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CNAS L3192

Report ID: SZ081229-026a

UN38.3 TEST REPORT

Sample Name: Li-Mn Battery CR2032

Client: Guangzhou TianQiu Enterprise Co., Ltd.

Manufacturer: Guangzhou TianQiu Enterprise Co., Ltd.

Pony Testing International Group

http://www.ponytestsz.com

I、 SAMPLE DESCRIPTION

Sample Name	Li-Mn Battery		Battery Type	CR2032	
Client	Guangzhou TianQiu Enterprise Co., Ltd.				
Manufacturer	Guangzhou TianQiu Enterprise Co., Ltd.				
Nominal Voltage	3.0V	Rated Capacity	210mAh	Limited Charge Voltage	NA
Charge Current	NA	Maximum Continuous Charge Current	NA	End Charge Current	NA
Cut-off Voltage	2.0V	Maximum Discharge	15mA	Use	Calculator、watch
Cells Number	1PCS	Cell Model	CR2032	Rated Capacity	210mAh
Manufacturer of cell	Guangzhou TianQiu Enterprise Co., Ltd.		Chemical component		Li/MnO_2
Client date	2008-12-29		Finished date	2009-01-09	

II、STANDARD

Recommendations on transport of dangerous goods，manual of test and criteria，section 38.3 lithium batteries（ST/SG/AC.10/11/ section 38.3)

III、 TEST ITEM

1. Altitude simulation
2. Thermal test
3. Vibration
4. Shock
5. External short circuit
6. Impact
7. Forced discharge

IV、 CONCLUSION

ITEM	SAMPLE NUMBER	STANDARD	CONCLUSION
Altitude simulation	N 1~N10 N11~N20	UN38.3	PASS
Thermal test			PASS
Vibration			PASS
Shock			PASS
External short circuit			PASS
Impact	N21~N25 C1~C5		PASS
Forced discharge	N26~N30 C6~C10		PASS

The submitted samples were complied with the stated requirements of ST/SG/AC.10/11/ section 38.3.

Technique Controller: Song Wei

Approval Date: January 9, 2009

Notes:

Batteries of N1~N10 are undischarged.

Batteries of N11~N20 are fully discharged.

Batteries of N21~N25 are undischarged.

Batteries of C1~C5 are fully discharged.

Batteries of N26~N30, C6~C10 are fully discharged.

V、 PHOTO OF THE SAMPLE

Authenticate the photo on original report only

VI、 TEST METHOD

Each cell must be subjected to test 1 to 6 and 8. Test 1 to 5 must be conducted in sequence on the same cell or battery. Test 6 and 8 should be conducted using not otherwise tested cells or batteries.

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 11.3 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.

