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报告编号(Report ID): 0903133-005a

锂电池UN38.3测试报告

Lithium Battery UN38.3 Test Report

样品名称 (Samples)	Lithium-ion Power Battery SE180AHA
委托单位 (Client)	China Aviation lithium battery（LuoYang） Co.,Ltd
生产单位 (Manufacturer)	China Aviation lithium battery（LuoYang） Co.,Ltd

PONY 谱尼测试
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I、SAMPLE DESCRIPTION

Sample Name	Li-ion Power Battery		Battery Type	SE180AHA	
Client	China Aviation lithium battery（LuoYang） Co.,Ltd				
Manufacturer	China Aviation lithium battery（LuoYang） Co.,Ltd				
Nominal Voltage	3.2V	Rated Capacity	180Ah	Limited Charge Voltage	3.6V
Charge Current	0.3C	Maximum Continuous Charge Current	1C	End Charge Current	0.015C
Cut-off Voltage	2.5V	Maximum Discharge	3C	Use	Power
Cells Number	1Pcs	Cell Model	SE180AHA	Rated Capacity	180Ah
Manufacturer of cell	China Aviation lithium battery（LuoYang） Co.,Ltd		Chemical component	$LiFePO_4$	
Client date	2009-03-13		Finished date	2009-04-05	

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	N1~N10 N11~N20	UN38.3	PASS
Thermal test			PASS
Vibration			PASS
Shock			PASS
External short circuit			PASS
Impact	N21~N30 C1~C10		PASS
Forced discharge	N31~N40 C11~C20		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: April 5, 2009

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Notes:

Batteries of N1~N10 are full charged after one cycle;

Batteries of N11~N20、N31~N40 are full discharged after one cycle;

Batteries of N21~N30 are half-charged after one cycle;

Batteries of C1~C20 are full discharged after fifty cycles.

V、 PHOTO OF THE SAMPLE

Authenticate the photo on original report only

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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

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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.

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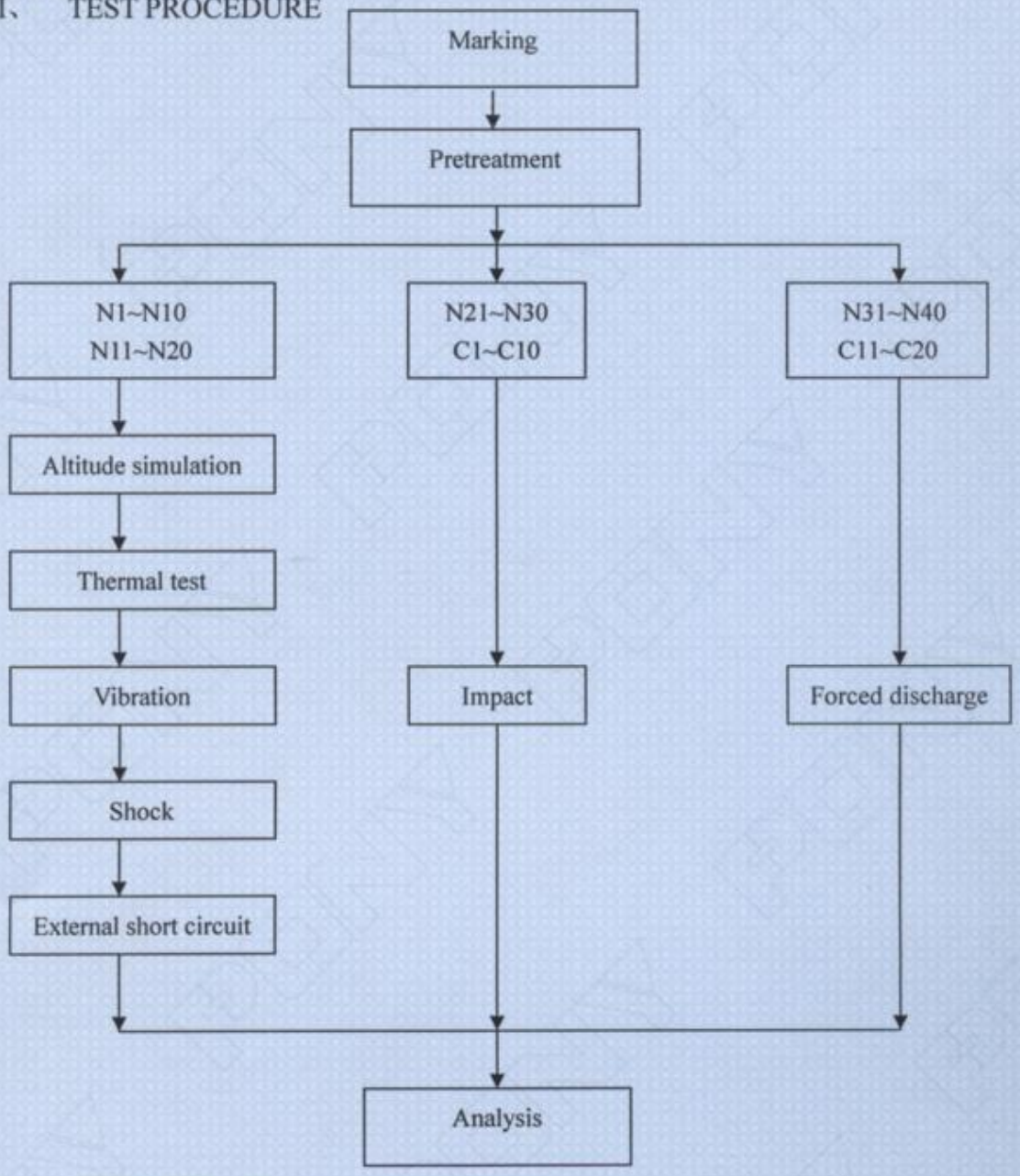
VII、 TEST PROCEDURE



