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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>L15L2PB1</b>
Cell Model name	<b>ICP595490A1</b>
Nominal voltage	<b>7.6 V</b>
Electric power capacity	<b>35 Wh</b>
Lithium equivalent content	<b>2.65 g</b>

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# UN38.3 Test Report

## - L15L2PB1 (Nom.35Wh, 7.6V) -

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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"> <li>- After OCV (%) ≥ 90%</li> <li>- No leakage, no venting, no disassembly, no rupture, no fire</li> <li>- Mass loss limit (leakage)                             <ol style="list-style-type: none"> <li>1) If <math>M &lt; 1g</math>, less than 0.5%,</li> <li>2) If <math>1g \leq M \leq 75g</math>, less than 0.2%,</li> <li>3) If <math>M &gt; 75g</math>, less than 0.1%</li> </ol> </li> </ul>	<p>T1~T5 : Sequence Tests</p> <pre> graph TD     T1[Test 1 Altitude Simulation] --&gt; T2[Test 2 Thermal Test]     T2 --&gt; T3[Test 3 Vibration]     T3 --&gt; T4[Test 4 Shock]     T4 --&gt; 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℃	<ul style="list-style-type: none"> <li>- No disassembly, no rupture, no fire within 6 hours after the test</li> <li>- Max. Temp ≤ 170℃</li> </ul>	
Test 6. Impact	Φ=15.8±0.1mm bar, 9.1±0.1kg mass, 61±2.5cm height	<ul style="list-style-type: none"> <li>- No disassembly, no fire within 6 hours after the test</li> <li>- Max. Temp ≤ 170℃</li> </ul>	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"> <li>- No disassembly, no fire within 7 days after the test</li> </ul>	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"> <li>- No disassembly, no fire within 7 days after the test</li> </ul>	Resistance of Electric Loader $1/\Omega = (\text{max. discharge current}) / (12 + \text{Initial OCV})$

# 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	8.676	160.36	8.674	160.35	99.98	0.006	Pass	8.561	160.34	98.70	0.006	Pass	8.557	160.34	99.95	0.000	Pass	8.554	160.34	99.96	0.000	Pass
2	8.656	160.82	8.656	160.82	100.00	0.000	Pass	8.545	160.82	98.72	0.000	Pass	8.545	160.81	100.00	0.006	Pass	8.541	160.81	99.95	0.000	Pass
3	8.647	160.11	8.644	160.10	99.97	0.006	Pass	8.532	160.09	98.70	0.006	Pass	8.528	160.09	99.95	0.000	Pass	8.526	160.09	99.98	0.000	Pass
4	8.653	160.74	8.651	160.73	99.98	0.006	Pass	8.547	160.72	98.80	0.006	Pass	8.544	160.71	99.96	0.006	Pass	8.541	160.71	99.96	0.000	Pass

**B. 50th cycle fully charged state**

5	8.659	160.61	8.659	160.61	100.00	0.000	Pass	8.559	160.59	98.85	0.012	Pass	8.556	160.58	99.96	0.006	Pass	8.556	160.58	100.00	0.000	Pass
6	8.654	160.72	8.651	160.71	99.97	0.006	Pass	8.544	160.70	98.76	0.006	Pass	8.544	160.69	100.00	0.006	Pass	8.541	160.69	99.96	0.000	Pass
7	8.656	160.48	8.652	160.48	99.95	0.000	Pass	8.542	160.46	98.73	0.012	Pass	8.542	160.46	100.00	0.000	Pass	8.539	160.46	99.96	0.000	Pass
8	8.650	160.65	8.648	160.64	99.98	0.006	Pass	8.535	160.64	98.69	0.000	Pass	8.532	160.64	99.96	0.000	Pass	8.532	160.63	100.00	0.006	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	8.554	56.44	Pass
2	8.541	55.90	Pass
3	8.526	56.61	Pass
4	8.541	55.90	Pass

**B. 50th cycle fully charged state**

5	8.556	57.09	Pass
6	8.541	56.07	Pass
7	8.539	56.63	Pass
8	8.532	56.86	Pass

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

**A. 1st cycle fully charged state**

9	8.662	23.21	Pass
10	8.666	23.49	Pass
11	8.661	22.98	Pass
12	8.655	23.58	Pass

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

**B. 50th cycle fully charged state**

13	8.653	23.69	Pass
14	8.653	22.92	Pass
15	8.658	22.64	Pass
16	8.662	22.66	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	3.822	20.45	Pass
C-2	3.823	20.52	Pass
C-3	3.823	21.43	Pass
C-4	3.824	20.80	Pass
C-5	3.824	22.09	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	3.221	103.92	Pass
C-7	3.218	116.05	Pass
C-8	3.230	105.14	Pass
C-9	3.219	98.71	Pass
C-10	3.231	113.00	Pass
C-11	3.221	94.48	Pass
C-12	3.212	103.91	Pass
C-13	3.208	105.73	Pass
C-14	3.248	97.84	Pass
C-15	3.256	99.20	Pass

**B. 50th cycle fully discharged state**

C-16	3.314	85.24	Pass
C-17	3.309	98.81	Pass
C-18	3.320	106.37	Pass
C-19	3.331	103.76	Pass
C-20	3.316	73.64	Pass
C-21	3.318	105.77	Pass
C-22	3.312	103.81	Pass
C-23	3.313	87.25	Pass
C-24	3.316	89.89	Pass
C-25	3.313	94.44	Pass

