

MATERIAL SAFETY DATA SHEET

SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Engineered Power Inc

#109, 1120 - 53 Ave N.E.
Calgary, Alberta T2E 6N9 Canada
1-403-235-2584

Emergency Telephone Number

1-800-255-3924 Within USA, Canada, Puerto Rico, US Virgin Isl.
1-813-248-0585 Outside North America Continent (call collect)

PRODUCT NAME: **LMRCC-HT - Lithium/Thionyl Chloride Batteries - 4.5g Lithium**

SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS

INGREDIENTS:	NAME	CAS #	OSHA PEL	ACGIH TLV
	Lithium (Li)	7439-93-2	N/A	Not established
	Thionyl Chloride	7719-09-7	1.0 ppm (4.9 mg/m ³)	1.0 ppm (4.9 mg/m ³)
	Lithium Chloride	7447-41-8	Not established	Not established

SECTION 3 - HAZARDS IDENTIFICATION

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

Do not expose to temperatures above temperature rating of battery due to leak hazard.

If cell or battery leaks or vents

- **Primary Routes of Entry:** Inhalation
- **Carcinogenity:** 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.

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 PROCEDURES

Flash Point: N/A

Auto-Ignition Temp: N/A

Updated: March 31, 2005

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 150°C. 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) #138 for cells involved in an accident, cells that have vented, or have exploded.

SECTION 7 - HANDLING AND STORAGE

Storage: Cells should be stored at room temperature, approx. 21°C (70 F)

Precautions: Do not short circuit or expose to temperatures above 150°C. Do not recharge, over discharge, puncture or crush.

Shelf Life: 10 years.

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

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 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.

SECTION 9 - PHYSICAL / CHEMICAL CHARACTERISTICS

Boiling Point: Thionyl Chloride: 77°C
Vapor Pressure: Thionyl Chloride: 92mm @ 20°C
Vapor Density: Thionyl Chloride: 4.1
Solubility in Water: Thionyl Chloride: Decomposes violently on contact with water.
Specific Gravity: Thionyl Chloride: 1.63

Melting Point: Thionyl Chloride: -105°C
Evaporation Rate: N/A
Water Reactive: Thionyl Chloride hydrolyzes to form SO₂ and HCl gasses and strongly acidic wastewater.
Appearance & Odor: Thionyl Chloride – Colorless to pale yellow; sharp, pungent odor.

SECTION 10 - STABILITY AND REACTIVITY

Stability: Stable

Conditions to Avoid: Temperatures in excess of 150°C. High humidity for extended periods.

Incompatibility: N/A

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

Hazardous Polymerization: Will not occur.

Other: N/A

SECTION 11 - TOXICOLOGICAL INFORMATION

Acute Toxicity:

Thionyl Chloride

LC₅₀ (Inhalation): 1274 ppm (rat 1-hr)

LD₅₀: N/A

Eye Effects: Corrosive

Skin Effects: Corrosive

Aluminum Chloride

LC₅₀ (Oral Rat): 3450 mg/kg

Fetotoxicity: Has Adverse effects on growth and behavior

Gallium (III) Chloride

LC₅₀: N/A

Eye Effects: N/A

Other Effects: N/A

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

03/31/05

Waste Disposal Code: D003

Other: All lithium thionyl chloride batteries should be disposed of by a certified hazardous waste disposal facility. Contact Battery Engineering Inc. for recommended disposal facilities.

SECTION 14 - TRANSPORT INFORMATION

**US DOT (per CFR 172.101) and IATA/ICAO
Proper Shipping Name:** LITHIUM BATTERIES

UN Number: UN 3090

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 (see section 1), 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.

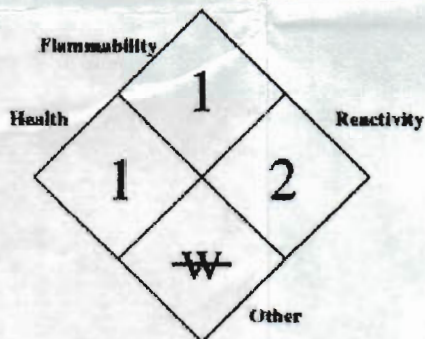
SECTION 15 - REGULATORY INFORMATION

OSHA Status: 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 grams and less than 12 grams are restricted, and they are 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)]. Those batteries with lithium or lithium alloy content greater than 12 grams must be individually approved by the governing authority, and they cannot be shipped under these regulations.

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 materials (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).

SECTION 16 - OTHER INFORMATION



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