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CERTIFICATE OF COMPLIANCE

The following product has been evaluated according to the 5th revised edition Amendment 2 of the UN Manual of Tests and Criteria.

We, LG Chem. Ltd hereby certify that this cell meets the requirements of the regulation for transportation of lithium-ion cells and batteries.




<input checked="" type="checkbox"/> Lithium-ion cell <input type="checkbox"/> Lithium-ion battery <input type="checkbox"/> Lithium-ion single cell battery	
Model name	ICP405995L1
Capacity	Min. 3530mAh
Nominal voltage	3.87 V
Type of Cell	Polymer

Conducted By: Dae Ho Nam

Manager
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LG Chem. Ltd
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Reviewed By: Byung Soo Kim

General Manager
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문서번호	QAE-EF02-150327-PO405995L1	
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	우민제	
Approved	김병수	

SolutionPartner

UN Test Report

- ICP405995L1 (Min. 3530mAh) -

목 차

1. UN Transportation Regulation Test
2. Test Procedure
3. Test Result
4. Sample Image

2015. 03. 27



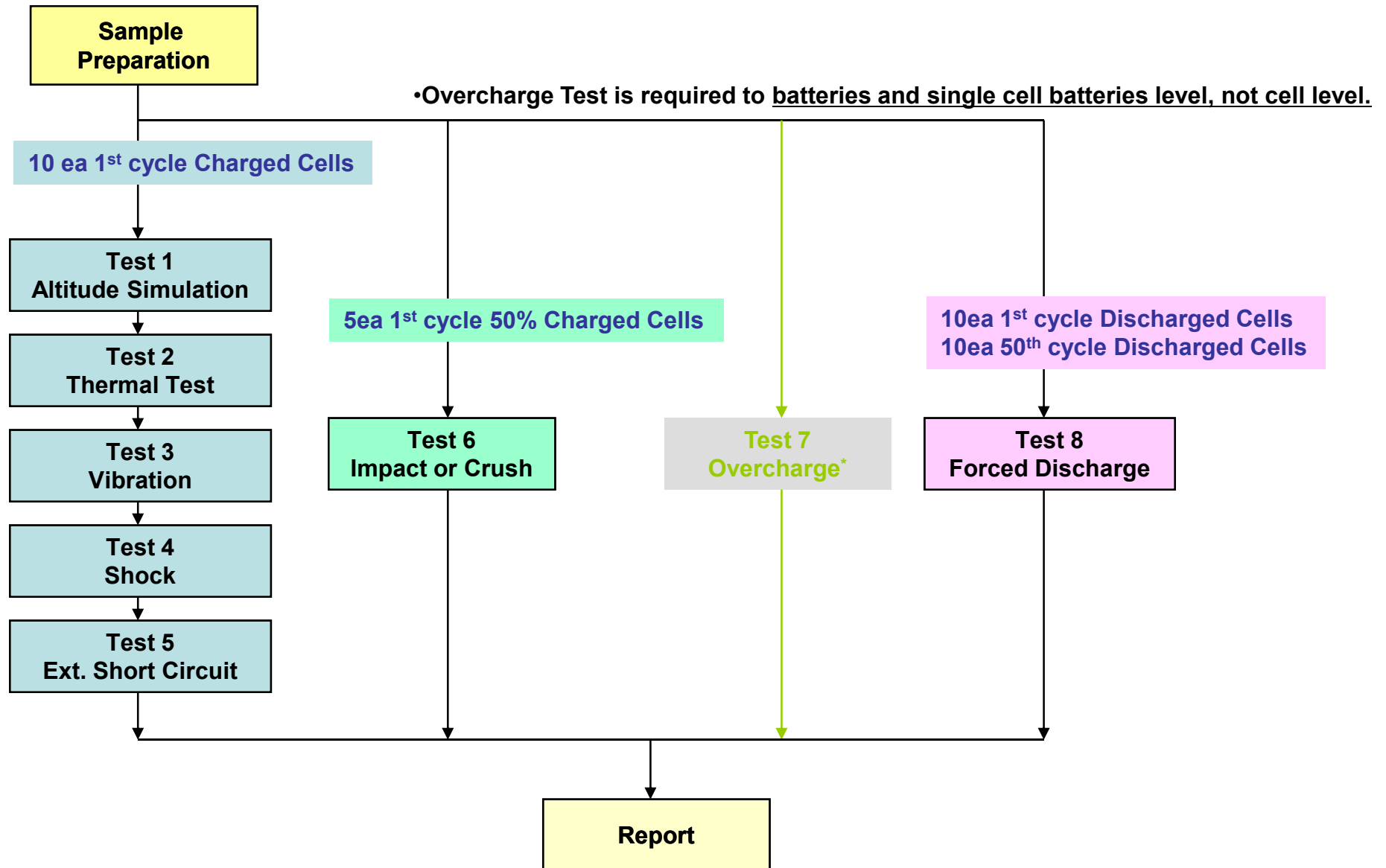
1. UN Transportation Regulation Test

Test	Condition	Requirements
Test 1. Altitude Simulation	Storing at (low pressure)11.6kPa for 6hr at 20+/-5℃	- Measuring mass before/ after each test (If M<1g, less than 0.5%, If 1g≤M≤75g, less than 0.2%, If M>75g, less than 0.1%) - Measuring voltage before/ after each test (more than 90%) - No leakage, no venting, no disassembly, no rupture, no fire
Test 2. Thermal Test	[72±2℃,6hr ↔ -40 ± 2℃,6hr,interval max. 30min] x 10cycle Storing at 20±5℃ for 24h	
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	
Test 4. Shock	Half sine shock (peak acceleration : 150gn, pulse duration : 6msec) x 6 (±x, y, z), direction x 3 cycle	
Test 5. External Short Circuit	100mΩ ext. short-circuit at 55±2℃ 1hr continue after returning at 55±2℃	
Test 6. Impact for cylindrical cells (> 18mm diameter)	Φ=15.8mm bar, 9.1kg mass, 61±2.5cm height	- No disassembly, no fire within 6 hours after the test - Temp. monitoring (max. 170℃)
Test 6. Crush for cylindrical cells (≤ 18mm diameter) for prismatic, pouch, coin/button cells	Crushing rate :1.5cm/s, until 13kN±0.78kN or 100mV drop or 50% deformation	