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

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IX、 DATA

1. Altitude simulation

No.	Pre-test		After test		Mass loss	Voltage loss	Status
	Mass (g)	Voltage (V)	Mass (g)	Voltage (V)			
N1	5366.300	3.335	5366.200	3.334	0.002	0.030	PASS
N2	5414.500	3.301	5414.500	3.301	0.000	0.000	PASS
N3	5369.400	3.438	5369.400	3.437	0.000	0.029	PASS
N4	5380.100	3.436	5380.000	3.435	0.002	0.029	PASS
N5	5381.300	3.364	5381.300	3.362	0.000	0.059	PASS
N6	5382.000	3.387	5382.000	3.387	0.000	0.000	PASS
N7	5381.000	3.370	5381.000	3.369	0.000	0.030	PASS
N8	5376.800	3.380	5376.800	3.380	0.000	0.000	PASS
N9	5365.700	3.342	5365.600	3.341	0.002	0.030	PASS
N10	5374.800	3.451	5374.800	3.451	0.000	0.000	PASS
N11	5384.800	---	5384.700	---	0.002	---	PASS
N12	5394.300	---	5394.300	---	0.000	---	PASS
N13	5394.200	---	5394.200	---	0.000	---	PASS
N14	5371.600	---	5371.600	---	0.000	---	PASS
N15	5364.600	---	5364.500	---	0.002	---	PASS
N16	5366.100	---	5366.100	---	0.000	---	PASS
N17	5367.600	---	5367.600	---	0.000	---	PASS
N18	5371.900	---	5371.900	---	0.000	---	PASS
N19	5398.500	---	5398.400	---	0.002	---	PASS
N20	5382.100	---	5382.100	---	0.000	---	PASS

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2. Thermal test

No.	Pre-test		After test		Mass loss	Voltage loss	Status
	Mass (g)	Voltage (V)	Mass (g)	Voltage (V)			
N1	5366.200	3.334	5365.400	3.327	0.015	0.210	PASS
N2	5414.500	3.301	5413.600	3.292	0.017	0.273	PASS
N3	5369.400	3.437	5368.800	3.354	0.011	2.415	PASS
N4	5380.000	3.435	5379.100	3.345	0.017	2.620	PASS
N5	5381.300	3.362	5380.600	3.329	0.013	0.982	PASS
N6	5382.000	3.387	5381.000	3.330	0.019	1.683	PASS
N7	5381.000	3.369	5376.300	3.330	0.087	1.158	PASS
N8	5376.800	3.380	5376.300	3.329	0.009	1.509	PASS
N9	5365.600	3.341	5364.800	3.328	0.015	0.389	PASS
N10	5374.800	3.451	5374.600	3.357	0.004	2.724	PASS
N11	5384.700	---	5383.700	---	0.019	---	PASS
N12	5394.300	---	5393.400	---	0.017	---	PASS
N13	5394.200	---	5393.300	---	0.017	---	PASS
N14	5371.600	---	5370.800	---	0.015	---	PASS
N15	5364.500	---	5363.800	---	0.013	---	PASS
N16	5366.100	---	5365.500	---	0.011	---	PASS
N17	5367.600	---	5366.800	---	0.015	---	PASS
N18	5371.900	---	5371.100	---	0.015	---	PASS
N19	5398.400	---	5397.800	---	0.011	---	PASS
N20	5382.100	---	5381.600	---	0.009	---	PASS

