

MATERIAL SAFETY DATA SHEET

MSDS023

Section 1. Chemical Product And Company Identification

Ultralife Part Number:	U10013, U10014	
Description:	Ultralife D Cell, U3356 or U3360	
Size:	3 Volt, Manganese Dioxide/Lithium Metal	
Ameri-King Part Number:	4500010-1	
Ameri-King Description:	Lithium Battery Pack - Non-Rechargeable	
National Stock Code:	N/A	
Manufactured by	<input checked="" type="checkbox"/> Ultralife Batteries (UK) Ltd.	<input checked="" type="checkbox"/> Ultralife Batteries, Inc.
	18 Nuffield Way	2000 Technology Pkwy
	Abington, Oxfordshire, OX14 1TG, England	Newark, NY 14513-2175
CAGE Code	U6734	0UU59
Emergency Telephone Number:	Chemtrec for Spills, Leaks, Fires	
	USA	1-800-424-9300
	International	703-527-3887
Technical Contact Telephone Number:	1-800-332-5000	

Section 2. Composition/Information on Ingredients

Chemical Name	CAS #	Exposure Limits	Percent of Content
Manganese Dioxide, MnO ₂	1313-13-9	None Listed	40 – 45
Lithium Metal, Li	7439-93-2	None Listed	3 – 4
Propylene Carbonate, C ₄ H ₆ O ₃	108-32-7	None Listed	4 – 5
Ethylene Glycol Dimethyl Ether, C ₄ H ₁₀ O ₂	110-71-4	5 ppm TWA 1ppm Pregnant Women	3 – 4
Shipping Name: 1,2-Dimethoxyethane			
Tetrahydrofuran, C ₄ H ₈ O	109-99-9	200 ppm TWA	3 – 4
Lithium Perchlorate, LiClO ₄	7791-03-9	None Listed	1

Important Note: The materials in this section may only represent a hazard if the integrity of the battery is compromised or if the battery is physically or electrically abused.

Product: Emergency Locator Transmitter (ELT) Battery Pack containing lithium manganese dioxide cells. Each battery pack has a net weight of 1.6 lbs

Electrochemical system: Each battery pack contains 13.2 grams of lithium metal. Each battery pack is diode protected, and fused.

ULTRALIFE BATTERIES

FA1284 Rev: F OCT 01 2007

Page 1 of 6

MSDS023

Rev.: K

Date: OCT 31 2007

Section 3. Hazards Identification

- 3.1 Emergency overview: May leak and /or flame if opened, recharged, connected improperly, or disposed of in fire.
- 3.2 Potential health effects: Skin contact may cause irritation and absorption. Contact with raw lithium may cause burns.
Routes of entry: Inhalation or ingestion of electrolyte may have toxic effects.
Acute exposure: Electrolyte may irritate skin and eyes.
Effects of chronic exposure: Electrolyte contains a teratogen
- 3.3 Perchlorate Material - special handling may apply. See www.dtsc.ca.gov/hazardouswaste.

Section 4. First Aid Measures

Electrolyte Contact

Skin- Immediately flush with plenty of water for at least 15 minutes. If symptoms are present after flushing, get medical attention.

Eyes- Immediately flush with plenty of water for at least 15 minutes and get medical attention.

Lithium Metal Contact

Skin- Remove particles of lithium from skin as rapidly as possible. Immediately flush with plenty of water for at least 15 minutes and get medical attention.

Eyes- Immediately flush with plenty of water for at least 15 minutes and get immediate medical attention.

Section 5. Fire Fighting Measures

Extinguishing Media:

Copious amounts of cold water are an effective extinguishing medium for lithium batteries. Do not use warm or hot water.

Do not use Halon type extinguishing material.

Fire Fighting Procedures

Use a positive pressure self-contained breathing apparatus if batteries are involved in a fire.

Full protective clothing is necessary.

During water application, caution is advised as burning pieces of lithium may be ejected from the fire.

Unusual Fire and Explosion Hazards

Batteries may flame or leak potentially hazardous organic vapors if exposed to excessive heat or fire.

Hazardous combustion products

Fire or excessive heat may produce hazardous decomposition products.