Test 7. Overcharge	Only for battery, not cell.	- Overcharge Test is required to pack battery level, not cell level.
Test 8. Forced Discharge	Discharge at max. discharge current (with 12V DC power supply), Duration time = rated capacity/initial test current	- No disassembly, no fire within 7 days after the test

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

* 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.2)

2. Test Procedure



3-1. T1-T4 Test Result

Before			Altitude (T1)					Thermal (T2)					Vibration (T3)					Shock (T4)				
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 charged state

1	4.364	52.512	4.363	52.511	99.98	0.002	Pass	4.290	52.504	98.33	0.013	Pass	4.289	52.501	99.98	0.006	Pass	4.288	52.496	99.98	0.010	Pass
2	4.364	52.255	4.363	52.254	99.98	0.002	Pass	4.289	52.244	98.30	0.019	Pass	4.288	52.242	99.98	0.004	Pass	4.288	52.238	100.00	0.008	Pass
3	4.364	52.742	4.363	52.741	99.98	0.002	Pass	4.290	52.730	98.33	0.021	Pass	4.289	52.728	99.98	0.004	Pass	4.289	52.725	100.00	0.006	Pass
4	4.363	52.164	4.363	52.163	100.00	0.002	Pass	4.290	52.152	98.33	0.021	Pass	4.290	52.151	100.00	0.002	Pass	4.290	52.150	100.00	0.002	Pass
5	4.363	52.508	4.363	52.506	100.00	0.004	Pass	4.291	52.501	98.35	0.010	Pass	4.290	52.497	99.98	0.008	Pass	4.289	52.495	99.98	0.004	Pass
6	4.362	52.413	4.360	52.409	99.95	0.008	Pass	4.289	52.400	98.37	0.017	Pass	4.289	52.400	100.00	0.000	Pass	4.289	52.398	100.00	0.004	Pass
7	4.364	52.168	4.362	52.167	99.95	0.002	Pass	4.290	52.162	98.35	0.010	Pass	4.290	52.160	100.00	0.004	Pass	4.289	52.158	99.98	0.004	Pass
8	4.364	52.255	4.363	52.254	99.98	0.002	Pass	4.290	52.243	98.33	0.021	Pass	4.289	52.241	99.98	0.004	Pass	4.289	52.239	100.00	0.004	Pass
9	4.364	52.738	4.360	52.737	99.91	0.002	Pass	4.289	52.728	98.37	0.017	Pass	4.289	52.725	100.00	0.006	Pass	4.288	52.721	99.98	0.008	Pass
10	4.364	52.243	4.361	52.242	99.93	0.002	Pass	4.291	52.238	98.39	0.008	Pass	4.291	52.236	100.00	0.004	Pass	4.291	52.231	100.00	0.010	Pass
Ave.	4.364	52.400	4.362	52.398	99.97	0.003	-	4.290	52.390	98.34	0.016	-	4.289	52.388	99.99	0.004	-	4.289	52.385	99.99	0.006	-

Requirement	<ul style="list-style-type: none"> - 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
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3-2. T5/T6/T8 Test Result

