Pony Testing International Group

报告编号(Report ID)： 0907034-058-1

锂电池 UN38.3 测试报告

Lithium Battery UN38.3 Test Report

样品名称 (Sample Description)	Lithium ion battery
委托单位 (Applicant)	Shandong Real Force Enterprises Co.,Ltd
生产单位 (Manufacturer)	Shandong Real Force Enterprises Co.,Ltd

PONY 谱 尼 测 试
Pony Testing International Group
www.ponytest.com

Pony Testing International Group

I. SAMPLE DESCRIPTION

Sample Name	Lithium ion battery	Battery Type	RFE-F20
Manufacturer	Shandong Real Force Enterprises Co.,Ltd		
Applicant	Shandong Real Force Enterprises Co.,Ltd		
Nominal Voltage	3.2V	Rated Capacity	20Ah
Charge Voltage	3.8V	Limit Voltage	2.0V
Maximum Charge Current	10A	Maximum Discharge Current	60A
Client date	Jul-3-2009	Finished date	Jul-17-2009

II. STANDARD

RECOMMENDATIONS ON TRANSPORT OF DANGEROUS GOODS, MANUAL OF TEST AND CRITERIA, SECTON 38.3 LITHIUM BATTERIES (ST/SG/AC.10/11/Rev 4 section 38.3)

III. TEST ITEM

1. Altitude simulation
2. Thermal test
3. Vibration
4. Shock
5. External short circuit
6. Impact
7. Overcharge (not applicable)
8. Forced discharge

IV. CONCLUSION

ITEM	SAMPLE NUMBER	STANDARD	CONCLUSION
Altitude simulation	N1~N20	UN38.3-T1	Pass
Thermal test		UN38.3-T2	Pass
Vibration		UN38.3-T3	Pass
Shock		UN38.3-T4	Pass
External short circuit		UN38.3-T5	Pass
Impact	N21~N25&C1~C5	UN38.3-T6	Pass
Forced discharge	N26~N35&C6~15	UN38.3-T8	Pass

The submitted samples were complied with the stated requirements of ST/SG/AC.10/11/Rev 4 section 38.3.

Compiled by: Checked by: Approved by:

V. PHOTO OF THE SAMPLE

Battery:

Following this page blank

VI. TEST METHOD

Each cell and battery type must be subjected to test 1 to 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. Test 7 may be conducted using undamaged batteries previously used in Test 1 to 5 for purposes of testing on cycled 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 and batteries 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. Overcharge

The charge current shall be twice the manufacturer's recommended maximum continuous charge current. The minimum voltage of the test shall be as follows:

(a) When the manufacturer's recommended charge voltage is not more than 18V, the minimum voltage of the test shall be the lesser of two times the maximum charge of the battery or 22V.

(b) When the manufacturer's recommended charge voltage is more than 18V, the minimum voltage of the test shall be 1.2 times the maximum charge voltage.

Tests are to be conducted at ambient temperature; the duration of the test shall be 24 hours.

Rechargeable batteries meet this requirement if there is no disassembly and no fire within seven days of the test.

