



CONFIDENTIAL

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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>L17L2PB1</b>
Cell Model name	<b>ICP595490L2</b>
Nominal voltage	<b>7.6 V</b>
Electric power capacity	<b>30 Wh</b>

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# UN38.3 Test Report

## - L17L2PB1 (Nom.30Wh, 7.6V)-

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2017. 07. 06



# 1. UN38.3 Test Condition

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>	T1~T5 : Sequence Tests <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 1g) 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/Ω = (max. discharge current) / (12 + Initial OCV)

## 2. General Information

### 1. Standard charge / discharge Condition

	Mode	Condition	End Condition
Charge	CC / CV	Current = 2690 mA Voltage = 8.7 V	Current = 195 mA
Discharge	CC	Current = 780 mA	Voltage = 6.0 V

### 2. Cycle Condition

	Mode	Condition	End Condition
Charge	CC / CV	Current = 2690 mA Voltage = 8.7 V	Current = 195 mA
Discharge	CC	Current = 780 mA	Voltage = 6.0 V

### 3. Test Condition

	Mode	Condition
Test 7. Overcharge	CC / CV	Max. Charge Current = 2690 mA CC/CV 2Imax (5380mA) 17.4 V cut-off 24Hr
Test 8. Forced Discharge	CC	Max. Discharge Current = 3900 mA Duration Time = 60 min

# 3-1. 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	8.686	139.06	8.680	139.05	99.93	0.002	Pass	8.586	139.05	98.92	0.001	Pass	8.585	139.05	99.99	0.003	Pass	8.577	139.05	99.91	0.001	Pass
2	8.686	139.05	8.678	139.04	99.91	0.003	Pass	8.585	139.04	98.93	0.004	Pass	8.578	139.04	99.92	0.001	Pass	8.574	139.04	99.95	0.001	Pass
3	8.687	139.06	8.680	139.06	99.92	0.003	Pass	8.593	139.06	99.00	0.003	Pass	8.588	139.05	99.94	0.003	Pass	8.587	139.05	99.99	0.000	Pass
4	8.670	139.04	8.663	139.04	99.92	0.001	Pass	8.569	139.03	98.91	0.004	Pass	8.562	139.03	99.92	0.002	Pass	8.557	139.03	99.94	0.000	Pass

## B. 50th cycle fully charged state

5	8.690	139.08	8.686	139.08	99.95	0.001	Pass	8.596	139.08	98.96	0.001	Pass	8.593	139.08	99.97	0.001	Pass	8.592	139.08	99.99	0.000	Pass
6	8.690	139.05	8.685	139.05	99.94	0.003	Pass	8.590	139.04	98.91	0.002	Pass	8.588	139.04	99.98	0.002	Pass	8.588	139.04	100.00	0.000	Pass
7	8.679	139.07	8.678	139.07	99.99	0.002	Pass	8.588	139.07	98.96	0.001	Pass	8.585	139.06	99.97	0.003	Pass	8.577	139.06	99.91	0.004	Pass
8	8.681	139.09	8.678	139.08	99.97	0.002	Pass	8.586	139.08	98.94	0.002	Pass	8.585	139.08	99.99	0.001	Pass	8.578	139.07	99.92	0.004	Pass

# 3-2. 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	8.577	55.43	Pass
2	8.574	55.68	Pass
3	8.587	55.37	Pass
4	8.557	55.59	Pass

### B. 50th cycle fully charged state

5	8.592	55.82	Pass
6	8.588	55.13	Pass
7	8.577	55.46	Pass
8	8.578	55.36	Pass

## Over Charge (T7)

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

9	8.692	24.83	Pass
10	8.695	25.73	Pass
11	8.691	25.33	Pass
12	8.693	24.78	Pass

## Over Charge (T7)

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

13	8.687	25.23	Pass
14	8.691	25.24	Pass
15	8.684	24.33	Pass
16	8.691	25.27	Pass

# 3-3. T6/T8 Test Result (ICP595490L2)

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

**A. 1st cycle 50% charged state**

C-1	3.871	22.13	Pass
C-2	3.868	22.33	Pass
C-3	3.871	22.51	Pass
C-4	3.872	22.85	Pass
C-5	3.870	23.40	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	3.320	43.79	Pass
C-7	3.330	43.28	Pass
C-8	3.333	42.94	Pass
C-9	3.323	43.84	Pass
C-10	3.331	44.13	Pass
C-11	3.311	42.94	Pass
C-12	3.319	43.15	Pass
C-13	3.311	43.98	Pass
C-14	3.311	42.86	Pass
C-15	3.345	45.19	Pass

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

C-16	3.394	42.97	Pass
C-17	3.394	42.35	Pass
C-18	3.412	43.60	Pass
C-19	3.420	44.72	Pass
C-20	3.380	43.38	Pass
C-21	3.386	44.38	Pass
C-22	3.369	44.98	Pass
C-23	3.411	42.57	Pass
C-24	3.414	44.05	Pass
C-25	3.397	42.85	Pass

# 4. Sample Image