Damaged or opened batteries can result in rapid heating and the release of flammable vapors. Vapors are heavier than air and may travel along the ground or be moved by ventilation to an ignition source and flash back.

Section 6. Accidental Release Measures

Damaged batteries that are not hot or burning should be placed in a sealed plastic bag or container.

Section 7. Handling And Storage

Do not store batteries in a manner that allows terminals to short circuit.

Batteries should be separated from other materials and stored in a non-combustible, well ventilated, sprinkler-protected structure with sufficient clearance between walls and battery stacks. Do not place batteries near heating equipment, nor expose to direct sunlight for long periods

Batteries should be stored in a dry area at temperatures no higher than 85°C (194°F). Air conditioning or cooling is not required unless excessively high temperatures above 90°C (194°F) will be encountered. Elevated storage temperatures above 72°C (162°F) can result in reduced battery shelf life and service life, and should be avoided. Batteries should be kept as cool as possible in order to maximize shelf life and service life.

Batteries are not designed to be recharged. Charging a battery may result in electrolyte leakage and/ or cause the battery to flame.

Never disassemble a battery.

Should a battery unintentionally be crushed, thus releasing its contents, rubber gloves must be used to handle all battery components. Avoid inhalation of any vapors that may be emitted.

In the event of skin or eye exposure to the electrolyte, refer to Section 4, First Aid Measures.

More than a momentary short circuit will generally reduce the battery service life. Batteries with fuses will no longer be functional after being shorted.

Extended short circuiting creates high temperatures in the cell. High temperatures can cause burns in skin or cause the cell to flame.

Avoid reversing battery polarity within the battery assembly. To do so may cause cell to flame or to leak.

The use of old and new batteries or batteries of varying sizes and types in the same battery assembly should be avoided. The batteries' electrical characteristics and capabilities vary and damage may result to batteries or electrical equipment.

Section 8. Exposure Controls/Personal Protection

No engineering controls are required for handling batteries that have not been damaged. Personal protective equipment for damaged batteries should include chemical resistant gloves and safety glasses. In the event of a fire, SCBA should be worn along with thermally protective outer garments.

Section 9. Physical And Chemical Properties

Not Applicable

Section 10. Stability And Reactivity

- (1) This product is stable under ordinary conditions of use and storage.
- (2) It is not recommended that this product be stored above 85°C (194°F).
- (3) Damaged batteries will react with water. Non-discharged batteries contain elemental Lithium. This is water reactive. This reaction gives off heat and hydrogen gas. A thermal reaction may occur.
- (4) Hazardous decomposition products: Carbon Monoxide (CO), and Hydrogen Fluoride (HF)

Section 11. Toxicological Information

- (1) Irritancy: The electrolytes contained in this battery can irritate eyes with any contact. Prolonged contact with the skin or mucous membranes may cause irritation.
- (2) Sensitization: No information is available at this time.
- (3) Carcinogenicity: No information is available at this time.
- (4) Reproductive toxicity: No information is available at this time.
- (5) Teratogenicity: This product contains a known teratogen as indicated in the chemical information in section 2.
- (6) Mutagenicity: No information is available at this time.

Section 12. Ecological Information

Not applicable to this material/product.

Section 13. Disposal Considerations

Batteries must be completely discharged prior to disposal and/ or the terminals must be taped or capped to prevent short circuit. This product does not contain any materials listed by the United States EPA as requiring specific waste disposal requirements. When completely discharged it is not considered hazardous. Disposal of large quantities of lithium power cells may be subject to Federal, State, or Local regulations. Consult your local, state and provincial regulations regarding disposal of these batteries.

Section 14. Transport Information

Ultralife's lithium metal primary cells and batteries and lithium ion cells and batteries are classified and regulated as Class 9 dangerous goods (also known as "hazardous materials" in the United States) by the International Civil Aviation Organization (ICAO), International Air Transport Association (IATA), International Maritime Organization (IMO) and many government agencies such as the U.S. Department of Transportation (DOT). These organizations and agencies publish regulations that contain detailed packaging, marking, labeling, documentation, and training requirements that must be followed when offering (shipping) Ultralife's cells and batteries for transportation. **However, small cells and batteries are not subject to certain provisions of the regulations (e.g., Class 9 labeling and UN specification packaging) if they meet specific requirements.** The regulations are based on the UN Recommendations on the Transport of Dangerous Goods Model Regulations and the UN Manual of Tests and Criteria. **These regulations also apply to shipments of cells and batteries that are packed with or contained in equipment.** Failure to comply with these regulations can result in substantial civil or criminal penalties.