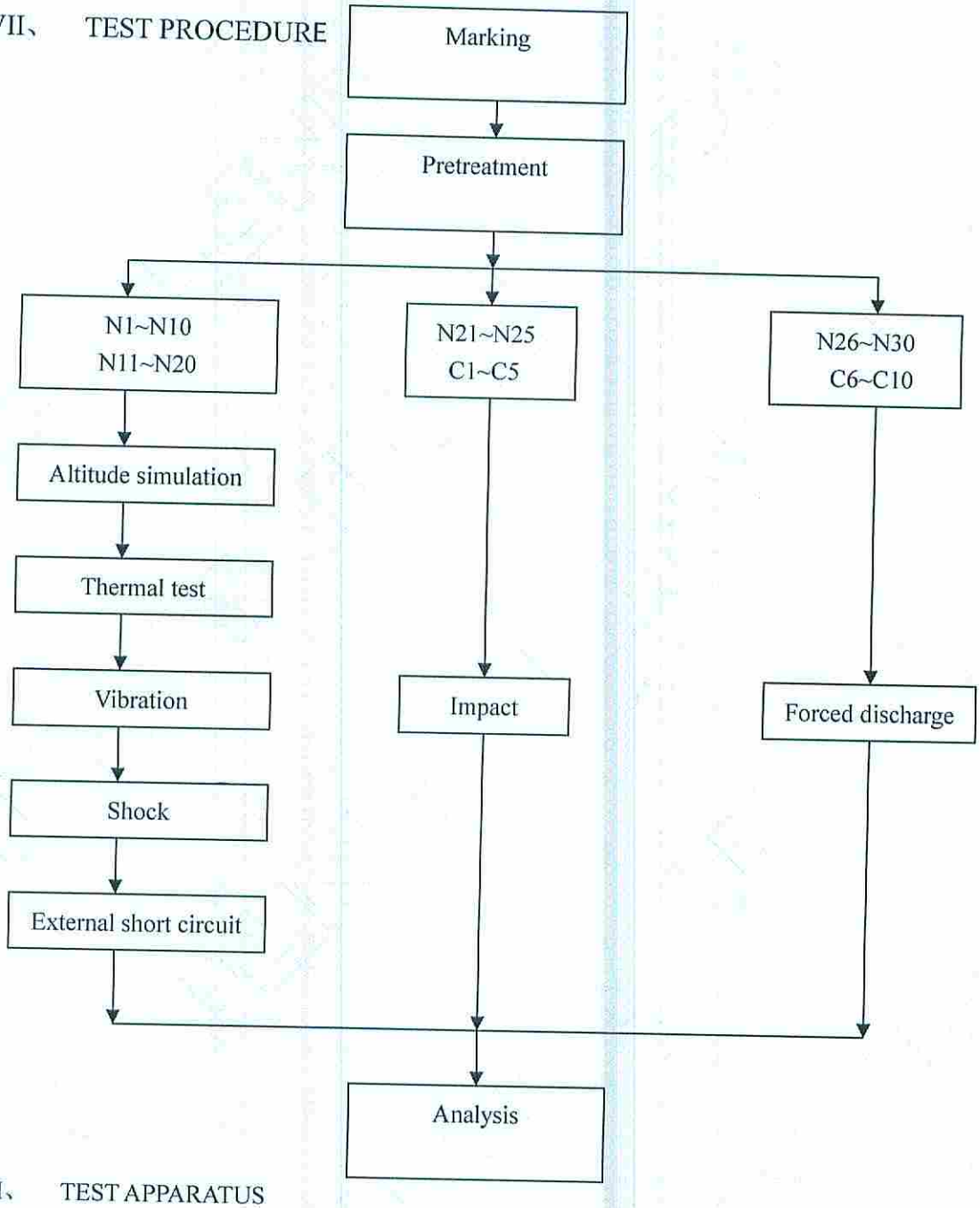
Cells and component cells meet this requirement if their external temperature does not exceed 170 ℃ and there is no disassembly and no fire within six hours of this test.

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-037 Vacuum desiccation
SZSB-120 Temperature circulation chamber
SZSB-128 Vibration test instrument
SZSB-081 Impact test instrument
SZSB-077 DC regulated power supply
SZSB-125 Electronic balance
SZSB-090 Digital multimeter

IX、 DATA

1. Altitude simulation

No.	Pre-test		After test		Mass loss	Voltage loss	Status
	Mass (g)	Voltage (V)	Mass (g)	Voltage (V)			
N1	2.818	3.360	2.816	3.360	0.071	0.00	PASS
N2	2.865	3.373	2.864	3.372	0.035	0.03	PASS
N3	2.813	3.353	2.809	3.351	0.142	0.06	PASS
N4	2.798	3.338	2.796	3.338	0.071	0.00	PASS
N5	2.778	3.350	2.776	3.349	0.072	0.03	PASS
N6	2.810	3.361	2.809	3.360	0.036	0.03	PASS
N7	2.783	3.339	2.781	3.339	0.072	0.00	PASS
N8	2.810	3.346	2.810	3.346	0.000	0.00	PASS
N9	2.808	3.349	2.808	3.349	0.000	0.00	PASS
N10	2.819	3.353	2.818	3.353	0.035	0.00	PASS
N11	2.824	---	2.824	---	0.000	---	PASS
N12	2.810	---	2.810	---	0.000	---	PASS
N13	2.806	---	2.806	---	0.000	---	PASS
N14	2.832	---	2.832	---	0.000	---	PASS
N15	2.774	---	2.774	---	0.000	---	PASS
N16	2.804	---	2.803	---	0.036	---	PASS
N17	2.806	---	2.806	---	0.000	---	PASS
N18	2.792	---	2.791	---	0.036	---	PASS
N19	2.776	---	2.776	---	0.000	---	PASS
N20	2.792	---	2.792	---	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	2.816	3.360	2.815	3.390	0.036	-0.89	PASS
N2	2.864	3.372	2.862	3.409	0.070	-1.10	PASS
N3	2.809	3.351	2.808	3.380	0.036	-0.87	PASS
N4	2.796	3.338	2.793	3.362	0.107	-0.72	PASS
N5	2.776	3.349	2.773	3.377	0.108	-0.84	PASS
N6	2.809	3.360	2.807	3.392	0.071	-0.95	PASS
N7	2.781	3.339	2.779	3.372	0.072	-0.99	PASS
N8	2.810	3.346	2.808	3.398	0.071	-1.55	PASS
N9	2.808	3.349	2.806	3.379	0.071	-0.90	PASS
N10	2.818	3.353	2.817	3.384	0.035	-0.92	PASS
N11	2.824	---	2.822	---	0.071	---	PASS
N12	2.810	---	2.807	---	0.107	---	PASS
N13	2.806	---	2.804	---	0.071	---	PASS
N14	2.832	---	2.829	---	0.106	---	PASS
N15	2.774	---	2.771	---	0.108	---	PASS
N16	2.803	---	2.799	---	0.143	---	PASS
N17	2.806	---	2.804	---	0.071	---	PASS
N18	2.791	---	2.790	---	0.036	---	PASS
N19	2.776	---	2.774	---	0.072	---	PASS
N20	2.792	---	2.791	---	0.036	---	PASS

