

# 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	QAE-EF02-151124-B-L15L4PC1	Test 1. Altitude Simulation	Pass
Date of test report	2015.11.24	Test 2. Thermal Test	Pass
Model name	L15L4PC1	Test 3. Vibration	Pass
Type	Pouch	Test 4. Shock	Pass
Nominal voltage	7.6 V	Test 5. External Short Circuit	Pass
Capacity	40.0 Wh	Test 6. Impact or Crush	Pass
Weight	180.0 g	Test 7. Overcharge	Pass
Dimensions	223.80mm X 104.00mm X 4.00mm	Test 8. Forced Discharge	Pass

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# UN38.3 Test Report

## - L15L4PC1 (Nom.40Wh, 7.6V)-

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2015. 11. 24

# 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)

# 2-1. 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	179.14	8.676	179.13	100.00	0.006	Pass	8.577	179.13	98.86	0.000	Pass	8.576	179.11	99.99	0.011	Pass	8.575	179.10	99.99	0.006	Pass
2	8.656	179.95	8.656	179.95	100.00	0.000	Pass	8.552	179.94	98.80	0.006	Pass	8.552	179.92	100.00	0.011	Pass	8.551	179.92	99.99	0.000	Pass
3	8.647	179.03	8.645	179.03	99.98	0.000	Pass	8.533	179.02	98.70	0.006	Pass	8.530	179.01	99.96	0.006	Pass	8.530	179.01	100.00	0.000	Pass
4	8.653	179.80	8.652	179.78	99.99	0.011	Pass	8.541	179.77	98.72	0.006	Pass	8.541	179.76	100.00	0.006	Pass	8.537	179.75	99.95	0.006	Pass

## B. 50th cycle fully charged state

5	8.659	179.19	8.658	179.17	99.99	0.011	Pass	8.556	179.16	98.82	0.006	Pass	8.554	179.14	99.98	0.011	Pass	8.553	179.13	99.99	0.006	Pass
6	8.654	179.31	8.652	179.29	99.98	0.011	Pass	8.553	179.27	98.86	0.011	Pass	8.552	179.24	99.99	0.017	Pass	8.550	179.23	99.98	0.006	Pass
7	8.656	179.19	8.654	179.17	99.98	0.011	Pass	8.554	179.17	98.84	0.000	Pass	8.550	179.16	99.95	0.006	Pass	8.547	179.16	99.96	0.000	Pass
8	8.650	179.42	8.647	179.41	99.97	0.006	Pass	8.538	179.41	98.74	0.000	Pass	8.535	179.39	99.96	0.011	Pass	8.533	179.38	99.98	0.006	Pass

# 2-2. 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	8.575	55.04	Pass
2	8.551	55.21	Pass
3	8.530	54.63	Pass
4	8.537	56.29	Pass

### B. 50th cycle fully charged state

5	8.553	56.00	Pass
6	8.550	55.10	Pass
7	8.547	55.19	Pass
8	8.533	55.70	Pass

## Over Charge (T7)

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

9	8.650	25.83	Pass
10	8.645	24.73	Pass
11	8.643	25.10	Pass
12	8.646	24.56	Pass

## Over Charge (T7)

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

13	8.621	26.04	Pass
14	8.629	26.15	Pass
15	8.627	25.73	Pass
16	8.621	24.37	Pass

# 2-3. T6/T8 Test Result (ICP3549100A1)

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

## A. 1st cycle 50% charged state

C-1	3.823	22.71	Pass
C-2	3.821	22.74	Pass
C-3	3.823	23.03	Pass
C-4	3.825	23.39	Pass
C-5	3.823	23.49	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	3.310	46.41	Pass
C-7	3.351	48.90	Pass
C-8	3.312	46.80	Pass
C-9	3.351	49.04	Pass
C-10	3.318	47.18	Pass
C-11	3.326	49.27	Pass
C-12	3.334	48.11	Pass
C-13	3.330	48.30	Pass
C-14	3.314	46.83	Pass
C-15	3.314	47.64	Pass

## B. 50th cycle fully discharged state

C-16	3.341	45.57	Pass
C-17	3.390	45.37	Pass
C-18	3.334	45.35	Pass
C-19	3.371	46.11	Pass
C-20	3.397	44.59	Pass
C-21	3.396	45.62	Pass
C-22	3.336	46.28	Pass
C-23	3.321	44.44	Pass
C-24	3.367	44.66	Pass
C-25	3.353	44.64	Pass

# 3. Sample Image