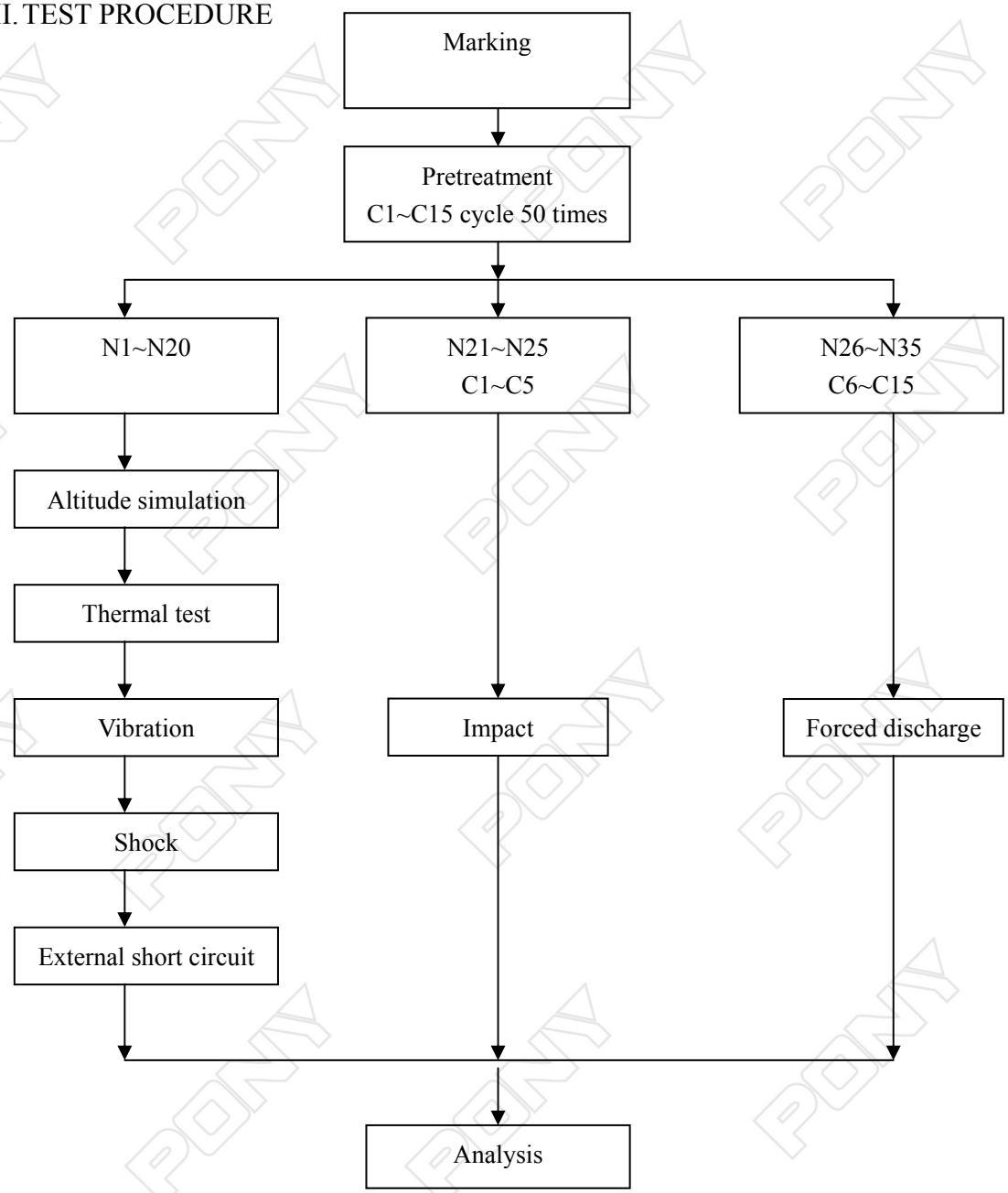
8. Forced discharge

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.

Following this page blank

VII. TEST PROCEDURE



VIII. TEST APPARATUS

Rechargeable battery test system
Vibration test instrument
Digital multimeter
High acceleration test instrument
Low temperature chamber
DC regulated power supply
Electronic balance
Vacuum desiccation
Desiccation chamber

IX. DATA

1. Altitude simulation

No.	Pre-test		After test		Mass loss	Voltage loss	Status
	Mass (g)	Voltage (V)	Mass (g)	Voltage (V)			
N1	616.62	3.336	616.55	3.336	0.011%	0.00%	OK
N2	611.69	3.331	611.65	3.331	0.007%	0.00%	OK
N3	614.63	3.336	614.58	3.336	0.008%	0.00%	OK
N4	613.08	3.337	613.03	3.337	0.008%	0.00%	OK
N5	612.60	3.337	612.54	3.337	0.010%	0.00%	OK
N6	616.78	3.336	616.73	3.336	0.008%	0.00%	OK
N7	615.79	3.337	615.74	3.337	0.008%	0.00%	OK
N8	613.61	3.336	613.58	3.336	0.005%	0.00%	OK
N9	613.17	3.337	613.17	3.337	0.000%	0.00%	OK
N10	611.77	3.337	611.73	3.337	0.007%	0.00%	OK
N11	615.28	---	615.24	---	0.007%	---	OK
N12	613.80	---	613.78	---	0.003%	---	OK
N13	613.89	---	613.85	---	0.007%	---	OK
N14	616.46	---	616.43	---	0.005%	---	OK
N15	609.11	---	609.04	---	0.011%	---	OK
N16	614.98	---	614.97	---	0.002%	---	OK
N17	610.72	---	610.72	---	0.000%	---	OK
N18	611.06	---	610.99	---	0.011%	---	OK
N19	612.35	---	612.29	---	0.010%	---	OK
N20	612.21	---	612.15	---	0.010%	---	OK

Following this page blank。

2. Thermal test

No.	Pre-test		After test		Mass loss	Voltage loss	Status
	Mass (g)	Voltage (V)	Mass (g)	Voltage (V)			
N1	616.55	3.336	616.54	3.334	0.002%	0.06%	OK
N2	611.65	3.331	611.63	3.328	0.003%	0.09%	OK
N3	614.58	3.336	614.55	3.332	0.005%	0.12%	OK
N4	613.03	3.337	613.02	3.332	0.002%	0.15%	OK
N5	612.54	3.337	612.53	3.332	0.002%	0.15%	OK
N6	616.73	3.336	616.72	3.331	0.002%	0.15%	OK
N7	615.74	3.337	615.71	3.332	0.005%	0.15%	OK
N8	613.58	3.336	613.56	3.332	0.003%	0.12%	OK
N9	613.17	3.337	613.15	3.332	0.003%	0.15%	OK
N10	611.73	3.337	611.71	3.332	0.003%	0.15%	OK
N11	615.24	---	615.23	---	0.002%	---	OK
N12	613.78	---	613.75	---	0.005%	---	OK
N13	613.85	---	613.83	---	0.003%	---	OK
N14	616.43	---	616.42	---	0.002%	---	OK
N15	609.04	---	609.02	---	0.003%	---	OK
N16	614.97	---	614.94	---	0.005%	---	OK
N17	610.72	---	610.71	---	0.002%	---	OK
N18	610.99	---	610.97	---	0.003%	---	OK
N19	612.29	---	612.24	---	0.008%	---	OK
N20	612.15	---	612.12	---	0.005%	---	OK