Cell and Battery Testing Requirements

The dangerous goods regulations require that each cell and battery design be subject to tests contained in Section 38.3 of the UN Manual of Tests and Criteria prior to being offered for transport. Ultralife's cells and batteries have been tested and comply with all of the UN testing requirements. **Batteries or battery packs constructed from Ultralife's cells must be subjected to tests contained in the UN Manual of Tests and Criteria.**

Additional Information

UN Recommendations on the Transport of Dangerous Goods Model Regulations

IATA Dangerous Goods Regulations

International Maritime Dangerous Goods Code

European Road Regulations (ADR)

U.S. Hazardous Materials Regulations

For more information, please refer to the Transportation Regulations Page on
Ultralife's Web Site:

<http://www.ultralifebatteries.com/subcategory.php?ID=12>

(1) Product is shipped as:

Ground (DOT)	Air (IATA/ICAO)	Water(IMDG)
No ground transportation	Lithium Battery Pack Only #3090 /	Lithium Battery Pack Only #3090 /
shipping requirement for	Emergency Locator Transmitter #3072	Emergency Locator Transmitter #3072
placards	Lithium Batteries / Life-Saving Appliances, Not Self-Inflating	Lithium Batteries / Life-Saving Appliances, Not Self-Inflating

(2) Special shipping information: This battery has been tested to Section 38.3 of 'UN Manual of Tests and Criteria'. These batteries should be placarded and labeled as defined in DOT, IATA and IMDG regulations based on mode of transportation.

These batteries cannot be shipped on passenger aircraft.

Section 15. Regulatory Information

USA: This MSDS meets/exceeds OSHA requirements.

Canada: This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

International: This MSDS conforms to European Union (EU), the International Standards Organization (ISO) and the International Labour Organization (ILO) and as documented in ANSI (American National Standards Institute) Standard Z400.1-1993.

Section 16. Other Information

The information contained herein is furnished without warranty of any kind. Users should consider this data only as a supplement to other information gathered by them and must make independent determinations of the suitability and completeness of information from all sources to assure proper use and disposal of these materials and the safety and health of employees and customers.

SAFETY PRECAUTIONS FOR LITHIUM-MANGANESE DIOXIDE (Li-MnO₂) CELLS AND BATTERIES

A. GENERAL¹

- 1) Lithium-Manganese Dioxide (Li-MnO₂) primary (non-rechargeable) cells and batteries have higher energy on a weight and volume basis than conventional batteries such as carbon-zinc and alkaline. Li-MnO₂ cells have a typical open circuit voltage (OCV) of 3.3 volts, and a normal operating voltage range of 2.5 to 3.0 volts depending on device current drain and ambient operating temperature. The chemical components that are responsible for their superior energy density may also contribute to an increased safety hazard if they are misused or abused. Li-MnO₂ batteries can be used with minimal risk if attention is given to both safety and enhanced performance capability.
- 2) Personnel who use or handle Li-MnO₂ cells and batteries must be familiar with their properties, safety precautions, handling procedures, and transportation and disposal requirements. For information on transportation regulations for lithium batteries refer to Ultralife document UBI-5120: [Ultralife Batteries Lithium Battery Transportation Regulations](#).
- 3) Insure that batteries are protected from heat, short circuits, compaction, mutilation, or other abusive physical or electrical conditions during storage, use and disposal. Dispose of lithium batteries in accordance with all applicable federal, state and local regulations.
- 4) Contact Ultralife for questions regarding the proper use and limitations of cells and batteries.

