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## CERTIFICATE OF COMPLIANCE

The following product has been evaluated according to the 5<sup>th</sup> revised edition Amendment2 of the UN Manual of Tests and Criteria.

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




<input type="checkbox"/> Lithium-ion cell <input checked="" type="checkbox"/> Lithium-ion battery <input type="checkbox"/> Lithium-ion single cell battery	
Model name	<b>L14L4P71</b>
Cell Model name	<b>ICP3549100L1</b>
Nominal voltage	<b>7.6 V</b>
Electric power capacity	<b>34 Wh</b>
Lithium equivalent content	<b>1.084g</b>

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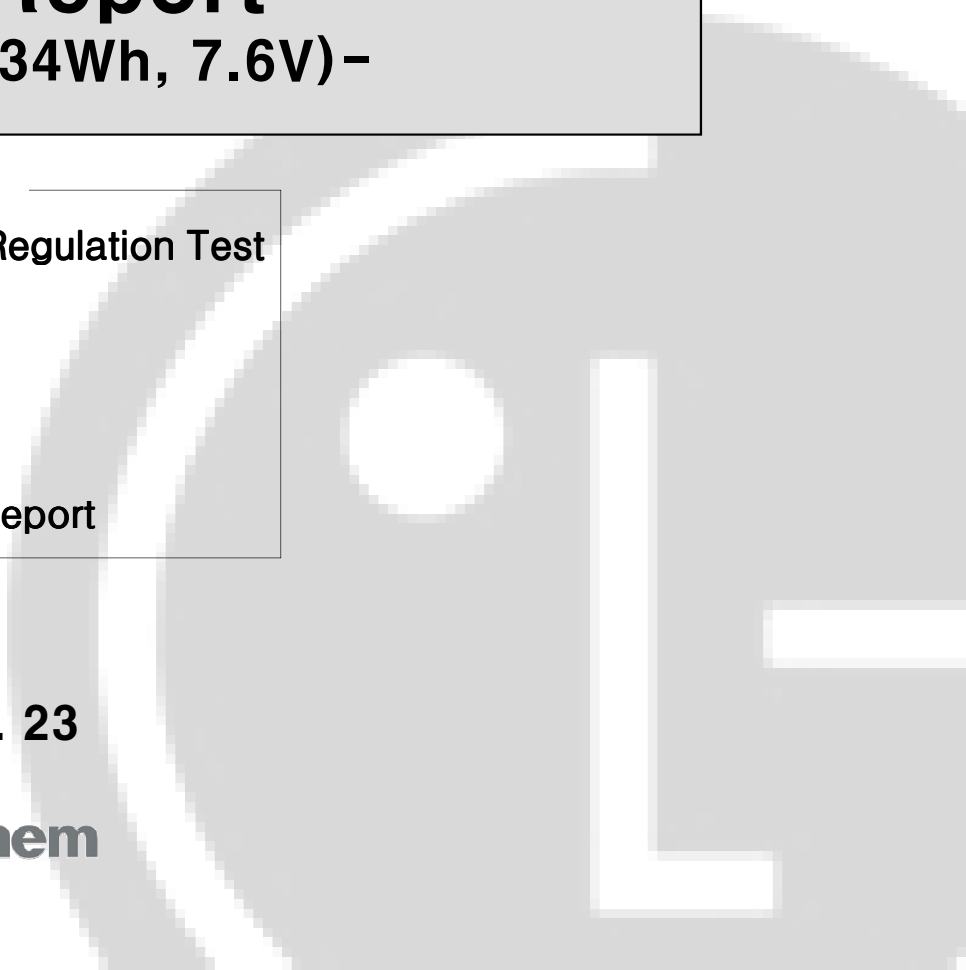
# UN Test Report

