Pony Testing International Group

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锂电池 UN38.3 测试报告

Lithium Battery UN38.3 Test Report

Sample Name	Cylindrical Li/MnO_2 Battery CR2
Client	Wuhan Lixing (Torch) Power Sources Co., Ltd.
Manufacturer	Wuhan Lixing (Torch) Power Sources Co., Ltd.

P O N Y 谱 尼 测 试

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I、 SAMPLE DESCRIPTION

Sample Name	Cylindrical Li/MnO_2 Battery		Battery Type	CR2	
Client	Wuhan Lixing (Torch) Power Sources Co., Ltd.				
Manufacturer	Wuhan Lixing (Torch) Power Sources Co., Ltd.				
Nominal Voltage	3V	Rated Capacity	850mAh	Limited Charge Voltage	---
Charge Current	---	Maximum Continuous Charge Current	---	End Charge Current	---
Cut-off Voltage	2V	Maximum Discharge Current	1000mA	Use	---
Cells Number	1PCS	Cell Model	CR2	Rated Capacity	850mAh
Manufacturer of cell	Wuhan Lixing (Torch) Power Sources Co., Ltd.				
Chemical component	Electrolyte, Li, MnO_2 etc.				
Client date	2011-04-01		Finished date	2011-04-22	

II、STANDARD

Recommendations on transport of dangerous goods，manual of test and criteria，section 38.3 lithium batteries.

III、 TEST ITEM

1. Altitude simulation
2. Thermal test
3. Vibration
4. Shock
5. External short circuit
6. Impact
7. Overcharge (For battery)
8. Forced discharge

IV、 CONCLUSION

ITEM	SAMPLE NUMBER	STANDARD	CONCLUSION
Altitude simulation	N1~N10 N11~N20	UN38.3	PASS
Thermal test			PASS
Vibration			PASS
Shock			PASS
External short circuit			PASS
Impact	N21~N30		PASS
Overcharge (For battery)	---		N/A (Not applicable)
Forced discharge	N31~N40		PASS

The submitted battery and component cell were complied with the stated requirements of UN38.3.

Edited by: Zuojingjing Checked by: Liyou Approved by: Liyou

Approval Date：April 22, 2011

Notes：

Cells of N1~N10 、N21~N25 are not discharged;

Cells of N11~N20、N26~N40 are full discharged.

V、 PHOTO OF THE SAMPLE



Authenticate the photo on original report only

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VI、 TEST METHOD

Test 1 to 5 must be conducted in sequence on the same cell.

In order to quantify the mass loss, the following procedure is provided:

$$Mass\ loss(\%) = (M1-M2) / M1 \times 100\%$$

Where M1 is the mass before the test and M2 is the mass after the test. When mass loss does not exceed the value in table blow, it shall be considered as “no mass loss”.

Mass M of cell or battery	Mass loss limit
M＜1g	0.5%
1g＜M＜5g	0.2%
M≥5g	0.1%

In test 1 to 4, cells meet this requirement if there is no mass loss, no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.

1. Altitude simulation

Test batteries or cells shall be stored at a pressure of 11.6 kPa or less for at least six hours at ambient temperature(20±5℃).

2. Thermal test

Test cells and batteries are to be stored for at least six hours at a test temperature equal to 75±2℃, followed by storage for at least six hours at a test temperature equal to - 40±2℃. The maximum time interval between test temperature extremes is 30 minutes. This procedure is to be repeated 10 times, after which all cells and batteries are to be stored for 24 hours at ambient temperature(20±5℃). For large cell and batteries the duration of exposure to the test temperature extremes should be at least 12 hours.

3. Vibration

Cells and batteries are firmly secured to the platform of the vibration machine without distorting the cells in such a manner as to faithfully transmit the vibration. The vibration shall be a sinusoidal waveform with a logarithmic sweep between 7 Hz and 200 Hz and back to 7 Hz traversed in 15minutes. This cycle shall be repeated 12 times for a total of 3 hours for each of three mutually perpendicular mounting positions of the cell. One of the directions of vibration must be perpendicular to the terminal face.

The logarithmic frequency sweep is as follows: from 7 Hz a peak acceleration of 1 g is maintained until 18 Hz is reached. The amplitude is then maintained at 0.8 mm (1.6 mm total excursion) and the frequency increased until a peak acceleration of 8 g occurs (approximately 50 Hz). A peak acceleration of 8 g is then maintained until the frequency is increased to 200 Hz.