B. HANDLING¹

Observe the following guidelines when handling lithium cells and batteries:

- 1) Store batteries in a cool, dry, ventilated area.
- 2) Keep batteries in their original packaging until ready for use. Do not store cells or batteries loosely in boxes or bins.
- 3) Use special care in handling batteries. Make sure they are not punctured, crushed, mishandled, disassembled or exposed to storage temperatures exceeding the maximum specified temperature on the product technical data sheet.
- 4) Inspect batteries prior to use and do not use if there is any evidence of leakage or deformity. Consult the Material Safety Data Sheet (MSDS) for precautions to use when handling leaking batteries.
- 5) Turn off equipment if battery becomes hot. Wait for battery to cool before removing from equipment.
- 6) Use batteries only for the application for which they were designed.
- 7) Take warning labels seriously and follow all safety precautions.
- 8) Control battery fires in accordance with instructions on the MSDS.

¹ Information Source: RTCA Document No. RTCA/DO-227, June 23, 1995; Appendix C, Lithium Battery Safety Guidelines

SAFETY PRECAUTIONS FOR LITHIUM-MANGANESE DIOXIDE (Li-MnO₂) CELLS AND BATTERIES

Observe the following precautions when handling lithium cells and batteries:

- 1) Do not store batteries with other hazardous or combustible materials.
- 2) Do not heat or incinerate batteries. Do not dispose of batteries with other waste unless permitted by applicable regulations.
- 3) Do not open, puncture, crush, disassemble, or subject batteries to physical abuse.
- 4) Do not damage cell fill ports or glass-to-metal seals, as electrolyte leakage can result.
- 5) Do not charge primary lithium batteries. Charging is considered severe abuse and may result in venting, fire or explosion under some conditions.
- 6) Do not use a lithium battery in any application except the one for which it is intended.
- 7) Do not short circuit battery terminals. High current may lead to excessive heating.
- 8) Do not replace fuses if they activate.

C. INSTALLATION

- 1) **Installing Battery Packs in the Equipment:** To avoid damage to the battery pack, make sure the battery pack is positioned away from heat sources in the equipment.
- 2) **Mechanisms to Prevent Dropping:** Be sure to use a battery pack locking mechanism to prevent the battery pack from being ejected if the equipment is dropped or receives a sudden impact.
- 3) **Preventing Short Circuits and Reversed Connections:** Use a terminal structure that makes it unlikely the terminals will be shorted by metallic objects such as rings, necklaces, clips, hairpins, etc. Structure the battery and the terminals to the battery in such a way that the battery pack cannot be put in backwards when installed in the equipment.
- 4) **Inclusion in Other Equipment:** If the battery is built into other equipment, use caution to strictly avoid designing airtight battery compartments.
- 5) **Terminal Materials in the External Equipment:** Use materials that are highly resistant to corrosion (such as nickel or nickel-plated copper). If contact resistance is an issue, we recommend you use contact plating (such as gold plating) on the terminals.

D. USE OF THE BATTERY

See next section on "Safety Warnings for Lithium-Manganese Dioxide Cells and Batteries."

E. PLEASE NOTE

The performance and life expectancy of batteries depends heavily on how the batteries are used. In order to ensure safety, be sure to consult with Ultralife in advance regarding battery storage and operating specifications and equipment structures when designing equipment that includes these batteries.

**SAFETY WARNINGS FOR LITHIUM-MANGANESE DIOXIDE (Li-MnO₂)
CELLS AND BATTERIES****A. WHEN USING THE BATTERY****! WARNING !**

- 1) Lithium cells and batteries may get hot, explode or ignite and cause serious injury if exposed to abuse conditions. Be sure to follow the safety warnings listed below:
 - Do not place the battery in fire or heat the battery.
 - Do not install the battery backwards so the polarity is reversed.
 - Do not connect the positive terminal and negative terminal of the battery to each other with any metal object (such as wire).
 - Do not carry or store battery together with bracelets, necklaces, hairpins or other metal objects.
 - Do not pierce the battery with nails, strike the battery with a hammer, step on the battery or otherwise subject it to strong impacts or shocks.
 - Do not solder directly onto the battery.
 - Do not expose battery to water or salt water, or allow the battery to get wet.
- 2) Do not disassemble or modify the battery. The battery contains safety and protection devices, which, if damaged, may cause the battery to generate heat, explode or ignite.
- 3) Do not place the battery in or near fire, on stoves or other high temperature locations. Do not place the battery in direct sunlight, or use or store the battery inside cars in hot weather. Doing so may cause the battery to generate heat, explode or ignite. Using the battery in this manner may also result in a loss of performance and a shortened life expectancy.