Following this page blank。

3. Vibration

No.	Pre-test		After test		Mass loss	Voltage loss	Status
	Mass (g)	Voltage (V)	Mass (g)	Voltage (V)			
N1	616.54	3.334	616.54	3.334	0.000%	0.00%	OK
N2	611.63	3.328	611.63	3.328	0.000%	0.00%	OK
N3	614.55	3.332	614.55	3.332	0.000%	0.00%	OK
N4	613.02	3.332	613.02	3.332	0.000%	0.00%	OK
N5	612.53	3.332	612.53	3.332	0.000%	0.00%	OK
N6	616.72	3.331	616.72	3.331	0.000%	0.00%	OK
N7	615.71	3.332	615.71	3.332	0.000%	0.00%	OK
N8	613.56	3.332	613.56	3.332	0.000%	0.00%	OK
N9	613.15	3.332	613.15	3.332	0.000%	0.00%	OK
N10	611.71	3.332	611.71	3.332	0.000%	0.00%	OK
N11	615.23	---	615.23	---	0.000%	---	OK
N12	613.75	---	613.75	---	0.000%	---	OK
N13	613.83	---	613.83	---	0.000%	---	OK
N14	616.42	---	616.42	---	0.000%	---	OK
N15	609.02	---	609.02	---	0.000%	---	OK
N16	614.94	---	614.94	---	0.000%	---	OK
N17	610.71	---	610.71	---	0.000%	---	OK
N18	610.97	---	610.97	---	0.000%	---	OK
N19	612.24	---	612.24	---	0.000%	---	OK
N20	612.12	---	612.12	---	0.000%	---	OK

Following this page blank。

4. Shock

NO.	Pre-test		After test		Mass loss	Voltage loss	Status
	Mass (g)	Voltage (V)	Mass (g)	Voltage (V)			
N1	616.54	3.334	616.54	3.334	0.000%	0.00%	OK
N2	611.63	3.328	611.63	3.328	0.000%	0.00%	OK
N3	614.55	3.332	614.55	3.332	0.000%	0.00%	OK
N4	613.02	3.332	613.02	3.332	0.000%	0.00%	OK
N5	612.53	3.332	612.53	3.332	0.000%	0.00%	OK
N6	616.72	3.331	616.72	3.331	0.000%	0.00%	OK
N7	615.71	3.332	615.71	3.332	0.000%	0.00%	OK
N8	613.56	3.332	613.56	3.332	0.000%	0.00%	OK
N9	613.15	3.332	613.15	3.332	0.000%	0.00%	OK
N10	611.71	3.332	611.71	3.332	0.000%	0.00%	OK
N11	615.23	---	615.23	---	0.000%	---	OK
N12	613.75	---	613.75	---	0.000%	---	OK
N13	613.83	---	613.83	---	0.000%	---	OK
N14	616.42	---	616.42	---	0.000%	---	OK
N15	609.02	---	609.02	---	0.000%	---	OK
N16	614.94	---	614.94	---	0.000%	---	OK
N17	610.71	---	610.71	---	0.000%	---	OK
N18	610.97	---	610.97	---	0.000%	---	OK
N19	612.24	---	612.24	---	0.000%	---	OK
N20	612.12	---	612.12	---	0.000%	---	OK

Following this page blank。

5. External short circuit

No.	Peak temperature(℃)	Status
N1	78	OK
N2	75	OK
N3	74	OK
N4	75	OK
N5	74	OK
N6	76	OK
N7	72	OK
N8	73	OK
N9	71	OK
N10	72	OK
N11	56	OK
N12	58	OK
N13	56	OK
N14	61	OK
N15	65	OK
N16	63	OK
N17	59	OK
N18	63	OK
N19	64	OK
N20	58	OK

6. Impact

No.	Peak temperature(℃)	Status
N21	86	OK
N22	86	OK
N23	84	OK
N24	91	OK
N25	92	OK
C1	45	OK
C2	43	OK
C3	46	OK
C4	45	OK
C5	42	OK

7. Overcharge

Not applicable.

8. Forced discharge

No.	Status
N26	OK
N27	OK
N28	OK
N29	OK
N30	OK
N31	OK
N32	OK
N33	OK
N34	OK
N35	OK
C6	OK
C7	OK
C8	OK
C9	OK
C10	OK
C11	OK
C12	OK
C13	OK
C14	OK
C15	OK

End of report