Guangzhou Markyn Battery Co., Ltd
STANDARD DOCUMENT

Lithium Manganese Dioxide Cell

Specification of ER22G68

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Guangzhou Markyn Battery Co., Ltd

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1.Scope

The document applies to Lithium Manganese Dioxide Cell supplied by Guangzhou Markyn Battery Co., Ltd

2.Category

Lithium Manganese Dioxide Cell

3.Characteristic

TABLE 3.1

No.	Item	Characteristic	Remark
3.1	Cell type	ER22G68	
3.2	Open circuit voltage（V）	3.6	
3.3	Nominal capability（mAh）(3.0KΩ/1mA，Cut-off voltage 2.0V)	400	
3.4	Discharge capability(mAh）(6.98KΩ to cut-off voltage 2.0V)	375±25	
3.5	Maximum recommended continuous current（ma）	5	Please consult GMB
3.6	Maximum pulse current（ma）	20	Please consult GMB
3.7	Outside dimensions（mm）	Diameter Φ 17.0 Height H 34.5	See the attached drawing 12
3.8	Normal weight（g）	6	
3.9	Volume of battery（cm^3）	1.2	
3.10	Operating temperature（℃）	-55～+85	

4.Appearance

4.1 Structure:

Glass-to-metal technology and patents of GMB ownself for sealed and packing technology to ensure the inherent safety to both the device and the battery.

（at 1atm He下≤10^{-7}atm.cc/s）

4.2Appearance：No scathe, no crackle, no dirty spots, no deformation and leakages.

5. **Date coding**：The date should be marked on the thimble.

Method:MM—YY Month—year

Year

Month

6.Technology requirement and performance

6.1Technology requirement

TABLE 6.1

No.	Item	Test condition	The performance stored for a year or less	The performance stored after a year
6.1.1	Open circuit voltage Room temperature Low temperature High temperature	 25±2℃ -30±2℃ 60±2℃	 3.63—3.73V 3.62—3.72V 3.64—3.74V	 3.63—3.73V 3.62—3.72V 3.64—3.74V
6.1.2	Operating voltage Room temperature Low temperature High temperature	Load discharge：6.98KΩ 20±2℃ -40±2℃ 60±2℃	 The lowest：3.4V The lowest：3.0V The lowest：3.5V	 The lowest：3.4V The lowest：2.8V The lowest：3.5V
6.1.3	Life-Service Room temperature Low temperature High temperature Room temperature	2.0V cut off Loaddischarge6.98KΩ 20±2℃ -40±2℃ 60±2℃ Load discharge：660Ω 20±2℃	 The lowest：800h The lowest：400h The lowest：760h The lowest：50h	 The lowest：766h The lowest：360h The lowest：720h The lowest：48h
6.1.4	Electrolyte Leakage	In testing 1-3	No leakage	
6.1.5	Deformation	In testing 1-3	The cell size don't overstep standard.	

6.2 Safety and Apply to circumstance capability

6.2.1 Safety

TABLE 6.2.1

No.	Test method	Test method	Standard
6.2.1.1	Forced charge capability	In reverse connect 12V DC power, burden 3 times of charge current specified by manufacturer(10mA), Observe test result after forced charge for above 24 hours.	No leakage,no explosion
6.2.1.2	Over discharge	Connect in series single cell of complete discharge and 1PCS new cell to forced discharge for 13h, then observe test result.	No leakage,no explosion
6.2.1.3	Short circuit at room temperature	Short circuit each cell with 1.3mm copper lead in turn and put it in small box.Record test result after some time.	The requirement is no explosion, no fire etc. The surface temperature≤ 150±2℃
6.2.1.4	Short circuit at 60℃	Lay the cell up on 19CM board and put in oven to heat to 60 ±2℃（140±4℉）。After 1h in turn with 1.3mm copper lead (No.30AWG) short circuit and put it in oven.Take out shell,come back to room temperature and observe test result after some time.	

6.2.2 Apply to circumstance capability

TABLE 6.2.2

No.	Test method	Test method	Standard
6.2.2.1	High-low temperature cycle test	Put the cell in constant temperature oven for 30min, rise to 75±2℃ and keep it for 4h，Then after 30min drop to 20±3℃ and keep it for 2h, after 30min drop to -40±3℃ and keep it for 4h, last after 30min rise to 20±3℃. Cycle the stages 10 times.	No leakage,no explosion
6.2.2.2	Low press test	Put the cell in vacuum oven. Set temperature 20±3℃, press is 0.07MPa, lay it aside for 6h and take out to check.	No leakage,no explosion
6.2.2.3	Free fall	Each cell should be dropped 10 times from 1.9m onto cement ground.	No leakage,no explosion
6.2.2.4	Vibration	Put the cell in box and fix it. Then put it on electromotion instrument.(Vibration 0.75mm),original frequency is 10Hz，at 1Hz/min rise to 55Hz，at the same rate drop to 10Hz. The whole course is 90min.	No leakage,no explosion

7.Electronical test

7.1 Test condition and instrument:

7.1.1 Test environment:

Unless other stated, normal ambient conditions apply.Temperature: 25±3℃, Relative humidity:65±20%,barometric

7.1.2 Orientation of the cell:

Cell should be oriented with positive terminals in upward position.