4. Shock

Test cells and batteries shall be secured to the testing machine by means of a rigid mount, which will support all mounting surfaces of each test battery. Each cell or battery shall be subjected to a half-sine shock of peak acceleration of 150 g and pulse duration of 6 milliseconds. Each cell or battery shall be subjected to three shocks in the positive direction followed by three shocks in the negative direction of three mutually perpendicular mounting positions of the cell or battery for a total of 18 shocks.

5. External short circuit

The cell and battery to be tested shall be temperature stabilized so that its external case temperature reaches 55±2℃ and then the cell or battery shall be subjected to a short circuit condition with a total external resistance of less than 0.1 ohm at 55±2℃. This short circuit condition is continued for at least one hours after the cell or battery external case temperature has returned to 55±2℃. The cell or battery must be observed for a further six hours for the test to be conclude.

Cells and batteries meet this requirement if their temperature does not exceed 170℃ and there is no disassembly, no rupture and no fire within six hours of this test.

6. Impact

The test sample cell or component cell is to be placed on a flat surface. A 15.8 mm diameter bar is to be placed across the center of the sample. A 9.1 kg mass is to be dropped from a height of 61±2.5 cm onto the sample.

A cylindrical or prismatic cell is to be impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the 15.8 mm diameter curved surface lying across the center of the test sample. A prismatic cell is also to be rotated 90 degrees around its longitudinal axis so that both the wide and narrow side will be subjected to the impact. Each sample is to be subjected to only a single impact; Separate samples are to be used for each impact.

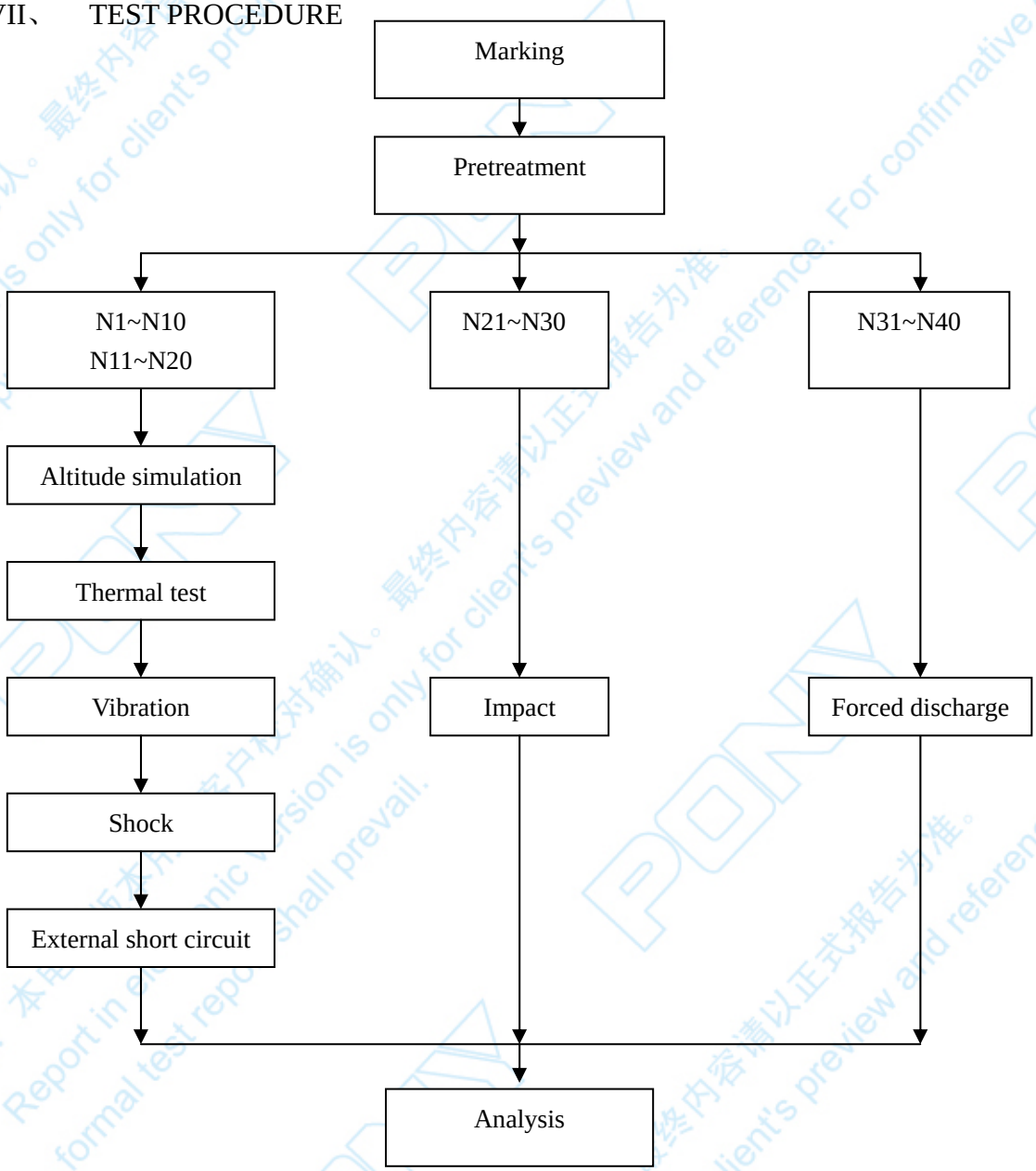
Cells and component cells meet this requirement if their external temperature does not exceed 170 ℃ and there is no disassembly and no fire within six hours of this test.

