride cells with a lithium or lithium alloy content of greater than 0.5 are restricted and subject to DOT (49 CFR) and IATA shipping regulations. Cells that contain less than 0.5 grams of lithium or lithium alloy and batteries that contain less than 1.0 grams of lithium or lithium alloy are unrestricted, and they can be shipped by any means [49 CFR 173.185(a)(c)].

**IATA:** Lithium batteries have to be separated to prevent external short circuits, and must be packed in inner fiberboard containers (no more than 500 grams of lithium per inner container). The containers may then be packed with at least one inch of non-combustible packing material (vermiculite) separating each inner package in UN approved fiberboard boxes, steel drums, fiber drums, or wooden boxes. These packages must be printed with a United Nations Marking Symbol (section 6.0 of IATA shipping regulations).

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## Section 16 – OTHER INFORMATION

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### Lithium Battery Safety

With proper use and handling, lithium batteries have demonstrated an excellent safety record. The success and wide use of lithium batteries is partially due to the fact that they contain more energy per unit weight than conventional batteries. However, the same properties that result in a high energy density also contribute to potential hazards if the energy is released at a fast-uncontrolled rate. In recognition of the high-energy content of lithium systems, safety has been incorporated into the design and manufacture of all Electrochem batteries. However, abuse or mishandling of lithium batteries can still result in hazardous conditions. The information provided here is intended to give users some guidelines to safe handling and use of Electrochem lithium batteries.

### Cell Abuse

In general, the conditions that cause damage to cells and jeopardize safety are summarized on the label of each cell. These conditions include:

- Short Circuit
- Charging
- Forced Over discharge
- Excessive heating or incineration
- Crush, puncture or disassembly
- Very rough handling or high shock and vibration could also result in cell damage.

### Cell Handling and Inspection Guidelines

The most frequent forms of cell abuse can easily be identified and controlled in the workplace. It is our experience that inadvertent short circuits are the largest single cause of field failures.

**Problems associated with shorting as well as other hazardous conditions can be greatly reduced by observing the following guidelines:**

- Cover all metal work surfaces with an insulating material.
- The work area should be clean and free of sharp objects that could puncture the insulating sleeve on each cell.
- Never remove the shrink-wrap from a cell or battery pack.
- All persons handling cells should remove jewelry items such as rings, wristwatches, pendants, etc., that could come in contact with the battery terminals.
- If cells are removed from their original packages for inspection, they should be neatly arranged to preclude shorting.
- Cells should be transported in plastic trays set on push carts. This will reduce the chances of cells being dropped on the floor, causing physical damage.
- All inspection tools (calipers, rulers, etc.) should be made from non conductive materials, or covered with a non conductive tape.
- Cells should be inspected for physical damage. Cells with dented cases or terminal caps should be inspected for electrolyte leakage. If any is noted, the cell should be disposed of in the proper manner.

### Cell Storage

Cells should be stored in their original containers. Store cells in a well ventilated, cool, dry area. Store cells in an isolated area, away from combustible materials. Never stack heavy objects on top of boxes containing lithium batteries to preclude crushing or puncturing the cell case.

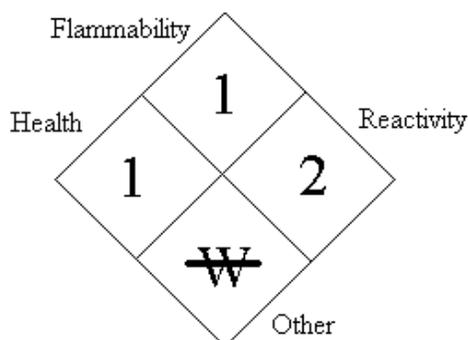
### Handling During Product Assembly

All personnel handling batteries should wear appropriate protective equipment such as safety glasses.

- Do not solder wires or tabs directly to the battery. Only solder to the leads welded to the cell by the manufacturer.
- Never touch a cell case directly with a hot soldering iron. Heat sinks should be used when soldering to the tabs, and contact with the solder tabs should be limited to a few seconds.
- Cells should not be forced into (or out of) battery holders or housings. This could deform the cell causing an internal short circuit, or fracturing the glass to metal hermetic seal.
- All ovens or environmental chambers used for testing cells or batteries should be equipped with an over-temperature controller to protect against excessive heat.
- Only precision convection ovens should be used for cell testing. Lesser ovens may exhibit uneven heating and hot spots that can exceed the rated temperature of the battery.
- Do not connect cells or batteries of different chemistries together.
- Do not connect cells or batteries of different sizes together.
- Do not connect old and new batteries together.
- Consult Electrochem before encapsulating batteries during discharge. Cells may exceed their maximum rated temperature if insulated.

Although we have provided a general overview of lithium battery safety and handling, we urge you to call us with any questions. Our technical services staff will be pleased to assist you with your questions.

### NFPA RATING



- For cells or battery packs involved in an accident, cells that have vented, or exploded, follow the North American Emergency Response Guide (NAERG) #138.

**Prepared by: Matthew Franco**  
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