## - L14L4P71 (Nom.34Wh, 7.6V) -

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2014. 07. 23



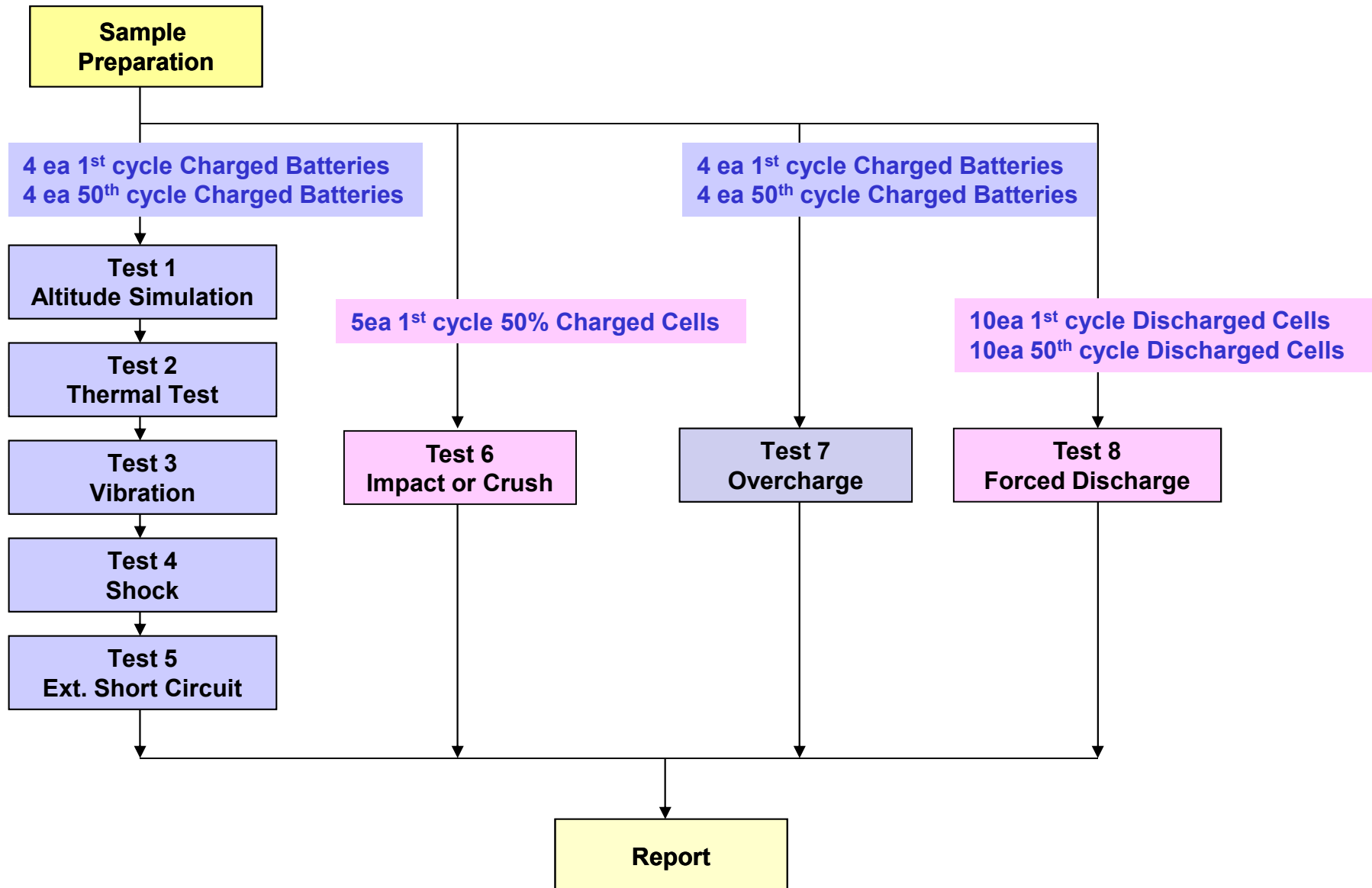
# 1. UN Transportation Regulation Test

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	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 within 7 days after the test
Test 8. Forced Discharge	Discharge at max. discharge current (with 12V DC power supply), Duration time = rated capacity/initial test current	

\* 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 state

Charge	1	8.678	172.09	8.665	172.09	99.85	0.001	Pass	8.585	172.09	99.08	0.003	Pass	8.488	172.06	98.87	0.015	Pass	8.339	172.05	98.24	0.005	Pass
	2	8.641	172.77	8.631	172.75	99.88	0.009	Pass	8.548	172.73	99.04	0.014	Pass	8.448	172.72	98.83	0.003	Pass	8.303	172.71	98.28	0.009	Pass
	3	8.641	172.99	8.629	172.97	99.86	0.008	Pass	8.543	172.97	99.00	0.004	Pass	8.441	172.96	98.81	0.005	Pass	8.296	172.94	98.28	0.012	Pass
	4	8.650	172.10	8.637	172.08	99.85	0.012	Pass	8.557	172.07	99.07	0.004	Pass	8.457	172.06	98.83	0.009	Pass	8.313	172.04	98.30	0.006	Pass
	Ave.	8.653	172.49	8.641	172.47	99.86	0.007	-	8.558	172.46	99.05	0.006	-	8.459	172.45	98.83	0.008	-	8.313	172.44	98.28	0.008	-

