



MATERIAL SAFETY DATA SHEET

SHENZHEN WEINENG ELECTRONICS CO., LTD.
MSDS No: 201901CR2477

Product Name: **Lithium-Manganese Button Cell Battery**
(Lithium Metal Battery)

Issued and Revised Date: 01-JAN-2019

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: Lithium-Manganese Button Cell Battery
Applicable Models/Sizes: CR-2477

Supplier Identification:

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2. COMPOSITION / INFORMATION ON INGREDIENTS

Information about the chemical nature of product:

Ingredient Name	CAS No.	Concentration	Weight
Stainless Steel		34.739%	2.953g
Copper Polypropylene	9003-07-0	2.556%	0.217g
Manganese powder	1313-13-9	45.591%	3.875g
Lithium Sheet	7439-93-2	3.409%	0.290g
Lithium Perchlorate	7791-03-9	5.578%	0.473g
Diaphragm Polypropylene	9003-07-0	0.227%	0.019g
Teflon	9002-84-0	1.545%	0.131g
Graphite	7782-42-5	1.545%	0.131g
Propylene Carbonate	108-32-7	2.409%	0.205g
1,2-dimethoxyethane	110-71-4	2.409%	0.205g

3. Independent Certification of Lithium-Manganese Button Cell Battery UN Transportation Model Regulation

No	Test Item	Criteria	Result	Remark
T1	Altitude Simulation	No mass loss, leakage, venting, disassembly, rupture, and fire. OCV should not be less than 90% before testing.	Passed	
T2	Thermal Test	No mass loss, leakage, venting, disassembly, rupture, and fire. OCV should not be less than 90% before testing.	Passed	
T3	Vibration	No mass loss, leakage, venting, disassembly, rupture, and fire. OCV should not be less than 90% before testing.	Passed	
T4	Shock	No mass loss, leakage, venting, disassembly, rupture, and fire. OCV should not be less than 90% before testing.	Passed	
T5	External Short Circuit	External temperature should not exceed 170 degC. No disassembly, rupture, and fire within six hours of this test.	Passed	
T6	Impact	External temperature should not exceed 170 degC. No disassembly, and fire within six hours of this test.	Passed	
T7	Overcharge	No disassembly, and fire within seven days of this test.	Passed	Battery only
T8	Forced Discharge	No disassembly, and fire within seven days of this test.	Passed	

We confirmed the test results based on the UN manual of tests and criteria 38.3

4. HAZARDS IDENTIFICATION

All chemical materials of lithium-manganese button cell battery cell are stored in a hermetically sealed metal case, designed to withstand temperatures and pressures encountered during normal use. There is no physical danger of ignition or explosion and chemical danger of hazardous materials' leakage during normal use. However, if exposed to a fire, added mechanical shocks, decomposed, added electric stress by miss-use, the gas release vent will be operated and hazardous materials may be released.

Potential Health Effects:

Cobalt and Cobalt compounds are considered to be possible human carcinogen(s). These chemicals may cause allergic skin sensitization (rash) and irritate eyes, skin, nose, throat, respiratory system.

Since electrolyte is flammable liquid, it does not bring close to fire. It may cause moderate to severe eye irritation, dryness of the skin. Breathing of its mist, vapor or fume may irritate nose, throat and lungs. Exposure of electrolyte material in the area which contains water may generate hydrofluoric acid, which can cause immediate burns on skin, severe eye burn. The ingestion of electrolyte can cause serious chemical burns of mouth, esophagus and gastrointestinal tract.

5. FIRST-AID MEASURES

- ▶ Eyes: Flush with water for at least 15 minutes. If irritation occurs and persists, contact a medical doctor.
- ▶ Skin: Remove contaminated clothing and thoroughly wash with soap and plenty of water. If irritation persists, contact a medical doctor.
- ▶ Inhalation: Remove to fresh air. If breathing difficulty or discomfort occurs and

persists, see a medical doctor. If breathing has stopped, give artificial respiration and see a medical doctor IMMEDIATELY.

6. FIRE-FIGHTING MEASURE

- ▶ Hazardous Combustion Products: When burned, hazardous products of combustion including fumes of carbon monoxide, carbon dioxide, and fluorine can occur
- ▶ Extinguishing Media: Water, carbon dioxide, dry chemical, or foam.
- ▶ Basic Fire Fighting Procedures: Wear NIOSH/MSHA approved positive pressure self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
- ▶ Unusual Fire & Explosion Hazards: This material does not represent an unusual fire or explosion hazard.
 - Flash Point: Not available
 - Autolgnition Temperature: No Data.
 - Flammability Limits in Air, Lower, % by Volume: 1.4
 - Flammability Limits in Air, Upper, % by Volume: 11

7. ACCIDENTAL RELEASE MEASURES

- ▶ Procedure for Release and Spill: Sweep up and place in a suitable container, dispose or waste according to all local, state and Federal Laws and Regulations.
- ▶ Before cleanup measures begin, review the entire MSDS with particular attention Potential Health Effects; and on Recommended Personal Protective Equipment.