3. Vibration

No.	Pre-test		After test		Mass loss	Voltage loss	Status
	Mass (g)	Voltage (V)	Mass (g)	Voltage (V)			
N1	2.815	3.390	2.815	3.389	0.000	0.03	PASS
N2	2.862	3.409	2.861	3.409	0.035	0.00	PASS
N3	2.808	3.380	2.808	3.379	0.000	0.03	PASS
N4	2.793	3.362	2.792	3.361	0.036	0.03	PASS
N5	2.773	3.377	2.772	3.375	0.036	0.06	PASS
N6	2.807	3.392	2.807	3.391	0.000	0.03	PASS
N7	2.779	3.372	2.778	3.371	0.036	0.03	PASS
N8	2.808	3.398	2.808	3.397	0.000	0.03	PASS
N9	2.806	3.379	2.806	3.378	0.000	0.03	PASS
N10	2.817	3.384	2.816	3.384	0.035	0.00	PASS
N11	2.822	---	2.822	---	0.000	---	PASS
N12	2.807	---	2.806	---	0.036	---	PASS
N13	2.804	---	2.803	---	0.036	---	PASS
N14	2.829	---	2.828	---	0.035	---	PASS
N15	2.771	---	2.771	---	0.000	---	PASS
N16	2.799	---	2.799	---	0.000	---	PASS
N17	2.804	---	2.804	---	0.000	---	PASS
N18	2.790	---	2.790	---	0.000	---	PASS
N19	2.774	---	2.773	---	0.036	---	PASS
N20	2.791	---	2.791	---	0.000	---	PASS

4. Shock

NO.	Pre-test		After test		Mass loss	Voltage loss	Status
	Mass (g)	Voltage (V)	Mass (g)	Voltage (V)			
N1	2.815	3.389	2.815	3.389	0.000	0.00	PASS
N2	2.861	3.409	2.861	3.408	0.000	0.03	PASS
N3	2.808	3.379	2.807	3.378	0.036	0.03	PASS
N4	2.792	3.361	2.791	3.361	0.036	0.00	PASS
N5	2.772	3.375	2.772	3.375	0.000	0.00	PASS
N6	2.807	3.391	2.806	3.390	0.036	0.03	PASS
N7	2.778	3.371	2.778	3.370	0.000	0.03	PASS
N8	2.808	3.397	2.808	3.397	0.000	0.00	PASS
N9	2.806	3.378	2.805	3.378	0.036	0.00	PASS
N10	2.816	3.384	2.816	3.384	0.000	0.00	PASS
N11	2.822	---	2.822	---	0.000	---	PASS
N12	2.806	---	2.806	---	0.000	---	PASS
N13	2.803	---	2.802	---	0.036	---	PASS
N14	2.828	---	2.827	---	0.035	---	PASS
N15	2.771	---	2.770	---	0.036	---	PASS
N16	2.799	---	2.799	---	0.000	---	PASS
N17	2.804	---	2.804	---	0.000	---	PASS
N18	2.790	---	2.790	---	0.000	---	PASS
N19	2.773	---	2.773	---	0.000	---	PASS
N20	2.791	---	2.790	---	0.036	---	PASS

5. External short circuit

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

6. Impact

No.	Peak temperature(℃)	Status
N21	25	PASS
N22	24	PASS
N23	23	PASS
N24	25	PASS
N25	24	PASS
C1	22	PASS
C2	24	PASS
C3	23	PASS
C4	25	PASS
C5	24	PASS

7. Forced discharge

No.	Status
N26	PASS
N27	PASS
N28	PASS
N29	PASS
N30	PASS
C6	PASS
C7	PASS
C8	PASS
C9	PASS
C10	PASS