7. Forced discharge

Each cell shall be forced discharged at ambient temperature by connecting its in series with a 12 V D.C. power supply at an initial current equal to the maximum discharge current specified by the manufacturer. The specified discharge current is to be obtained by connecting a resistive load of the appropriate size and rating in series with the test cell. Each cell shall be forced discharged for a time interval (in hours) equal to its rated capacity divided by the initial test current (in Ampere).

Primary or rechargeable cells meet this requirement if there is no disassembly and fire within seven days of the test.

VII、 TEST PROCEDURE



VIII、 TEST APPARATUS

SZSB-121 Rechargeable battery test system
SZSB-280 Vacuum chamber (for battery test)
SZSB-120 Temperature circulation chamber
SZSB-128 Vibration test instrument
SZSB-082 Shock test instrument
SZSB-281 Battery anti-explosion chamber
SZSB-077 DC regulated power supply
SZSB-081 Impact test instrument
SZSB-125 Electronic balance
SZSB-090 Digital multimeter
SZSB-185 Thermoelectric pair

IX、 DATA

1. Altitude simulation

No.	Pre-test		After test		Mass loss （%）	Voltage loss （%）	Status
	Mass (g)	Voltage (V)	Mass (g)	Voltage (V)			
N1	10.925	3.211	10.925	3.211	0.000	0.00	PASS
N2	11.088	3.192	11.087	3.192	0.009	0.00	PASS
N3	10.975	3.188	10.975	3.187	0.000	0.03	PASS
N4	11.022	3.220	11.022	3.220	0.000	0.00	PASS
N5	11.112	3.208	11.111	3.208	0.009	0.00	PASS
N6	11.015	3.197	11.015	3.197	0.000	0.00	PASS
N7	11.005	3.200	11.005	3.200	0.000	0.00	PASS
N8	10.998	3.204	10.998	3.204	0.000	0.00	PASS
N9	10.952	3.188	10.951	3.188	0.009	0.00	PASS
N10	10.944	3.217	10.944	3.217	0.000	0.00	PASS
N11	11.052	---	11.052	---	0.000	---	PASS
N12	11.138	---	11.137	---	0.009	---	PASS
N13	10.744	---	10.744	---	0.000	---	PASS
N14	10.952	---	10.952	---	0.000	---	PASS
N15	10.943	---	10.943	---	0.000	---	PASS
N16	10.865	---	10.865	---	0.000	---	PASS
N17	10.942	---	10.942	---	0.000	---	PASS
N18	11.096	---	11.095	---	0.009	---	PASS
N19	10.742	---	10.742	---	0.000	---	PASS
N20	10.999	---	10.999	---	0.000	---	PASS

2. Thermal test

No.	Pre-test		After test		Mass loss （%）	Voltage loss （%）	Status
	Mass (g)	Voltage (V)	Mass (g)	Voltage (V)			
N1	10.925	3.211	10.922	3.240	0.027	-0.90	PASS
N2	11.087	3.192	11.083	3.225	0.036	-1.03	PASS
N3	10.975	3.187	10.972	3.223	0.027	-1.13	PASS
N4	11.022	3.220	11.019	3.238	0.027	-0.56	PASS
N5	11.111	3.208	11.107	3.238	0.036	-0.94	PASS
N6	11.015	3.197	11.012	3.231	0.027	-1.06	PASS
N7	11.005	3.200	11.002	3.232	0.027	-1.00	PASS
N8	10.998	3.204	10.994	3.235	0.036	-0.97	PASS
N9	10.951	3.188	10.948	3.224	0.027	-1.13	PASS
N10	10.944	3.217	10.941	3.244	0.027	-0.84	PASS
N11	11.052	---	11.048	---	0.036	---	PASS
N12	11.137	---	11.133	---	0.036	---	PASS
N13	10.744	---	10.741	---	0.028	---	PASS
N14	10.952	---	10.949	---	0.027	---	PASS
N15	10.943	---	10.940	---	0.027	---	PASS
N16	10.865	---	10.862	---	0.028	---	PASS
N17	10.942	---	10.939	---	0.027	---	PASS
N18	11.095	---	11.091	---	0.036	---	PASS
N19	10.742	---	10.739	---	0.028	---	PASS
N20	10.999	---	10.995	---	0.036	---	PASS

