MATERIAL SAFETY DATA SHEET

Issued: 6/7/2005

Section 1 – IDENTIFICATION

Product Name:

LITHIUM SULFURYL CHLORIDE
CELLS AND BATTERIES

Hermetically-Sealed Lithium Sulfuryl Chloride Cells & Batteries
All Electrochem CSC & PMX Cells and Batteries

Section 2 – COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>TLV/PEL</th>
<th>ACGIH</th>
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<tbody>
<tr>
<td>Sulfuryl Chloride</td>
<td>N/A</td>
<td>1.5 mg/m3</td>
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<tr>
<td>7791-25-5</td>
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<td>TLV/PEL</td>
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<tr>
<td>Lithium</td>
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<td>3.5 mg/m3</td>
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<td>Chlorine</td>
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<td>Carbon</td>
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<td>TLV/PEL</td>
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<tr>
<td>1333-85-4</td>
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<td>TLV/PEL</td>
</tr>
</tbody>
</table>

Section 3 – HAZARDS IDENTIFICATION

**DANGER** INTERNAL CONTENTS ARE EXTREMELY HAZARDOUS. LEAKING FLUID IS CORROSIVE AND DANGEROUS UPON INHALATION. 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 or sulfuryl chloride vapors 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.

Section 4 – FIRST AID MEASURES

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.
Section 5 – FIRE FIGHTING MEASURES

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, CO₂, 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.

Section 6 – ACCIDENTAL RELEASE MEASURES

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) #118 for cells involved in an accident, cells that have vented, or have exploded.

Section 7 – HANDLING & STORAGE

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 close proximity of other combustible / flammable materials.

Section 8 – EXPOSURE CONTROLS / PERSONAL PROTECTION

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: Chemical Worker Safety Glasses or face shield.

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.

Section 9 – PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point: Sulphuryl Chloride: 69°C

Vapor Pressure: Sulphuryl Chloride: 105 mm @ 20 °C

Vapor Density: Sulphuryl Chloride: 4.7 (air = 1)

Solubility in Water: Sulphuryl Chloride: Decomposes on contact with water. (Reacts Violently)

Specific Gravity: 13.8 liquid

Melting Point: Sulphuryl Chloride: -54 °C

Evaporation Rate: No Data

Water Reactive: Sulphuryl Chloride hydrolyzes into sulfuric, chlorosulfuric and hydrochloric acids and strongly acidic wastewater.

Appearance & Odor: Sulphuryl Chloride - yellow liquid; sharp, pungent odor.

Other: n/a

Section 10 – STABILITY & REACTIVITY

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)
Section 11 - TOXICOLOGICAL INFORMATION

Acute Toxicity (as applicable):
Thionyl Chloride
LC₅₀ (Inhalation): 500 ppm (rat, 1-hr)
LD₅₀: N/A
Eye Effects: Corrosive
Skin Effects: Corrosive
Sulfuryl Chloride
LC₅₀ (Inhalation): 130-250 ppm (rat, 1-hr)
LD₅₀: N/A
Eye Effects: Corrosive
Skin Effects: Corrosive

Section 12 - ECOLOGICAL INFORMATION

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

Section 13 - DISPOSAL CONSIDERATIONS

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.

Section 14 - TRANSPORT INFORMATION

US DOT (per 49 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 (Forbidden as cargo aboard passenger aircraft)
Shipping Requirements:
DOT: Lithium batteries and cells are subject to shipping requirements exceptions under 49 CFR 173.185.
IATA: Shipping of lithium batteries in aircrafts are regulated by the International Civil Aviation Organization (ICAO) and the International Air Transport Association (IATA) requirements in Special Provision "A45"

Section 15 - REGULATORY INFORMATION

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

Section 16 - OTHER INFORMATION

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 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 pushcarts. 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
Flammability
Reactivity
Health
Other

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

24-HOUR EMERGENCY RESPONSE
PHONE NUMBER:
(800) 255-3924

Prepared by: Matthew Franco
Rev. 05b (USP)
Date: 03/15/2005

Page 4 of 4
FIRE OR EXPLOSION
- Produce flammable gases on contact with water.
- May ignite on contact with water or moist air.
- Some react vigorously or explosively on contact with water.
- May be ignited by heat, sparks or flames.
- May re-ignite after fire is extinguished.
- Some are transported in highly flammable liquids.
- Runoff may create fire or explosion hazard.