EXT.Short Circuit (T5)			
NO.	Initial OCV(V)	Max. Temp (°C)	Result
A. 1st cycle fully charged state			
1	4.288	97.98	Pass
2	4.288	96.33	Pass
3	4.289	101.17	Pass
4	4.290	105.83	Pass
5	4.289	95.74	Pass
6	4.289	90.65	Pass
7	4.289	96.27	Pass
8	4.289	92.19	Pass
9	4.288	97.07	Pass
10	4.291	100.70	Pass
MAX.	4.291	105.83	-

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

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

Crush (T6)				
Direction	NO.	Initial OCV(V)	Max. Temp (°C)	Result
A. 1st cycle 50% charged state				
Flat	11	3.911	23.60	Pass
	12	3.910	23.61	Pass
	13	3.911	23.48	Pass
	14	3.911	23.60	Pass
	15	3.912	23.59	Pass
MAX.		3.912	23.61	-

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)			
NO.	Initial OCV(V)	Max. Temp (°C)	Result
A. 1st cycle fully discharged state			
16	3.031	50.75	Pass
17	3.022	48.38	Pass
18	3.028	47.51	Pass
19	3.020	44.63	Pass
20	3.021	48.07	Pass
21	3.032	44.19	Pass
22	3.026	43.19	Pass
23	3.021	43.42	Pass
24	3.026	44.68	Pass
25	3.027	51.03	Pass
MAX.	3.032	51.03	-

B. 50th cycle fully discharged state			
26	3.096	45.94	Pass
27	3.110	51.06	Pass
28	3.113	50.18	Pass
29	3.115	52.84	Pass
30	3.099	49.82	Pass
31	3.108	57.98	Pass
32	3.105	51.25	Pass
33	3.095	49.71	Pass
34	3.103	56.85	Pass
35	3.115	50.69	Pass
MAX.	3.115	57.98	-

Test Condition
- Discharge at max. discharge current (with 12V DC power supply) : 3530mA Duration time: rated capacity (60min)

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

4. Sample Image





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Capacity	Min. 3530mAh
Nominal voltage	3.87 V
Type of Cell	Polymer

Conducted By: Dae Ho Nam

Manager
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LG Chem. Ltd
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Reviewed By: Byung Soo Kim

General Manager
Certification & Evaluation
LG Chem. Ltd
E-mail: bskim@lgchem.com

문서번호	QAE-EF02-150327-PO405995L1	
Prepared	남익현	
	장승현	
Reviewed	남대호	
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 LG Chem

