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CERTIFICATE OF COMPLIANCE

The following product has been evaluated according to the 5th 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	L15L4PC2
Cell Model name	ICP516371L1
Nominal voltage	7.6 V
Electric power capacity	53 Wh
Lithium equivalent content	6.16 g

Conducted By: Dae Ho Nam

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문서번호	QAE-EF02-151124-B-L15L4PC2	
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UN38.3 Test Report

- L15L4PC2 (Nom.53Wh, 7.6V)-

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2015. 11. 24

1. UN38.3 Test Condition

Rev.5 / Amd.2

Test item	Test Condition	Requirements	Etc.
Test 1. Altitude Simulation	Storing at (low pressure)11.6kPa for 6hr at 20+/-5℃	<ul style="list-style-type: none"> - After OCV (%) ≥ 90% - No leakage, no venting, no disassembly, no rupture, no fire - Mass loss limit (leakage) <ol style="list-style-type: none"> 1) If M<1g, less than 0.5%, 2) If 1g≤M≤75g, less than 0.2%, 3) If M>75g, less than 0.1%) 	<p>T1~T5 : Sequence Tests</p> <pre> graph TD T1[Test 1 Altitude Simulation] --> T2[Test 2 Thermal Test] T2 --> T3[Test 3 Vibration] T3 --> T4[Test 4 Shock] T4 --> T5[Test 5 Ext. Short Circuit] </pre>
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	Φ=15.8±0.1mm bar, 9.1±0.1kg mass, 61±2.5cm height	<ul style="list-style-type: none"> - No disassembly, no fire within 6 hours after the test - Max. Temp ≤ 170℃ 	for cylindrical cells (not less than 18mm diameter)
Test 6. Crush	Crushing rate :1.5cm/s, until 13kN±0.78kN or 100mV drop or 50% deformation		for cylindrical cells (less than 18mm diameter) for prismatic, pouch, coin/button cells
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 22V. 2.If charge voltage > 18V, V (min.) = 1.2 x (max. charge voltage)	<ul style="list-style-type: none"> - No disassembly, no fire within 7 days after the test 	Only for Single Cell Battery / Battery
Test 8. Forced Discharge	Discharge at max. discharge current (connecting in series with 12V DC power supply), Duration time = rated capacity/initial test current	<ul style="list-style-type: none"> - No disassembly, no fire within 7 days after the test 	Resistance of Electric Loader 1/Ω = (max. discharge current) / (12 + Initial OCV)

2-1. T1-T4 Test Result

Before			Altitude (T1)					Thermal (T2)					Vibration (T3)					Shock (T4)				
NO.	OCV	Mass (g)	After OCV (V)	Mass (g)	After OCV(%)	Mass Loss(%)	Result	After OCV (V)	Mass (g)	After OCV(%)	Mass Loss(%)	Result	After OCV (V)	Mass (g)	After OCV(%)	Mass Loss(%)	Result	After OCV (V)	Mass (g)	After OCV(%)	Mass Loss(%)	Result

A. 1st cycle fully charged state

1	8.562	248.66	8.561	248.66	99.99	0.000	Pass	8.455	248.64	98.76	0.008	Pass	8.454	248.61	99.99	0.012	Pass	8.451	248.60	99.96	0.004	Pass
2	5.553	248.94	5.551	248.94	99.96	0.000	Pass	5.485	248.94	98.81	0.000	Pass	5.483	248.93	99.96	0.004	Pass	5.483	248.93	100.00	0.000	Pass
3	8.556	248.72	8.555	248.72	99.99	0.000	Pass	8.440	248.71	98.66	0.004	Pass	8.440	248.70	100.00	0.004	Pass	8.438	248.70	99.98	0.000	Pass
4	8.553	248.43	8.549	248.43	99.95	0.000	Pass	8.446	248.42	98.80	0.004	Pass	8.443	248.42	99.96	0.000	Pass	8.440	248.42	99.96	0.000	Pass

B. 50th cycle fully charged state

5	8.543	248.83	8.540	248.82	99.96	0.004	Pass	8.443	248.80	98.86	0.008	Pass	8.440	248.77	99.96	0.012	Pass	8.440	248.76	100.00	0.004	Pass
6	8.547	248.64	8.545	248.63	99.98	0.004	Pass	8.447	248.63	98.85	0.000	Pass	8.447	248.61	100.00	0.008	Pass	8.445	248.60	99.98	0.004	Pass
7	8.550	248.77	8.547	248.77	99.96	0.000	Pass	8.437	248.77	98.71	0.000	Pass	8.434	248.74	99.96	0.012	Pass	8.433	248.74	99.99	0.000	Pass
8	8.548	248.18	8.545	248.18	99.96	0.000	Pass	8.441	248.17	98.78	0.004	Pass	8.439	248.16	99.98	0.004	Pass	8.438	248.15	99.99	0.004	Pass

2-2. T5/T7 Test Result

EXT.Short Circuit (T5)

NO.	Initial OCV(V)	Max. Temp (°C)	Result
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A. 1st cycle fully charged state

1	8.451	55.35	Pass
2	5.483	55.79	Pass
3	8.438	56.64	Pass
4	8.440	55.02	Pass

B. 50th cycle fully charged state

5	8.544	25.18	Pass
6	8.544	24.87	Pass
7	8.548	24.39	Pass
8	8.543	24.58	Pass

Over Charge (T7)

NO.	Initial OCV(V)	Max. Temp (°C)	Result
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A. 1st cycle fully charged state

9	8.544	25.18	Pass
10	8.544	24.87	Pass
11	8.548	24.39	Pass
12	8.543	24.58	Pass

Over Charge (T7)

NO.	Initial OCV(V)	Max. Temp (°C)	Result
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B. 50th cycle fully charged state

13	8.528	24.97	Pass
14	8.524	25.28	Pass
15	8.525	24.43	Pass
16	8.522	25.28	Pass

2-3. T6/T8 Test Result (ICP516371L1)

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

A. 1st cycle 50% charged state

C-1	3.812	23.71	Pass
C-2	3.815	23.64	Pass
C-3	3.816	23.13	Pass
C-4	3.809	22.89	Pass
C-5	3.820	23.29	Pass

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

A. 1st cycle fully discharged state

C-6	3.005	46.41	Pass
C-7	3.007	48.90	Pass
C-8	3.008	46.80	Pass
C-9	3.010	49.04	Pass
C-10	3.012	47.18	Pass
C-11	3.010	49.27	Pass
C-12	3.009	48.11	Pass
C-13	3.008	48.30	Pass
C-14	3.009	46.83	Pass
C-15	3.009	47.64	Pass

B. 50th cycle fully discharged state

C-16	3.140	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

3. Sample Image

