



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>L17L2PF0</b>
Cell Model name	<b>ICP595490A1</b>
Nominal voltage	<b>7.6 V</b>
Electric power capacity	<b>35 Wh</b>

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# UN38.3 Test Report

## - L17L2PF0 (Nom.35Wh, 7.6V) -

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# 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 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/Ω = (max. discharge current) / (12 + Initial OCV)

## 2. General Information

### 1. Standard charge / discharge Condition

	Mode	Condition	End Condition
Charge	CC / CV	Current = 4471 mA Voltage = 8.7 V	Current = 225 mA
Discharge	CC	Current = 896 mA	Voltage = 6.0 V

### 2. Cycle Condition

	Mode	Condition	End Condition
Charge	CC / CV	Current = 4471 mA Voltage = 8.7 V	Current = 225 mA
Discharge	CC	Current = 896 mA	Voltage = 6.0 V

### 3. Test Condition

	Mode	Condition
Test 7. Overcharge	CC / CV	Max. Charge Current = 4500 mA CC/CV 2Imax (9000mA) 17.4 V cut-off 24Hr
Test 8. Forced Discharge	CC	Max. Discharge Current = 9000 mA Duration Time = 30 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	8.685	151.12	8.679	151.11	99.93	0.007	Pass	8.586	151.11	98.93	0.000	Pass	8.584	151.11	99.98	0.000	Pass	8.576	151.10	99.91	0.007	Pass
2	8.684	151.11	8.676	151.10	99.91	0.007	Pass	8.585	151.10	98.95	0.000	Pass	8.578	151.10	99.92	0.000	Pass	8.573	151.10	99.94	0.000	Pass
3	8.684	151.12	8.677	151.12	99.92	0.000	Pass	8.593	151.12	99.03	0.000	Pass	8.587	151.11	99.93	0.007	Pass	8.586	151.10	99.99	0.007	Pass
4	8.671	151.10	8.664	151.10	99.92	0.000	Pass	8.569	151.09	98.90	0.007	Pass	8.563	151.09	99.93	0.000	Pass	8.558	151.09	99.94	0.000	Pass

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

5	8.691	151.14	8.685	151.14	99.93	0.000	Pass	8.593	151.14	98.94	0.000	Pass	8.592	151.14	99.99	0.000	Pass	8.591	151.14	99.99	0.000	Pass
6	8.691	151.11	8.685	151.11	99.93	0.000	Pass	8.591	151.10	98.92	0.007	Pass	8.587	151.10	99.95	0.000	Pass	8.585	151.10	99.98	0.000	Pass
7	8.682	151.13	8.677	151.13	99.94	0.000	Pass	8.588	151.13	98.97	0.000	Pass	8.584	151.12	99.95	0.007	Pass	8.577	151.12	99.92	0.000	Pass
8	8.683	151.14	8.677	151.14	99.93	0.000	Pass	8.586	151.14	98.95	0.000	Pass	8.584	151.14	99.98	0.000	Pass	8.577	151.13	99.92	0.007	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	8.576	56.36	Pass
2	8.573	56.39	Pass
3	8.586	56.39	Pass
4	8.558	56.47	Pass

### B. 50th cycle fully charged state

5	8.591	56.38	Pass
6	8.585	56.35	Pass
7	8.577	56.55	Pass
8	8.577	56.47	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	24.33	Pass
10	8.695	24.73	Pass
11	8.691	24.33	Pass
12	8.693	24.26	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	24.36	Pass
14	8.691	24.33	Pass
15	8.684	24.67	Pass
16	8.691	24.36	Pass

# 3-3. 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

# 4. Sample Image

