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UN Test Report

- L13L3P61(34.8 Wh, 11.1V) -

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2014. 01. 02

1. UN Transportation Regulation Test

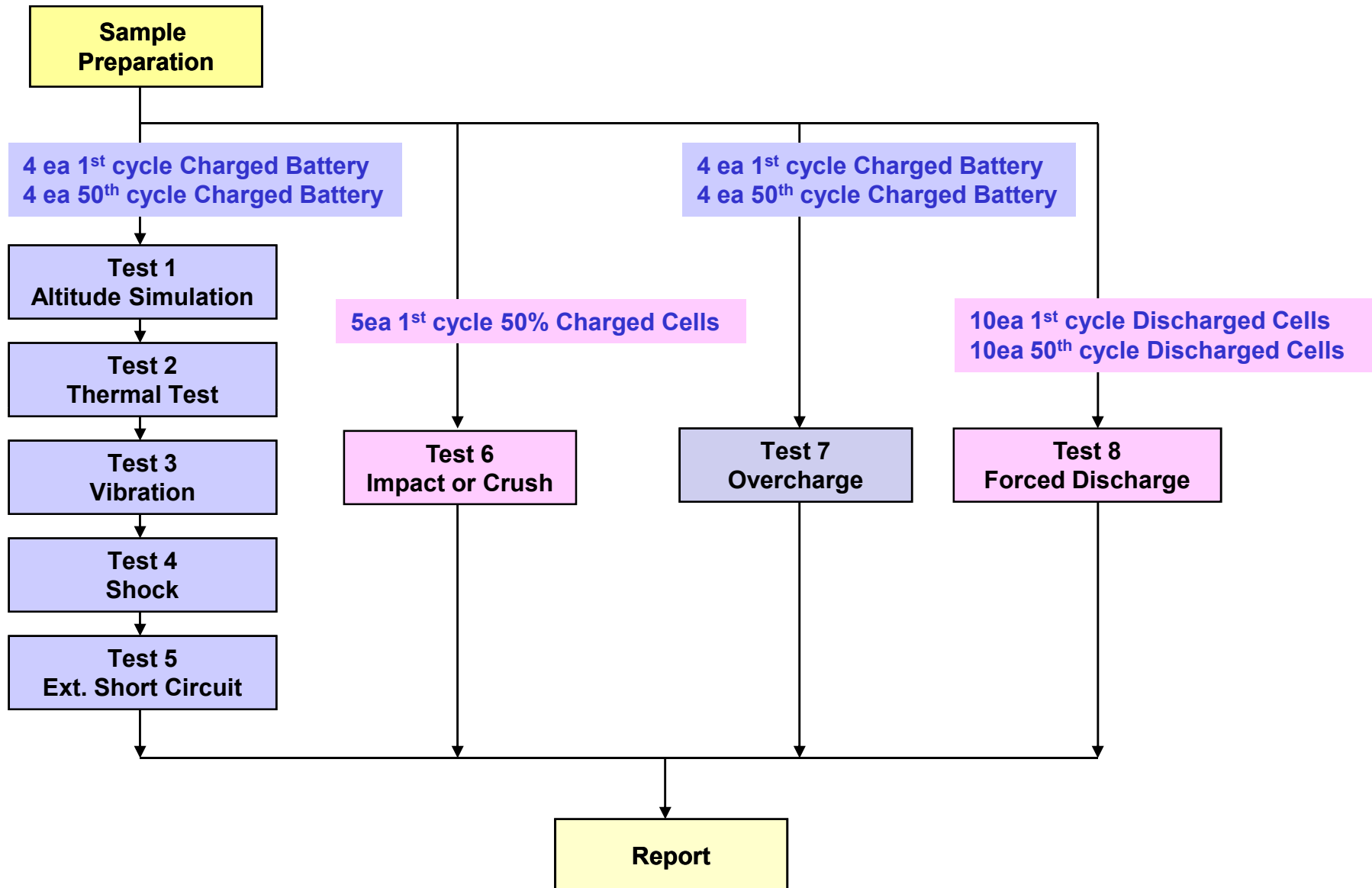
Test	Condition	Requirements
Test 1. Altitude Simulation	Storing at (low pressure)11.6kPa for 6hr at 20+/-5℃	
Test 2. Thermal Test	[72±2℃,6hr ↔ -40 ± 2℃,6hr,interval max. 30min] x 10cycle Storing at 20±5℃ for 24h	- Measuring mass before/ after each test 1) M<1g, less than 0.5% 2) 1g≤M≤75g, less than 0.2% 3) M>75g, less than 0.1%
Test 3. Vibration	[7Hz↔200Hz↔7Hz, in 15min] x 12 times x 3 direction 1) sinusoidal waveform with a logarithmic sweep 2) 7Hz 18Hz (maintaining 1gn) app. 50Hz (until 8gn) 200Hz (maintaining 8gn), 1.6mm total excursion	- Measuring voltage before/after each test (more than 90%)
Test 4. Shock	Half sine shock (peak acceleration : 150gn, pulse duration : 6msec) x 6 (±x, y, z) direction x 3 cycle	- No leakage, no venting, no disassembly, no rupture, no fire
Test 5. External Short Circuit	100mΩ ext. short-circuit at 55±2℃ 1hr continue after returning at 55±2℃	- No disassembly, no rupture, no fire (after 6 hours) - Temp. monitoring (max. 170℃)
Test 6. Impact for cylindrical cells (> 20mm diameter)	Φ=15.8mm bar, 9.1kg mass, 61±2.5cm height	- No disassembly, no rupture, no fire (after 6 hours)
Test 6. Crush for cylindrical cells (≤ 20mm diameter) for prismatic, pouch, coin/button cells	Crushing rate :1.5cm/s, until 13kN±0.78kN or 100mV drop or 50% deformation	- Temp. monitoring (max. 170℃)
Test 7. Overcharge	Current = Manufacturer's recommended max. continuous charge current X 2 Voltage 1.If charge voltage ≤ 18V, V (min.) = 2 x (max. charge voltage) or V (min.) = 22V. 2.If charge voltage > 18V, V (min.) = 1.2 x (max. charge voltage)	- No disassembly, no fire (after 7 days)
Test 8. Forced Discharge	Discharge at max. discharge current (with 12V DC power supply), Duration time = rated capacity/initial test current	- Appearance picture before/ after test - No disassembly, no fire (after 7 days) - Temp. monitoring (max. 170℃)