## B. 50th cycle fully state

Charge	5	8.662	172.10	8.646	172.09	99.82	0.008	Pass	8.561	172.08	99.02	0.007	Pass	8.465	172.07	98.88	0.006	Pass	8.314	172.06	98.22	0.002	Pass
	6	8.657	172.34	8.648	172.33	99.90	0.005	Pass	8.567	172.31	99.06	0.008	Pass	8.465	172.30	98.81	0.009	Pass	8.316	172.30	98.24	0.001	Pass
	7	8.663	172.66	8.646	172.65	99.80	0.001	Pass	8.563	172.65	99.04	0.003	Pass	8.467	172.64	98.88	0.005	Pass	8.318	172.64	98.24	0.002	Pass
	8	8.653	172.59	8.641	172.57	99.86	0.013	Pass	8.599	172.56	99.51	0.005	Pass	8.460	172.54	98.38	0.013	Pass	8.311	172.54	98.24	0.001	Pass
	Ave.	8.659	172.42	8.645	172.41	99.84	0.007	-	8.573	172.40	99.16	0.006	-	8.464	172.39	98.74	0.008	-	8.315	172.38	98.23	0.001	-

<b>Requirement</b>	<ul style="list-style-type: none"> <li>- Measuring mass before/after each test (If <math>M &gt; 75g</math>, less than 0.1%, <math>1g \leq M \leq 75</math>, less than 0.2%, <math>M &lt; 1g</math>, less than 0.5%)</li> <li>- Measuring voltage before/after each test (more than 90%, only charged samples)</li> <li>- No leakage, no venting, no disassembly, no rupture, no fire</li> </ul>
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# 3-2. T5/T7 Test Result

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

### A. 1st cycle fully state

Charge	1	8.339	55.95	Pass
	2	8.303	55.59	Pass
	3	8.296	54.80	Pass
	4	8.313	54.73	Pass
	MAX.	8.339	55.95	-

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

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

### A. 1st cycle fully state

Charge	9	8.646	24.86	Pass
	10	8.643	24.16	Pass
	11	8.640	24.21	Pass
	12	8.648	24.41	Pass
	MAX.	8.648	24.86	-

Test Condition
- Max. Charge Current : 2290mA - CC/CV 2Imax(4580mA) 17.4V cut-off 24Hr

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

### B. 50th cycle fully state

Charge	5	8.314	54.76	Pass
	6	8.316	55.90	Pass
	7	8.318	55.81	Pass
	8	8.311	55.13	Pass
	MAX.	8.318	55.90	-

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

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

### B. 50th cycle fully state

Charge	13	8.628	24.80	Pass
	14	8.620	23.46	Pass
	15	8.622	24.69	Pass
	16	8.624	23.94	Pass
	MAX.	8.628	24.80	-

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

# 3-3. T6/T8 Test Result (ICP3549100L1)

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

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

Flat	C-1	3.743	22.71	Pass
	C-2	3.751	22.74	Pass
	C-3	3.748	23.03	Pass
	C-4	3.748	23.39	Pass
	C-5	3.746	23.49	Pass
MAX.		3.751	23.49	-

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

C-6	3.001	46.41	Pass
C-7	3.007	48.90	Pass
C-8	2.978	46.80	Pass
C-9	2.979	49.04	Pass
C-10	2.979	47.18	Pass
C-11	2.985	49.27	Pass
C-12	3.009	48.11	Pass
C-13	2.979	48.30	Pass
C-14	3.011	46.83	Pass
C-15	2.980	47.64	Pass
MAX.	3.011	49.27	-

## B. 50th cycle fully discharged state

C-16	3.144	45.57	Pass
C-17	3.142	45.37	Pass
C-18	3.141	45.35	Pass
C-19	3.142	46.11	Pass
C-20	3.139	44.59	Pass
C-21	3.139	45.62	Pass
C-22	3.137	46.28	Pass
C-23	3.137	44.44	Pass
C-24	3.139	44.66	Pass
C-25	3.141	44.64	Pass
MAX.	3.144	46.28	-

Test Condition
- Discharge at max. discharge current (with 12V DC power supply) : 2290mA Duration time: rated capacity (60.0min)

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

# 4. Sample Image