HEALTH
- Inhalation or contact with vapors, substance or decomposition products may cause severe injury or death.
- May produce corrosive solutions on contact with water.
- Fire will produce irritating, corrosive and/or toxic gases.
- Runoff from fire control may cause pollution.

PUBLIC SAFETY
- CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.
- As an immediate precautionary measure, isolate spill or leak area in all directions for at least 50 meters (150 feet) for liquids and at least 25 meters (75 feet) for solids.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.
- Ventilate the area before entry.

PROTECTIVE CLOTHING
- Wear positive pressure self-contained breathing apparatus (SCBA).
- Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection.
- Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible.

EVACUATION
Large Spill
- See the Table of Initial Isolation and Protective Action Distances for highlighted substances. For non-highlighted substances, increase, in the downwind direction, as necessary, the isolation distance shown under "PUBLIC SAFETY".

Fire
- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.
FIRE
- DO NOT USE WATER OR FOAM.
  Small Fires
  - Dry chemical, soda ash, lime or sand.
  Large Fires
  - DRY sand, dry chemical, soda ash or lime or withdraw from area and let fire burn.
  - Move containers from fire area if you can do it without risk.
Magnesium Fires
- DRY sand, sodium chloride powder, graphite powder or Met-L-X\textsuperscript{®} powder.
Lithium Fires
- DRY sand, sodium chloride powder, graphite powder, copper powder or Lith-X\textsuperscript{®} powder.
Fire involving Tanks or Car/Trailer Loads
- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Do not get water inside containers.
- Cool containers with flooding quantities of water until well after fire is out.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.

SPILL OR LEAK
- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- Do not touch or walk through spilled material.
- Stop leak if you can do it without risk.
- Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material.
- DO NOT GET WATER on spilled substance or inside containers.
Small Spills
- Cover with DRY earth, DRY sand or other non-combustible material followed with plastic sheet to minimize spreading or contact with rain.
- Dike for later disposal; do not apply water unless directed to do so.
Powder Spills
- Cover powder spill with plastic sheet or tarp to minimize spreading and keep powder dry.
- DO NOT CLEAN-UP OR DISPOSE OF, EXCEPT UNDER SUPERVISION OF A SPECIALIST.

FIRST AID
- Move victim to fresh air.
- Call 911 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, wipe from skin immediately; flush skin or eyes with running water for at least 20 minutes.
- Keep victim warm and quiet.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.
### CELL SPECIFICATIONS:

- **Open Circuit Voltage (25°C)**: 3.9 V
- **Rated Capacity**: 30 Ah
- **Rated Discharge Current**: 1.0 A
- **Maximum continuous current**: 4.0 A
- **Cell Diameter**: 33.5 mm (1.32 in.)
- **Cell Length**: 111.4 mm (4.39 in.)
- **Cell Weight**: 213 g
- **Lithium weight**: 10.2 g
- **Safety Fuse**: 7.0 A
- **Self Discharge**: 3% per year at 25°C
- **Operating temperature**: -20°C to +93°C (-4°F to 200°F)

### Temperature Range

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August, 2002

### 25°C discharge

![25°C discharge graph](image)

### Capacity as a function of current and temperature

![Capacity graph](image)
LITHIUM SULFURYL CHLORIDE CELL

Technical Overview

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<tbody>
<tr>
<td>Open Circuit Voltage</td>
<td>3.9 V</td>
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<tr>
<td>Rated Discharge Current</td>
<td>175 mA</td>
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<td>Rated Capacity</td>
<td>7 Ah</td>
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<tr>
<td>Maximum Continuous Current</td>
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<tr>
<td>Cell Diameter</td>
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<tr>
<td>Cell Length</td>
<td>48.4 mm (1.90 in.)</td>
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<tr>
<td>Cell Weight</td>
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<tr>
<td>Lithium Weight</td>
<td>2.2 g</td>
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<tr>
<td>Safety Fuse</td>
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<tr>
<td>Self Discharge</td>
<td>3% per year at 25°C</td>
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<tr>
<td>Operating Temperature</td>
<td>-20°C to +93°C</td>
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<tr>
<td></td>
<td>-4°F to +200°F</td>
</tr>
</tbody>
</table>