8. HANDLING AND STORAGE

- ▶ Handling
 - Specific safe handling advice: Never throw out cells in a fire or expose to high temperatures. Do not soak cells in water and seawater. Do not expose to strong oxidizers. Do not give a strong mechanical shock or throw down. Never disassemble, modify or deform. Do not connect the positive terminal to the negative terminal with electrically conductive material.
- ▶ Storage conditions (suitable, to be avoided): Do not place the battery cell near heating equipment, nor expose to direct sunlight for long periods. Elevated temperatures can result in shortened battery cell life and degrade performance. Store in cool place (temperature: -20-45C, humidity: 45-75%).
- Incompatible products: Conductive materials, water, seawater, strong oxidizers and strong acids
- Packing material (recommended, not suitable): Insulative and tearproof materials are recommended.

9. EXPOSURE CONTROLS / PERSONAL PROTECTION

- ▶ Engineering controls: Investigate engineering techniques to reduce exposures use with adequate ventilation and recommended personal protective equipment.
- ▶ Eye/Face protection: Use good industrial practice to avoid eye contact. Processing of this product releases vapors or fumes which may cause eye irritation. Where eye contact may be likely wear chemical goggles and have eye flushing equipment available
- ▶ Skin protection: Minimize skin contamination by following good industrial hygiene practices. Wearing protective gloves is recommended. Wash hands and contaminated

skin thoroughly after handling.

▶ Respiratory protection: Avoid breathing dust and processing vapors. When adequate ventilation is not available, wear a NIOSH/MSHA respirator approved for protection against inorganic dusts.

▶ Special clothing: Robber gloves.

10. PHYSICAL DATA

Physical state: Solid

Form: Geometric solid

Color: Metallic color (without outer PVC cover)

Odor: No odor

pH: Not Applicable

Flash point: Not Applicable

Explosion properties: Not Applicable

Density: Not Applicable

Solubility: Not Soluble

11. STABILITY AND REACTIVITY

Hazardous reactions may occur under some specific conditions.

▶ Conditions to avoid: When a battery cell is exposed to an external short-circuit, crushes, modification, high temperature above 100 degree C, it will be the cause of heat generation and ignition. Avoid to be exposed to direct sunlight and high humidity.

▶ Materials to avoid: Conductive materials, water, seawater, strong oxidizers and strong acids.

▶ Hazardous decomposition products: Acrid or harmful gas is emitted during fire.

12. TOXICOLOGICAL INFORMATION

Eco Toxicological Information: No information available.

Local Environmental Effects: Unknown.

Since some internal materials remain in the environment, do not bury or throw out into the environment.

13 DISPOSAL INFORMATION

Waste disposal must be in accordance with the applicable regulations. Disposal of the lithium-manganese button cell battery cells should be performed by permitted, professional disposal Page:

firms knowledgeable in State or Local requirements of hazardous waste treatment and hazardous waste transportation. Incineration should never be performed by battery but users, eventually by trained professional in authorized facility with proper gas and fume treatment.

14 TRANSPORTATION/SHIPPING INFORMATION

▶ US DOT, All batteries are not subject to the requirements of the Department of Transportation (DOT) subchapter C, Hazardous Material Regulations since each battery meets the exceptions under 173.185 (b). The batteries are exempted from the US DOT regulations as long as they are separated to prevent short circuits and packed in strong packing for conditions normally encountered in transportation.

► ICAO and IATA, all batteries are regulated as Hazardous Material by the International Civil Aviation Organization (ICAO), the International Air Transport Association (IATA) and International Maritime Dangerous Goods Regulations (IMDG). The only DOT requirement for shipping these batteries is special provision 130 which states: "Batteries, dry are not subject.

They must be transported according to Section 38.3 of the Fifth Revised Edition Amendment 2 of the Recommendations on the Transport of Dangerous Goods, Manual of Test and Criteria (ST/SG/AC.10/11/Rev.5/Amend.2/Section 38.3) and Drop test of Section II of Packing Instructions 968~970 of 60th DGR Manual of IATA .

► IMO, all batteries are regulated as Hazardous Material by the International Maritime Organization (IMO) when transporting more than 24 batteries or 12 batteries in a single package. These must be transported according to the requirement in Special Provisions "188" and "230".

Batteries are as per IMDG SP:188 and tested as NON DG.

Package complies with the special provision 188 of IMDG CODE(Amdt.38-16)2016 Edition.

► ADR, RID, all batteries are regulated as Hazardous Material by the ADR (road) and RID (rail) when transporting more than 24 batteries or 12 batteries in a single package. These must be transported according to the requirement in Special Provisions "188" and "230".

► BUILDING OF NEW BATTERY PACK- if you build any of lithium batteries into battery pack, you must assure that they are being tested in accordance

15. DISPOSAL CONSIDERATIONS.

Lithium batteries are best disposed of as a non-hazardous waste when fully or mostly sidcharged. The Federal Environmental Protection Agency (EPA) do not list Lithium as a hazardous waste. However, if waste lithium batteries are still fully charged or only partially discharged, they can be considered a reactive hazardous waste because of significant amount of unreacted lithium in the battery. The battery must be neutralized through an approved secondary treatment facility prior to disposal as a hazardous waste. Secondary treatment centers receive these batteries as manifested hazardous waste under code "D003-reactive." Use a professional disposal firm for disposal of mass quantities of undischarged lithium batteries. DO NOT INCINERATE or subject battery cells to temperatures in excess of 212° F. Such treatment can cause cell rupture.

16. OTHER INFORMATION.

For more information please contact:

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