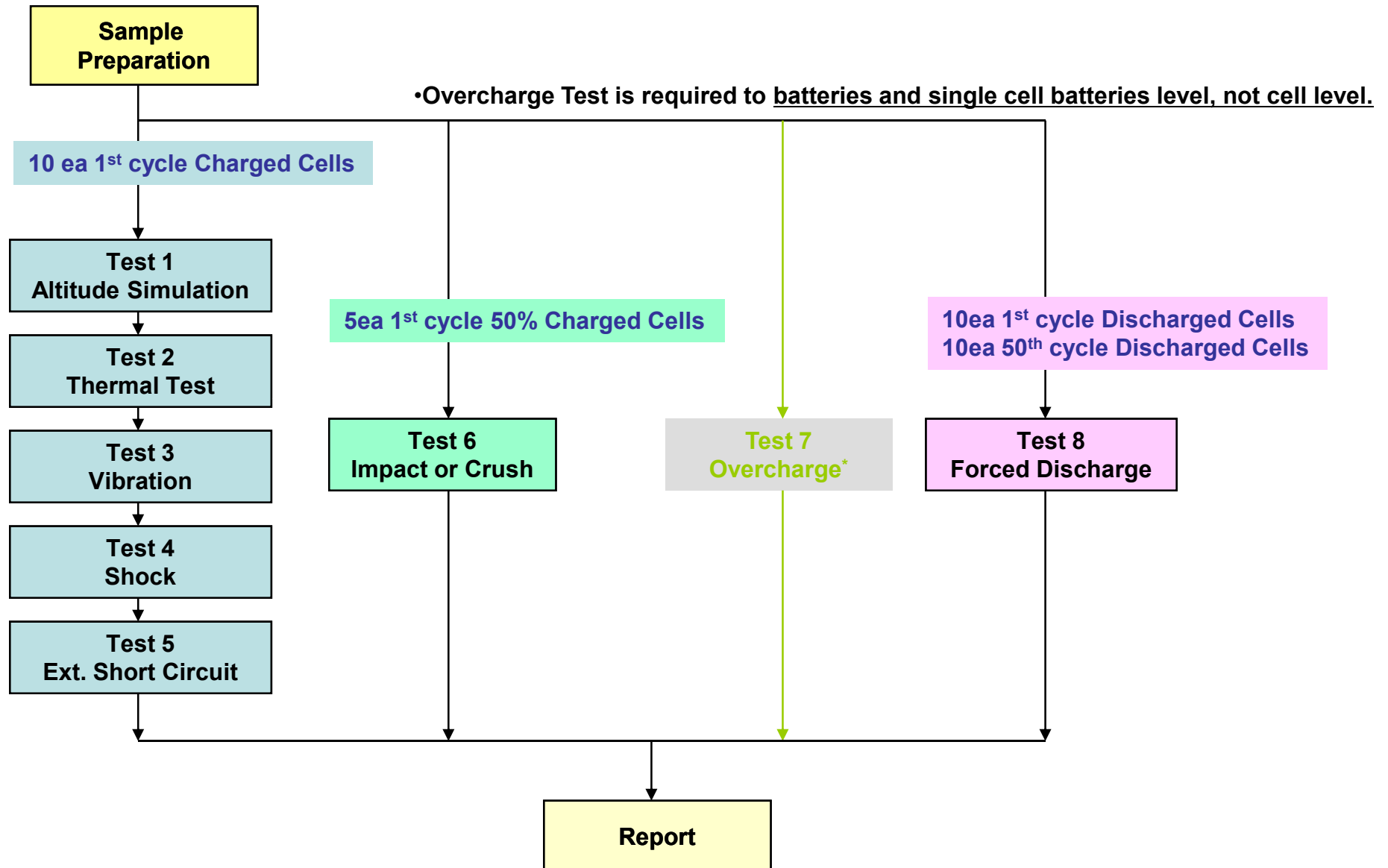
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Test 4. Shock	Half sine shock (peak acceleration : 150gn, pulse duration : 6msec) x 6 (±x, y, z), direction x 3 cycle	
Test 5. External Short Circuit	100mΩ ext. short-circuit at 55±2℃ 1hr continue after returning at 55±2℃	
Test 6. Impact for cylindrical cells (> 18mm diameter)	Φ=15.8mm bar, 9.1kg mass, 61±2.5cm height	- No disassembly, no fire within 6 hours after the test - Temp. monitoring (max. 170℃)
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10	4.364	52.243	4.361	52.242	99.93	0.002	Pass	4.291	52.238	98.39	0.008	Pass	4.291	52.236	100.00	0.004	Pass	4.291	52.231	100.00	0.010	Pass
Ave.	4.364	52.400	4.362	52.398	99.97	0.003	-	4.290	52.390	98.34	0.016	-	4.289	52.388	99.99	0.004	-	4.289	52.385	99.99	0.006	-

Requirement	<ul style="list-style-type: none"> - 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
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3-2. T5/T6/T8 Test Result

EXT.Short Circuit (T5)			
NO.	Initial OCV(V)	Max. Temp (°C)	Result
A. 1st cycle fully charged state			
1	4.288	97.98	Pass
2	4.288	96.33	Pass
3	4.289	101.17	Pass
4	4.290	105.83	Pass
5	4.289	95.74	Pass
6	4.289	90.65	Pass
7	4.289	96.27	Pass
8	4.289	92.19	Pass
9	4.288	97.07	Pass
10	4.291	100.70	Pass
MAX.	4.291	105.83	-

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

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

Crush (T6)				
Direction	NO.	Initial OCV(V)	Max. Temp (°C)	Result
A. 1st cycle 50% charged state				
Flat	11	3.911	23.60	Pass
	12	3.910	23.61	Pass
	13	3.911	23.48	Pass
	14	3.911	23.60	Pass
	15	3.912	23.59	Pass
MAX.		3.912	23.61	-

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)			
NO.	Initial OCV(V)	Max. Temp (°C)	Result
A. 1st cycle fully discharged state			
16	3.031	50.75	Pass
17	3.022	48.38	Pass
18	3.028	47.51	Pass
19	3.020	44.63	Pass
20	3.021	48.07	Pass
21	3.032	44.19	Pass
22	3.026	43.19	Pass
23	3.021	43.42	Pass
24	3.026	44.68	Pass
25	3.027	51.03	Pass
MAX.	3.032	51.03	-

B. 50th cycle fully discharged state			
26	3.096	45.94	Pass
27	3.110	51.06	Pass
28	3.113	50.18	Pass
29	3.115	52.84	Pass
30	3.099	49.82	Pass
31	3.108	57.98	Pass
32	3.105	51.25	Pass
33	3.095	49.71	Pass
34	3.103	56.85	Pass
35	3.115	50.69	Pass
MAX.	3.115	57.98	-

Test Condition
- Discharge at max. discharge current (with 12V DC power supply) : 3530mA Duration time: rated capacity (60min)

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

4. Sample Image