3. Vibration

No.	Pre-test		After test		Mass loss （%）	Voltage loss （%）	Status
	Mass (g)	Voltage (V)	Mass (g)	Voltage (V)			
N1	10.922	3.240	10.922	3.240	0.000	0.00	PASS
N2	11.083	3.225	11.082	3.224	0.009	0.03	PASS
N3	10.972	3.223	10.972	3.223	0.000	0.00	PASS
N4	11.019	3.238	11.019	3.238	0.000	0.00	PASS
N5	11.107	3.238	11.106	3.236	0.009	0.06	PASS
N6	11.012	3.231	11.012	3.231	0.000	0.00	PASS
N7	11.002	3.232	11.002	3.232	0.000	0.00	PASS
N8	10.994	3.235	10.994	3.235	0.000	0.00	PASS
N9	10.948	3.224	10.947	3.224	0.009	0.00	PASS
N10	10.941	3.244	10.941	3.243	0.000	0.03	PASS
N11	11.048	---	11.047	---	0.009	---	PASS
N12	11.133	---	11.132	---	0.009	---	PASS
N13	10.741	---	10.741	---	0.000	---	PASS
N14	10.949	---	10.948	---	0.009	---	PASS
N15	10.940	---	10.940	---	0.000	---	PASS
N16	10.862	---	10.862	---	0.000	---	PASS
N17	10.939	---	10.938	---	0.009	---	PASS
N18	11.091	---	11.091	---	0.000	---	PASS
N19	10.739	---	10.739	---	0.000	---	PASS
N20	10.995	---	10.995	---	0.000	---	PASS

4. Shock

No.	Pre-test		After test		Mass loss (%)	Voltage loss (%)	Status
	Mass (g)	Voltage (V)	Mass (g)	Voltage (V)			
N1	10.922	3.240	10.922	3.239	0.000	0.03	PASS
N2	11.082	3.224	11.082	3.224	0.000	0.00	PASS
N3	10.972	3.223	10.972	3.223	0.000	0.00	PASS
N4	11.019	3.238	11.018	3.238	0.009	0.00	PASS
N5	11.106	3.236	11.106	3.236	0.000	0.00	PASS
N6	11.012	3.231	11.012	3.229	0.000	0.06	PASS
N7	11.002	3.232	11.002	3.232	0.000	0.00	PASS
N8	10.994	3.235	10.994	3.235	0.000	0.00	PASS
N9	10.947	3.224	10.947	3.224	0.000	0.00	PASS
N10	10.941	3.243	10.941	3.243	0.000	0.00	PASS
N11	11.047	---	11.047	---	0.000	---	PASS
N12	11.132	---	11.132	---	0.000	---	PASS
N13	10.741	---	10.741	---	0.000	---	PASS
N14	10.948	---	10.947	---	0.009	---	PASS
N15	10.940	---	10.940	---	0.000	---	PASS
N16	10.862	---	10.862	---	0.000	---	PASS
N17	10.938	---	10.938	---	0.000	---	PASS
N18	11.091	---	11.091	---	0.000	---	PASS
N19	10.739	---	10.738	---	0.009	---	PASS
N20	10.995	---	10.995	---	0.000	---	PASS

5. External short circuit

No.	Peak temperature(℃)	Status
N1	81	PASS
N2	89	PASS
N3	83	PASS
N4	88	PASS
N5	82	PASS
N6	87	PASS
N7	89	PASS
N8	91	PASS
N9	87	PASS
N10	82	PASS
N11	56	PASS
N12	55	PASS
N13	59	PASS
N14	54	PASS
N15	57	PASS
N16	56	PASS
N17	58	PASS
N18	55	PASS
N19	56	PASS
N20	55	PASS

6. Impact

No.	Peak temperature(℃)	Status
N21	69	PASS
N22	67	PASS
N23	68	PASS
N24	66	PASS
N25	68	PASS
N26	24	PASS
N27	26	PASS
N28	24	PASS
N29	28	PASS
N30	25	PASS

7. Overcharge (For battery)

N/A (Not applicable)

8. Forced discharge

No.	Status
N31	PASS
N32	PASS
N33	PASS
N34	PASS
N35	PASS
N36	PASS
N37	PASS
N38	PASS
N39	PASS
N40	PASS