Key Features:
- Primary chemistry (non-rechargeable)
- High rate capability
- Advanced spiral-wound technology
- Stainless steel container
- Hermetic glass-to-metal sealing
- Wide operating temperature range as low as -20°C and up to +93°C
- Low self discharge rate (3% per year at 25°C)
- Restricted for transportation (Class 9)
- Custom terminations available

Main Applications:
- Military communications
- Oceanographic buoys and gliders
- Tracking systems
- Sensor systems
- Pipeline inspection gauges
- Beacons, transponders and receivers
- Seismic surveying birds

Capacity as a function of current and temperature

25°C discharge

NOTICE: The information on this datasheet is for single cells only. Please consult with Electrochem if you are interested in additional information. The information in this document is subject to change without notice and does not constitute a warranty of performance.

10000 Wehrle Drive, Clarence, NY 14031 • Tel 716.759.5800 • Fax 716.759.2562
Sales@ElectrochemSolutions.com • www.ElectrochemSolutions.com

Rev. 0001
Transport Certificate

This document is to certify that Electrochem Solutions lithium cell or battery model

3PD1243 CUSTOM PACK

in its original configuration as manufactured and transported from Electrochem, meets the requirements of *UN Recommendations on the Transport of Dangerous Goods – Manual of Tests and Criteria, Fourth Revised Edition, Section 38.3, Lithium Batteries (ST/SG/AC.10/11/Rev.4).* This certification remains valid as long as no changes, modifications, or additions are made to the model after being transported from a GB facility.

When transported by air or internationally, this model is classified as **Class 9 Dangerous Goods (Hazardous Material)** for transportation purposes per the *UN Recommendations on the Transport of Dangerous Goods – Model Regulations, Thirteenth Revised Edition (ST/SG/AC.10/1/Rev.13).* As of the date of this certification, in the United States, this model may be transported as non-restricted by ground following the regulations contained in 49 CFR 173.185. This model must be packaged, labeled, and documented according to country and international regulations for transportation.

Certified by:

Kevin Christopher
Director, Quality and IT

Jonathan Levis
Safety/Environmental Manager

John Hessien
Design Engineering Manager

670 Paramount Drive, Raynham, Ma 02767 USA • phone 716-759-5800 • www.electrochemsolutions.com

15TC- 3PD1243

REV A0009
Transport Certificate

This document is to certify that Electrochem Solutions lithium cell or battery model

3PD1395 (CUSTOM PACK)

in its original configuration as manufactured and transported from Electrochem, meets the requirements of UN Recommendations on the Transport of Dangerous Goods – Manual of Tests and Criteria, Fourth Revised Edition, Section 38.3, Lithium Batteries (ST/SG/AC.10/11/Rev.4). This certification remains valid as long as no changes, modifications, or additions are made to the model after being transported from a GB facility.

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and IT

Jonathan Levis
Safety/Environmental
Manager

John Hession
Design Engineering
Manager
Transport Certificate

This document is to certify that Electrochem Solutions lithium cell or battery model

3PD1478 ASSY,BATTERY PACK

in its original configuration as manufactured and transported from Electrochem, meets the requirements of UN Recommendations on the Transport of Dangerous Goods – Manual of Tests and Criteria, Fourth Revised Edition, Section 38.3, Lithium Batteries (ST/SG/AC.10/11/Rev.4). This certification remains valid as long as no changes, modifications, or additions are made to the model after being transported from a GB facility.