* Tests through T1-T5 shall be conducted in sequence with the same battery.

* We declare that the above-mentioned test is the result of being checked according to UN Test

(Manual of Test and Criteria ST/SG/AC.10/11/Rev.5/Amd.1)

2. Test Procedure



3-1. T1-T4 Test Result

Before				Altitude (T1)					Thermal (T2)					Vibration (T3)					Shock (T4)				
	Pack NO.	OCV	Mass	OCV	Mass	Residual OCV(%)	Mass Loss(%)	Result	OCV	Mass	Residual OCV(%)	Mass Loss(%)	Result	OCV	Mass	Residual OCV(%)	Mass Loss(%)	Result	OCV	Mass	Residual OCV(%)	Mass Loss(%)	Result

A. 1st cycle fully state

Charge	1	12.577	195.800	12.555	195.790	99.83	0.005	Pass	12.433	195.789	99.03	0.001	Pass	12.286	195.770	98.82	0.010	Pass	12.076	195.763	98.29	0.004	Pass
	2	12.582	195.670	12.565	195.660	99.86	0.005	Pass	12.440	195.639	99.01	0.011	Pass	12.292	195.614	98.81	0.013	Pass	12.082	195.600	98.29	0.007	Pass
	3	12.587	195.335	12.562	195.328	99.80	0.004	Pass	12.442	195.320	99.04	0.004	Pass	12.296	195.318	98.83	0.001	Pass	12.077	195.302	98.22	0.008	Pass
	4	12.582	195.010	12.558	194.995	99.81	0.008	Pass	12.444	194.977	99.09	0.009	Pass	12.304	194.963	98.87	0.007	Pass	12.084	194.958	98.21	0.003	Pass
	Ave.	12.582	195.454	12.560	195.443	99.83	0.005	-	12.440	195.431	99.04	0.006	-	12.295	195.416	98.83	0.008	-	12.080	195.406	98.25	0.005	-

B. 50th cycle fully state

Charge	5	12.572	195.618	12.550	195.600	99.83	0.009	Pass	12.429	195.593	99.04	0.004	Pass	12.291	195.590	98.89	0.002	Pass	12.081	195.575	98.29	0.008	Pass
	6	12.585	195.236	12.570	195.226	99.88	0.005	Pass	12.449	195.207	99.04	0.010	Pass	12.301	195.201	98.81	0.003	Pass	12.083	195.180	98.23	0.011	Pass
	7	12.578	195.710	12.559	195.697	99.85	0.007	Pass	12.439	195.682	99.04	0.008	Pass	12.301	195.667	98.89	0.008	Pass	12.083	195.652	98.23	0.008	Pass
	8	12.574	195.422	12.553	195.405	99.83	0.009	Pass	12.433	195.381	99.04	0.012	Pass	12.296	195.371	98.90	0.005	Pass	12.081	195.354	98.25	0.009	Pass
	Ave.	12.577	195.497	12.558	195.482	99.85	0.007	-	12.438	195.466	99.04	0.008	-	12.297	195.457	98.87	0.004	-	12.082	195.440	98.25	0.009	-