! WARNING !

- 4) If the device is to be used by small children, the caregiver should explain the contents of this document to the children and provide adequate supervision to ensure the device is being used appropriately.
- 5) When the battery is discharged, insulate the terminals with adhesive tape or similar materials before disposal.
- 6) Immediately discontinue use of the battery if, while using or storing the battery, the battery emits an unusual smell, feels hot, changes color or shape, or appears abnormal in any other way. Contact Ultralife if any of these problems are observed.
- 7) Do not place the battery in microwave ovens, high-pressure containers or on induction cookware.
- 8) In the event the battery leaks and the fluid gets into one's eye, do not rub the eye. Rinse well with water and immediately seek medical care. If left untreated, the battery fluid could cause damage to the eye. Refer to the MSDS for additional safety and handling instructions.

**SAFETY WARNINGS FOR LITHIUM-MANGANESE DIOXIDE (Li-MnO₂)
CELLS AND BATTERIES****B. WHEN DISCHARGING THE BATTERY****! WARNING !**

Do not discharge the battery using any device except for the specified device. When the battery is used in devices other than the specified device, it may damage the battery or reduce its life expectancy. If the device causes an abnormal current to flow, it may cause the battery to become hot, explode or ignite and cause serious injury.

Refer to the technical data sheets for the temperature ranges over which the battery can be discharged. Use of the battery outside this temperature range may damage performance of the battery or may reduce its life expectancy.

While considerable effort has been taken to accurately represent the information contained herein, Ultralife does not guarantee its accuracy or completeness. Information may contain errors, omissions, inaccuracies, or outdated information, and Ultralife disclaims any obligation to update such information. Ultralife makes no representations or warranties as to the completeness, accuracy, adequacy, currency, or reliability of this information and shall not be liable for any lack of the foregoing. Furthermore, the information does not constitute legal advice on battery design, and should not be considered legal advice, nor substitute for obtaining battery design advice directly from Ultralife engineers.

**To ensure user safety, please contact Ultralife Batteries, Inc.
when designing a device for use with Ultralife lithium cells and batteries**



Certificate Number: TDG – 0003

Date: November 10, 2004

Issue: Initial Release

Transportation Assessment Trials

Part Number: U10014, U10016

Lithium Content: 3.4 grams

Regulations:

- United Nations Recommendations on the Transport of Dangerous Goods Model Regulations
- European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR)
- U.S. Code of Federal Regulations CFR 49, parts 100-185 Transportation of Hazardous Materials
- International Air Transport Association (IATA) – Dangerous Goods Regulations
- International Civil Aviation Organization (ICAO) – Technical Instructions for the Safe Transport of Dangerous Goods by Air
- International Maritime Organization – International Maritime Dangerous Goods (IMDG) Code

These batteries have been tested and passed United Nations Manual of Tests and Criteria 38.3 requirements.

They must be shipped as a Class 9, UN3090 material, in an approved Packaging Group 2 container. For details regarding an exception to shipping this product as Class 9, please see 49 CFR 173.185(c).

Certified on behalf of Ultralife Batteries, Inc. by

A handwritten signature in black ink, appearing to read "Jennifer M. Dimock".

Jennifer M. Dimock
Environmental, Health and Safety Manager
Ultralife Batteries, Inc.



Certificate Number: TDG – 0002

Date: November 10, 2004

Issue: Initial Release

Transportation Assessment Trials

Part Number: U10013, U10015

Lithium Content: 3.4 grams

Regulations:

- United Nations Recommendations on the Transport of Dangerous Goods Model Regulations
- European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR)
- U.S. Code of Federal Regulations CFR 49, parts 100-185 Transportation of Hazardous Materials
- International Air Transport Association (IATA) – Dangerous Goods Regulations
- International Civil Aviation Organization (ICAO) – Technical Instructions for the Safe Transport of Dangerous Goods by Air
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Jennifer M. Dimock
Environmental, Health and Safety Manager
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