

# 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-170706-B-L17L2PB2	Test 1. Altitude Simulation	Pass
Date of test report	2017.07.06	Test 2. Thermal Test	Pass
Model name	L17L2PB2	Test 3. Vibration	Pass
Type	Pouch	Test 4. Shock	Pass
Nominal voltage	7.72 V	Test 5. External Short Circuit	Pass
Capacity	39.0 Wh	Test 6. Impact or Crush	Pass
Weight	151.5 g	Test 7. Overcharge	Pass
Dimensions	210.00mm X 57.00mm X 6.70mm	Test 8. Forced Discharge	Pass

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# UN38.3 Test Report

## - L17L2PB2 (Nom.39Wh, 7.72V) -

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2017. 07. 06



# 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>	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℃		
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 = 2460 mA Voltage = 8.8 V	Current = 246 mA
Discharge	CC	Current = 984 mA	Voltage = 6.0 V

### 2. Cycle Condition

	Mode	Condition	End Condition
Charge	CC / CV	Current = 2460 mA Voltage = 8.8 V	Current = 246 mA
Discharge	CC	Current = 984 mA	Voltage = 6.0 V

### 3. Test Condition

	Mode	Condition
Test 7. Overcharge	CC / CV	Max. Charge Current = 4920 mA CC/CV 2Imax (9840mA) 17.6 V cut-off 24Hr
Test 8. Forced Discharge	CC	Max. Discharge Current = 4920 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	8.779	151.61	8.772	151.61	99.92	0.002	Pass	8.684	151.60	99.00	0.003	Pass	8.680	151.60	99.95	0.001	Pass	8.674	151.60	99.93	0.001	Pass
2	8.787	151.64	8.783	151.64	99.95	0.002	Pass	8.687	151.63	98.91	0.002	Pass	8.678	151.63	99.90	0.001	Pass	8.671	151.63	99.92	0.001	Pass
3	8.774	151.61	8.766	151.61	99.91	0.001	Pass	8.675	151.61	98.96	0.003	Pass	8.670	151.61	99.94	0.000	Pass	8.668	151.60	99.98	0.002	Pass
4	8.787	151.60	8.781	151.60	99.93	0.001	Pass	8.688	151.60	98.94	0.003	Pass	8.685	151.60	99.97	0.001	Pass	8.679	151.59	99.93	0.001	Pass

## B. 50th cycle fully charged state

5	8.771	151.60	8.764	151.60	99.92	0.002	Pass	8.674	151.59	98.97	0.003	Pass	8.672	151.59	99.98	0.002	Pass	8.666	151.59	99.93	0.001	Pass
6	8.782	151.60	8.777	151.60	99.94	0.001	Pass	8.681	151.60	98.91	0.003	Pass	8.674	151.59	99.92	0.002	Pass	8.671	151.59	99.97	0.003	Pass
7	8.772	151.63	8.771	151.62	99.99	0.003	Pass	8.678	151.62	98.94	0.003	Pass	8.674	151.62	99.95	0.002	Pass	8.666	151.61	99.91	0.002	Pass
8	8.785	151.60	8.785	151.60	100.00	0.001	Pass	8.694	151.60	98.96	0.000	Pass	8.694	151.60	100.00	0.002	Pass	8.687	151.59	99.92	0.002	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	8.674	55.21	Pass
2	8.671	55.36	Pass
3	8.668	55.27	Pass
4	8.679	55.38	Pass

### B. 50th cycle fully charged state

5	8.666	55.37	Pass
6	8.671	55.24	Pass
7	8.666	55.49	Pass
8	8.687	55.37	Pass

## Over Charge (T7)

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

9	8.778	25.01	Pass
10	8.774	25.21	Pass
11	8.782	25.46	Pass
12	8.784	24.33	Pass

## Over Charge (T7)

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

13	8.779	25.31	Pass
14	8.784	25.08	Pass
15	8.783	24.17	Pass
16	8.779	25.16	Pass

# 3-3. T6/T8 Test Result (ICP595490C2)

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

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

C-1	3.894	21.28	Pass
C-2	3.898	21.45	Pass
C-3	3.901	21.34	Pass
C-4	3.887	21.49	Pass
C-5	3.891	21.38	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	3.119	42.74	Pass
C-7	3.112	42.87	Pass
C-8	3.082	40.83	Pass
C-9	3.112	41.56	Pass
C-10	3.087	41.29	Pass
C-11	3.079	41.32	Pass
C-12	3.110	40.56	Pass
C-13	3.085	43.44	Pass
C-14	3.116	42.94	Pass
C-15	3.110	42.90	Pass

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

C-16	3.126	42.99	Pass
C-17	3.117	40.38	Pass
C-18	3.126	43.11	Pass
C-19	3.106	41.94	Pass
C-20	3.138	40.67	Pass
C-21	3.122	42.08	Pass
C-22	3.148	41.68	Pass
C-23	3.155	43.03	Pass
C-24	3.148	41.46	Pass
C-25	3.109	40.88	Pass

# 4. Sample Image