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Certified by:

Kevin Christopher  Jon Levis (Dean Chapman for JL)  John Hession
Director, Quality  Safety/Environmental Manager  Design Engineering Manager

670 Paramount Drive, Raynham, MA 02767 USA  phone 716-759-5800  www.electrochemsolutions.com

15TC-3PD1478  REV A 0310  ECO 9717
Transport Certificate, Tadiran TL-5937 battery

We hereby certify that the Tadiran TL-5937 lithium cells meet all the requirements of each test in the current UN Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria, Part III, Section 38.3, as detailed in Tadiran internal report 15Q-636, dated December 2003 per the following table:

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<td>T2: Thermal Test</td>
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<td>T3: Vibrations</td>
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<td>T4: Shock</td>
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<td>T5: External Short Circuit</td>
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</table>

**Product description:**

TL-5937 is a primary (non-rechargeable), 3.7V lithium metal cell, consists of a single cell. The TL-5937 cell may come with optional suffixes consisting of a "r" followed by one or more letters and a digit. These suffixes indicate different types of finishing to the cell, e.g., TL-5937/S, TL-5937/T, TL-5937/P, TL-5937/TP, TL-5937PT2 etc.

- Nominal Capacity- 40Ah
- Lithium content per cell- 11.5 gram.

**Product Classification:**

1. **Worldwide besides the United State-** the TL-5937 lithium cell is subject to the Dangerous Goods Regulation, and thus shall be transported as Class 9. The cells must be packed in accordance with Packing Instructions of the applicable code, e.g., IATA/ICAO (Provisions: P968, P969 and P970), IMO (SP188, SP230 and P903) and ADR (SP188, SP230 and P903). Regulations changes necessitate referring to UN number 3090 (lithium batteries) and UN 3091 when packed with or in equipment.

2. **Transportation within, to and from the US-** Parts 171, 172, 173 and 175 of US-DOT CFR 49 are governing the transportation of lithium cells and batteries. TL-5937 cell and its finishing versions are defined as "large lithium cells and batteries" and thus should be transported as Class 9. Requirements for different transportation modes (e.g., Air, Sea, with and within equipment and for disposal) are defined in part 173.185 "Lithium cells and batteries".

Signed in Behalf of Tadiran:

Dr. M. Babai, Quality Manager,

Tadiran Batteries Ltd. P. O. Box 1, Kiryat Ekron, Israel 74950, Tel- (972-8) 9 444 560
**TADIRAN BATTERIES**

**MSDS No.- T-36-05 (Revision-D)**

**MATERIAL SAFETY DATA SHEET**

**SECTION 1- CHEMICAL PRODUCT AND COMPANY IDENTIFICATION**

**Manufacturer Name:** Tadiran, US office address- 2001 Marcus Avenue, Suite 125E, Lake Success, NY 11040

**US office address:** 2001 Marcus Avenue, Suite 125E, Lake Success, NY 11040

**Emergency Telephone No.** – CHEMTREC: 1-800-424-9300  
Tel. for information: 1-516-621-4980  
Tel. for information 972-8-944-4503

**Products Name:** Primary (non-rechargeable) Lithium metal Thionyl Chloride (Li/SOCl₂) cells and batteries, Non-rechargeable. Cells include the models of TL, TLH, and TLL, 3.6V series. This MSDS covers the the above models: 2100, 2134, 2135, 2137, 2150, 2155, 2186, 2200, 2300, 2450, 4902, 4903, 4920, 4930, 4934, 4935, 4937, 4940, 4951, 4955, 4986, 5101, 5104, 5114, 5134, 5135, 5137, 5151, 5155, 5186, 5233, 5242, 5276, 5293, 5315, 5902, 5903, 5920, 5930, 5937, 5940, 5955 and 5323 with all their finishing versions and batteries assembled from them, denoted by "/" followed by letters or digits.