7.1.3 Measure Instrument

（1）Dimensional measurement will be carried out using a caliper which has accuracy of ±0.02mm.

（2）Voltage measurement will be carried out using a voltmeter calibrated, which has an accuracy of minimum ±0.5% and a resolution of 0.01V and impedance of above 10MΩ.

（3）weight measurement will be carried out using a instrument which has accuracy of 0.05g.

（4）Load discharge include all outer circuit resistance, its tolerance ≤1%.

7.2 Test method

TABLE 7.2

Ambiance temperature（A）		Steady time(B)
Room temperature	20±2℃	The lowest: 12h
Low temperature	-40±2℃	12-24h
High temperature	60±2℃	12-24h

7.2.1 Deformation

Go along 3.7items (Table3.1) or attach drawing to do measurement test in the condition of 7.1

7.2.2 Load voltage

According to Table7.2, put the cell in temperature A and time B. Use voltmeter specified in 7.1.3(2) to measure voltage between "+" and"-".

7.2.3 Load voltage

Fit the battery with a 100mA/29Ω load resistance and discharge for 5min,then use voltmeter specified in 7.1.3(2) to measure voltage between "+" and"-".

7.2.4 Operating voltage

According to Table 7.2, put the battery in temperature A and B.Continually discharge at discharge resistance specified in 6.1.3. The voltage value after 60min is operating voltage.

7.2.5 Weight test

Use instrument of 7.1 to do weight test(3.8) in Table3.1 in test condition.

7.3 Service life

According to Table7.2, put the battery in temperature A and time B. Continually discharge at discharge resistance specified in 6.1.4. Stop discharge when voltage is lower than cut-off voltage 2.0V, the lowest operation life see 6.1.4.

7.4 Hermetically sealed test

Appearance is judged visually.

8. Quality guarantee

8.1 Quality standard:

In according to this product specification.

8.2 Check unit:

The basic unit is pcs.

8.3The definition of Batch No:

Batch serial is the same under the same production and system. (month and year).

9.Quality consistency check

Quality consistency check is used to judge guarantee steadiness of products quality in production. It can be execute refer to GB2828.1-2003, GB2829-2002.Sample project,check item and judge rule, ect., should be confirmed by the seller in principle. Quality consistency check should be disparted into A. B. C. D four groups.

9.1 A group Check

Have 100% quality check according to order of the Table9.1.

TABLE 9.1

Item	Technology requirement	Test method
Appearance, marking	5;7.4	Check from appearance
Voltage	6.1.1;6.1.2;6.1.3	7.1;7.2.2;7.2.3

9.2 B group Check

Take out sample at random form A group Check, Test item, order, check level AQL see the Table9.2.

TABLE 9.2

Item	Technology requirement	Test method	Check level	AQL
Appearance Size	3.7	7.1.3（1）	S-3	0.65
Weight	3.8	7.1.3（3）;7.2.5	S-3	0.65

9.3 C group Check

Take out sample at random form B group Check, Test item, order, check level AQL see the Table 9.3.

TABLE 9.3

Item	Technology requirement	Test method	Check level	AQL
Operating voltage	6.1.3 项	7.1;7.2.4	S-3	0.65
Capability	6.1.4	7.1;7.3	S-3	0.65

9.4 D group Check

D group should be checked by orderer or under orderer monitor.Test item,serial check level and AQL.See Table 9.4. Before having test result can't stop consignment.

TABLE 9.4

Item	Technology requirement	Test method	Check level	AQL
Storage and capability	6.1.4	7.1;7.3	S-3	0.65

10. Safety

Although the raw material of GMB batteries has no social effects of pollution ,and use a unique product technology to insure the security of the battery, it also have a definite danger as the same as other battery, when it suffer mechanism damage, so you must abide the following measure:

10.1 Storage

GMB lithium cell should be stored in cool, clean and dry place, recommended temp. 10℃~30℃, relative humidity ≤60%, avoid contact with corrosive matters, away from fire and heat. Notes:

- No exposure to place with temp. higher than 180℃
- The cell should be put in original packing to eliminate any possible external short circuit.
- Don't put cell in electricity conductive anti-static bags.
- Don't put the cell on the electricity conductive/metal surface.

10.2 Transport

Avoid violent shake, impact or extrusion and rain. Suitable vehicles are cars, trains, ships and planes.

10.3 Safe use

- Avoid short circuit between the cathode and the anode.
- Over discharge, extrusion, piercing and burning of cells are strictly prohibited.
- Disassembly of cells is strictly prohibited.
- Don't use cells out of the allowable temperature range.
- Keep the batteries away from children, if batteries are swallowed by mistake, please immediately contact a doctor.

11. Remark of production duty

You must strictly operate according to specification and remark of GMB. Reason of error use rise fire, explosion, so hurt body and lose wealth.We don't burden any duty on any contretemps risen from error use.

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12. Size Drawing