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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	L15L4PC3
Cell Model name	ICP344995L1
Nominal voltage	7.72 V
Electric power capacity	41 Wh
Lithium equivalent content	1.596 g

Conducted By: Min Je Woo

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문서번호	QDI-160524-B-L15L4PC3	
Prepared	남익현	
Reviewed	우민제	
Approved	남대호	

UN38.3 Test Report

- L15L4PC3 (Nom.41Wh, 7.72V) -

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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	8.747	164.74	8.743	164.74	99.95	0.000	Pass	8.652	164.73	98.96	0.006	Pass	8.648	164.72	99.95	0.006	Pass	8.645	164.71	99.97	0.006	Pass
2	8.743	164.09	8.739	164.09	99.95	0.000	Pass	8.646	164.08	98.94	0.006	Pass	8.640	164.07	99.93	0.006	Pass	8.632	164.06	99.91	0.006	Pass
3	8.743	164.18	8.740	164.17	99.97	0.006	Pass	8.651	164.16	98.98	0.006	Pass	8.650	164.15	99.99	0.006	Pass	8.648	164.14	99.98	0.006	Pass
4	8.748	164.76	8.741	164.76	99.92	0.000	Pass	8.646	164.75	98.91	0.006	Pass	8.642	164.75	99.95	0.000	Pass	8.640	164.75	99.98	0.000	Pass

B. 50th cycle fully charged state

5	8.760	164.89	8.757	164.88	99.97	0.007	Pass	8.668	164.86	98.98	0.012	Pass	8.661	164.86	99.92	0.000	Pass	8.655	164.85	99.93	0.006	Pass
6	8.762	164.50	8.760	164.48	99.98	0.010	Pass	8.661	164.48	98.87	0.000	Pass	8.658	164.48	99.97	0.000	Pass	8.652	164.48	99.93	0.000	Pass
7	8.761	164.21	8.758	164.20	99.97	0.005	Pass	8.661	164.19	98.89	0.006	Pass	8.659	164.17	99.98	0.012	Pass	8.652	164.17	99.92	0.000	Pass
8	8.765	164.30	8.760	164.28	99.94	0.010	Pass	8.669	164.28	98.96	0.000	Pass	8.665	164.26	99.95	0.012	Pass	8.662	164.25	99.97	0.006	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	8.645	55.12	Pass
2	8.632	56.00	Pass
3	8.648	56.63	Pass
4	8.640	55.18	Pass

B. 50th cycle fully charged state

5	8.655	54.75	Pass
6	8.652	55.68	Pass
7	8.652	55.28	Pass
8	8.662	55.77	Pass

Over Charge (T7)

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

9	8.746	23.43	Pass
10	8.742	24.22	Pass
11	8.749	25.02	Pass
12	8.747	23.68	Pass

Over Charge (T7)

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

13	8.720	25.02	Pass
14	8.725	24.31	Pass
15	8.724	25.26	Pass
16	8.727	23.46	Pass

2-3. T6/T8 Test Result (ICP344995L1)

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

A. 1st cycle 50% charged state

C-1	3.849	23.13	Pass
C-2	3.866	23.24	Pass
C-3	3.874	23.12	Pass
C-4	3.867	23.21	Pass
C-5	3.846	23.10	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	3.024	46.88	Pass
C-7	3.056	45.91	Pass
C-8	3.032	44.73	Pass
C-9	3.028	47.16	Pass
C-10	3.017	48.71	Pass
C-11	3.016	47.87	Pass
C-12	3.011	47.58	Pass
C-13	3.023	47.96	Pass
C-14	3.017	46.81	Pass
C-15	3.019	47.55	Pass

B. 50th cycle fully discharged state

C-16	3.116	44.86	Pass
C-17	3.123	45.29	Pass
C-18	3.119	44.54	Pass
C-19	3.107	44.63	Pass
C-20	3.123	45.71	Pass
C-21	3.117	45.85	Pass
C-22	3.124	46.82	Pass
C-23	3.119	45.44	Pass
C-24	3.113	44.96	Pass
C-25	3.119	46.87	Pass

3. Sample Image