**SECTION 2- COMPOSITION, INFORMATION ON INGREDIENTS**

<table>
<thead>
<tr>
<th>Ingredient Name</th>
<th>CAS #</th>
<th>%</th>
<th>ACGIH (TLV)</th>
<th>OHSA (PEL)</th>
<th>CHIP Classification</th>
</tr>
</thead>
</table>
| Lithium Metal (Li) | 7439-93-2 | <5%   | Not Established | None | F: R14/15  
C: R34  
R: 14/15, 34  
S: (1/2), 8,43,45 |
| Thionyl Chloride (SOCl₂) | 7719-09-7 | <47% | 0.2 ppm | 5 mg/m³ | R: 14,20/22,29, 35.  
S: (1/2),26,36/ 37/39, 45 |
| Carbon (C) | 1333-86-4 | <6% | 3.5 mg/m³ | 3.5 mg/m³ | None known |
| Aluminum Chloride (AlCl₃) | 7446-70-0 | <5% | 2 mg/m³ (Al salt, soluble) | R: 34  
S: (1/2),7/8,28, 45 |
| Lithium Chloride (LiCl) | 7447-41-8 | <2% | Not Established | |
| Glass | <1% | Not Established | |
| PVC | 9002-86-2 | <1% | Not Established | |
| PTFE | 9002-84-0 | <1% | Not Established | |
| Steel, nickel, and inert components | balance | | | |

TLV- Threshold Limit Value is personal exposure limits determined by ACGIH  
(American Council of Governmental Industrial Hygienists)

**IMPORTANT NOTE:** The above levels are not anticipated under normal use conditions.
SPECIAL FIRE FIGHTING PROCEDURES: Wear self-contained breathing apparatus to avoid breathing of irritant fumes (NIOSH approved SCBA & full protective equipment). Wear protective clothing and equipment to prevent body contact with electrolyte solution.

Fire may be fought, but only from safe fire-fighting distance. Evacuate all persons from immediate area of fire.

UNUSUAL EXPLOSION AND FIRE EXPLOSION: Battery may explode when subject to: excessive heat (above 150°C), recharged, over-discharged (discharge below 0V), punctured and crushed. During thermal decomposition generation of chlorine (Cl₂), hydrogen chloride (HCl), and sulfur dioxide (SO₂) can be formed.

SECTION 6- SPILL OR LEAKAGE PROCEDURES

PROCEDURES TO CONTAIN AND CLEAN UP LEAKS OR SPILLS: The material contained within the battery would only be released under abusive conditions.

In the event of battery rupture and leakage: contain the spill while wearing proper protective clothing and ventilate the area. Than, cover with sodium carbonate (Na₂CO₃) or 1:1 mixture of soda ash and slaked lime. Keep away from water, rain, and snow. Placed in approved container (after cooling if necessary) and disposed according to the local regulations.

NEUTRALIZING AGENTS: Sodium carbonate (Na₂CO₃) or 1:1 mixture of soda ash and slaked lime.

WASTE DISPOSAL METHOD: Product decomposed by water must be neutralized. if sufficiently diluted, it may be added to waste water if it is sufficiently diluted.

PRECAUTIONS IN HANDLING AND STORAGE: avoid short-circuiting, over-charging and heating to high temperatures. Store the batteries in dry and cool area and keep container dry and tightly closed in well-ventilated area. Store cells away from food and drink.

OTHER PRECAUTIONS: Never attempt to disassemble, machine, or otherwise modify batteries or injury may result.

SECTION 7- HANDLING AND STORAGE

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

HANDLING- Do not short circuit terminals, or expose to temperatures above the temperature rating of the battery, over charge the battery, forced over-discharge (voltage below 0.0V), throw to fire.

Do not crush or puncture the battery, or immerse in liquids.

STORAGE- is preferably done in cool (below 30°C), dry and ventilated area, which is subject to little temperature change.

Do not place the battery near heating equipment, nor expose to direct sunlight for long periods. Elevated temperatures can result in shortened battery life and degrade performance.

Keep batteries in original packaging until use and do not jumble them.
SECTION 10- STABILITY AND REACTIVITY

STABLE OR NOT STABLE
Stable

INCOMPATIBILITY (MATERIAL TO AVOID)
Strong mineral acids, water and alkali solutions.