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3. Vibration

No.	Pre-test		After test		Mass loss	Voltage loss	Status
	Mass (g)	Voltage (V)	Mass (g)	Voltage (V)			
N1	5365.400	3.327	5365.300	3.324	0.002	0.090	PASS
N2	5413.600	3.292	5413.400	3.291	0.004	0.030	PASS
N3	5368.800	3.354	5368.700	3.353	0.002	0.030	PASS
N4	5379.100	3.345	5379.000	3.343	0.002	0.060	PASS
N5	5380.600	3.329	5380.400	3.327	0.004	0.060	PASS
N6	5381.000	3.330	5381.000	3.326	0.000	0.120	PASS
N7	5376.300	3.330	5376.200	3.327	0.002	0.090	PASS
N8	5376.300	3.329	5376.200	3.326	0.002	0.090	PASS
N9	5364.800	3.328	5364.700	3.325	0.002	0.090	PASS
N10	5374.600	3.357	5374.400	3.354	0.004	0.089	PASS
N11	5383.700	---	5383.700	---	0.000	---	PASS
N12	5393.400	---	5393.200	---	0.004	---	PASS
N13	5393.300	---	5393.200	---	0.002	---	PASS
N14	5370.800	---	5370.700	---	0.002	---	PASS
N15	5363.800	---	5363.700	---	0.002	---	PASS
N16	5365.500	---	5365.500	---	0.000	---	PASS
N17	5366.800	---	5366.700	---	0.002	---	PASS
N18	5371.100	---	5371.000	---	0.002	---	PASS
N19	5397.800	---	5397.800	---	0.000	---	PASS
N20	5381.600	---	5381.500	---	0.002	---	PASS

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4. Shock

NO.	Pre-test		After test		Mass loss	Voltage loss	Status
	Mass (g)	Voltage (V)	Mass (g)	Voltage (V)			
N1	5365.300	3.324	5365.200	3.323	0.002	0.030	PASS
N2	5413.400	3.291	5413.400	3.290	0.000	0.030	PASS
N3	5368.700	3.353	5368.700	3.351	0.000	0.060	PASS
N4	5379.000	3.343	5379.000	3.342	0.000	0.030	PASS
N5	5380.400	3.327	5380.300	3.325	0.002	0.060	PASS
N6	5381.000	3.326	5381.000	3.324	0.000	0.060	PASS
N7	5376.200	3.327	5376.200	3.324	0.000	0.090	PASS
N8	5376.200	3.326	5376.100	3.324	0.002	0.060	PASS
N9	5364.700	3.325	5364.700	3.325	0.000	0.000	PASS
N10	5374.400	3.354	5374.400	3.353	0.000	0.030	PASS
N11	5383.700	---	5383.700	---	0.000	---	PASS
N12	5393.200	---	5393.200	---	0.000	---	PASS
N13	5393.200	---	5393.100	---	0.002	---	PASS
N14	5370.700	---	5370.700	---	0.000	---	PASS
N15	5363.700	---	5363.600	---	0.002	---	PASS
N16	5365.500	---	5365.300	---	0.004	---	PASS
N17	5366.700	---	5366.700	---	0.000	---	PASS
N18	5371.000	---	5371.000	---	0.000	---	PASS
N19	5397.800	---	5397.700	---	0.002	---	PASS
N20	5381.500	---	5381.500	---	0.000	---	PASS

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6. Impact

No.	Peak temperature(℃)	Status
N21	24	PASS
N22	23	PASS
N23	22	PASS
N24	24	PASS
N25	22	PASS
N26	23	PASS
N27	24	PASS
N28	22	PASS
N29	25	PASS
N30	22	PASS
C1	23	PASS
C2	24	PASS
C3	22	PASS
C4	23	PASS
C5	25	PASS
C6	24	PASS
C7	22	PASS
C8	21	PASS
C9	24	PASS
C10	22	PASS

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7. Forced discharge

No.	Status
N31	PASS
N32	PASS
N33	PASS
N34	PASS
N35	PASS
N36	PASS
N37	PASS
N38	PASS
N39	PASS
N40	PASS
C11	PASS
C12	PASS
C13	PASS
C14	PASS
C15	PASS
C16	PASS
C17	PASS
C18	PASS
C19	PASS
C20	PASS