Requirement

- Measuring mass before/after each test (If $M > 75g$, less than 0.1%, $1g \leq M \leq 75$, less than 0.2%, $M < 1g$, less than 0.5%)
- Measuring voltage before/after each test (more than 90%, only charged samples)
- No leakage, no venting, no disassembly, no rupture, no fire

3-2. T5/T7 Test Result

EXT.Short Circuit (T5)				
	Pack NO.	Initial OCV(V)	Max. Temp (°C)	Result

A. 1st cycle fully state

Charge	1	12.076	24.73	Pass
	2	12.082	24.03	Pass
	3	12.077	25.73	Pass
	4	12.084	25.39	Pass
	MAX.	12.084	25.73	-

Test Condition
- 100mΩ ext. short-circuit at 55±2°C

Over Charge (T7)				
	Pack NO.	Initial OCV(V)	Max. Temp (°C)	Result

A. 1st cycle fully state

Charge	9	12.540	25.20	Pass
	10	12.545	24.21	Pass
	11	12.544	25.03	Pass
	12	12.548	24.22	Pass
	MAX.	12.548	25.20	-

Test Condition
- Max. Charge Current : 3100 mA - CC/CV 2Imax(6200mA) 12.6 V cut-off 24Hr

EXT.Short Circuit (T5)				
	Pack NO.	Initial OCV(V)	Max. Temp (°C)	Result

B. 50th cycle fully state

Charge	5	12.081	24.43	Pass
	6	12.083	24.49	Pass
	7	12.083	24.84	Pass
	8	12.081	25.53	Pass
	MAX.	12.083	25.53	-

Requirement
- Temperature ≤ 170 (°C) - No disassembly, no rupture, no fire within 6 hours after the test

Over Charge (T7)				
	Pack NO.	Initial OCV(V)	Max. Temp (°C)	Result

B. 50th cycle fully state

Charge	13	12.530	24.99	Pass
	14	12.527	24.55	Pass
	15	12.526	24.63	Pass
	16	12.521	25.17	Pass
	MAX.	12.530	25.17	-

Requirement
- No disassembly, no fire within 7 day after the test

3-3. T6 Test Result (ICP3570102L1)

Crush (T6)				
	Pack NO.	Initial OCV(V)	Max. Temp (°C)	Result

A. 1st cycle 50% charged state (Direction :Flat)

Flat	1	3.895	25.03	Pass
	2	3.894	25.10	Pass
	3	3.895	25.05	Pass
	4	3.892	25.12	Pass
	5	3.896	25.08	Pass
MAX.		3.896	25.12	-

Test Condition
- Crushing rate :1.5cm/s, until 13kN±0.78kN or 100mV drop or 50% deformation

Requirement
- Temperature ≤ 170 (°C)
- No disassembly, no fire within 6 hours after the test

Forced Discharge (T8)			
Pack NO.	Initial OCV(V)	Max. Temp (°C)	Result

A. 1st cycle fully Discharged state

1	3.660	43.80	Pass
2	3.628	44.63	Pass
3	3.710	44.77	Pass
4	3.691	44.92	Pass
5	3.721	42.29	Pass
6	3.741	45.32	Pass
7	3.669	44.46	Pass
8	3.721	43.83	Pass
9	3.636	45.55	Pass
10	3.707	46.43	Pass
MAX.	3.741	46.43	-

B. 50th cycle fully discharged state

1	3.683	44.57	Pass
2	3.654	43.80	Pass
3	3.705	45.50	Pass
4	3.721	46.41	Pass
5	3.638	44.70	Pass
6	3.713	44.95	Pass
7	3.699	45.14	Pass
8	3.682	44.14	Pass
9	3.708	44.71	Pass
10	3.655	43.86	Pass
MAX.	3.721	46.41	-

Test Condition
- Discharge at max. discharge current (with 12V DC power supply) Duration time: rated capacity

Requirement
- No disassembly, no fire within 7 days after the test

4. Sample Image