HAZARDOUS DECOMPOSITION PRODUCTS
1. Reaction of lithium with water: Hydrogen (H₂), Lithium hydroxide (LiOH).
2. Thermal decomposition over 150°C: Sulfur oxides, (SO₂, SO₃), Sulfur chlorides (SCl₂, S₂Cl₂), Chlorine (Cl₂), Lithium oxide, Li₂O
3. Electrolyte with water: Hydrogen Chloride (HCl) and SO₂

DECOMPOSITION TEMPERATURE (°F)
NA

HAZARDOUS POLYMERIZATION: May Occur Will Not Occur X

CONDITIONS TO AVOID
Avoid mechanical abuse and electrical abuse such as short-circuiting, overcharge, over-discharge, (voltage reversal) and heating.

SECTION 11- TOXICOLOGICAL INFORMATION

THRESHOLD LIMIT VALUE (TLV) AND SOURCE: NA

HEALTH HAZARD ACUTE AND CHRONIC: Inhalation, skin contact, eye contact and ingestion are not likely by exposure to sealed battery.
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.
Carcinogenicity- NTP: No
Carcinogenicity- IARC: No
Carcinogenicity- OSHA: No

Explanation of Carcinogenicity- No ingredient of a concentration of 0.1% or greater is listed as a carcinogen or suspected carcinogen.

SIGNS AND SYMPTOMS OF OVEREXPOSURE: Exposure to leaking electrolyte from ruptured or leaking battery can cause:

Inhalation- Can cause burns and irritation of the respiratory system, coughing, wheezing and shortness of breath.
Eyes- Redness, tearing, burns. The electrolyte is corrosive to all ocular tissues.
Skin- The electrolyte is corrosive and causes skin irritation and burns.
Ingestion- The electrolyte solution causes tissue damage to throat and gastro/respiratory track.

MEDICAL CONDITION AGGRAVATED BY EXPOSURE: Preexisting skin, asthma and respiratory diseases are generally aggravated by exposure to liquid electrolyte vapors or liquid. For further information refer to section 4.

SECTION 12- ECOLOGICAL INFORMATION

1. When properly used or disposed the battery does not present environmental hazard.
2. Cells do not contain mercury, cadmium, or lead.
SECTION 16- OTHER INFORMATION/DISCLAIMER

The information and the recommendations set forth are made in good faith and believed to be accurate at the date of preparation. The present file refers to normal use of the product in question. Tadiran Batteries makes no warranty expressed or implied.

Assembly of battery packs:
The design and assembly of battery packs require special skills, expertise and experience. Therefore it is not recommended that the end user will attempt to self-assemble battery packs. It is preferable that any battery using lithium cells will be assembled by TADIRAN to ensure proper battery design and construction. A full assembly service is available from TADIRAN who can be contact for further information. If for any reason, this is not possible, TADIRAN can review the pack design in confidential to ensure that the design is safe and capable of meeting the stated performance requirements.
Transport Certificate

This document is to certify that Electrochem Solutions lithium cell or battery model

3PD1404 ASSEMBLY, BATTERY PACK

in its original configuration as manufactured and transported from Electrochem, meets the requirements of UN Recommendations on the Transport of Dangerous Goods – Manual of Tests and Criteria, Fifth Revised Edition, Section 38.3, Lithium Batteries (St/SG/AC.10/11/ Rev.5). This certification remains valid as long as no changes, modifications, or additions are made to the model after being transported from a GB facility.

When transported by air or internationally, this model is classified as Class 9 Dangerous Goods (Hazardous Material) for transportation purposes per the UN Recommendations on the Transport of Dangerous Goods – Model Regulations, Thirteenth Revised Edition (ST/SG/AC.10/1/Rev.13). This model must be packaged, labeled, and documented according to country and international regulations for transportation.

Certified by:

Kevin Christopher
Director, Quality
and IT

John Solomon
Manager, Environmental Health & Safety

John Hession
Design Engineering Manager

670 Paramount Drive, Raynham, Ma 02767 USA • phone 716-759-5800 • www.electrochemsolutions.com

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