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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	L15L3PB0
Cell Model name	ICP595490A1
Nominal voltage	11.4 V
Electric power capacity	52.5 Wh
Lithium equivalent content	3.97g

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문서번호	QAE-EF02-151102-B-L15L3PB0	
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UN38.3 Test Report

- L15L3PB0 (Nom.52.5Wh, 11.4V)-

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2015. 11. 02

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	13.012	219.13	13.009	219.12	99.98	0.005	Pass	12.861	219.12	98.86	0.000	Pass	12.858	219.10	99.98	0.009	Pass	12.854	219.09	99.97	0.005	Pass
2	13.010	219.33	13.005	219.32	99.96	0.005	Pass	12.833	219.29	98.68	0.014	Pass	12.833	219.27	100.00	0.009	Pass	12.828	219.27	99.96	0.000	Pass
3	13.016	219.16	13.012	219.15	99.97	0.005	Pass	12.844	219.12	98.71	0.014	Pass	12.844	219.11	100.00	0.005	Pass	12.838	219.11	99.95	0.000	Pass
4	13.016	219.65	13.016	219.64	100.00	0.005	Pass	12.847	219.62	98.70	0.009	Pass	12.844	219.61	99.98	0.005	Pass	12.840	219.61	99.97	0.000	Pass

B. 50th cycle fully charged state

5	13.038	219.32	13.034	219.32	99.97	0.000	Pass	12.872	219.30	98.76	0.009	Pass	12.871	219.28	99.99	0.009	Pass	12.868	219.27	99.98	0.005	Pass
6	13.007	219.87	13.004	219.86	99.98	0.005	Pass	12.839	219.86	98.73	0.000	Pass	12.834	219.85	99.96	0.005	Pass	12.831	219.85	99.98	0.000	Pass
7	13.001	219.30	12.997	219.29	99.97	0.005	Pass	12.838	219.28	98.78	0.005	Pass	12.834	219.26	99.97	0.009	Pass	12.829	219.25	99.96	0.005	Pass
8	12.998	219.43	12.998	219.42	100.00	0.005	Pass	12.843	219.42	98.81	0.000	Pass	12.839	219.42	99.97	0.000	Pass	12.838	219.42	99.99	0.000	Pass

2-2. T5/T7 Test Result

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

A. 1st cycle fully charged state

1	12.854	55.69	Pass
2	12.828	56.02	Pass
3	12.838	55.22	Pass
4	12.840	55.89	Pass

B. 50th cycle fully charged state

5	12.868	55.31	Pass
6	12.831	54.78	Pass
7	12.829	54.59	Pass
8	12.838	54.54	Pass

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

A. 1st cycle fully charged state

9	12.991	24.27	Pass
10	12.992	24.95	Pass
11	12.991	25.97	Pass
12	12.996	25.92	Pass

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

B. 50th cycle fully charged state

13	12.973	26.12	Pass
14	12.971	24.38	Pass
15	12.976	25.93	Pass
16	12.974	24.58	Pass

2-3. T6/T8 Test Result (ICP595490A1)

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

A. 1st cycle 50% charged state

C-1	3.733	24.25	Pass
C-2	3.723	23.95	Pass
C-3	3.724	23.69	Pass
C-4	3.733	23.45	Pass
C-5	3.727	23.47	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	3.396	80.41	Pass
C-7	3.395	81.99	Pass
C-8	3.399	86.40	Pass
C-9	3.401	79.60	Pass
C-10	3.397	90.31	Pass
C-11	3.980	81.89	Pass
C-12	3.399	84.08	Pass
C-13	3.398	81.53	Pass
C-14	3.398	82.76	Pass
C-15	3.400	73.80	Pass

B. 50th cycle fully discharged state

C-16	3.780	88.63	Pass
C-17	3.588	78.32	Pass
C-18	3.542	99.41	Pass
C-19	3.591	76.73	Pass
C-20	3.605	88.63	Pass
C-21	3.616	81.87	Pass
C-22	3.572	86.43	Pass
C-23	3.581	88.18	Pass
C-24	3.612	88.15	Pass
C-25	3.578	85.56	Pass

3. Sample Image

