

# UN38.3 Test Summary

The following product has been evaluated according to the 5th revised edition Amendment 2 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, batteries and single cell batteries.

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Description		List of Test Completed	
Test Report Number	QDI-170919-B-L17L2PF0	Test 1. Altitude Simulation	Pass
Date of test report	2017.09.19	Test 2. Thermal Test	Pass
Model name	L17L2PF0	Test 3. Vibration	Pass
Type	Pouch	Test 4. Shock	Pass
Nominal voltage	7.6 V	Test 5. External Short Circuit	Pass
Capacity	35.0 Wh	Test 6. Impact or Crush	Pass
Weight	151.0 g	Test 7. Overcharge	Pass
Dimensions	208.00mm X 57.00mm X 6.60mm	Test 8. Forced Discharge	Pass

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# UN38.3 Test Report

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

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2017. 09. 19



# 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 M&lt;1g, less than 0.5%,</li> <li>2) If 1g≤M≤75g, less than 0.2%,</li> <li>3) If M&gt;75g, 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℃		
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

