

# UN38.3 Test Summary

The following product has been evaluated according to the 6th revised edition 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-170731-B-L17L3P54	Test 1. Altitude Simulation	Pass
Date of test report	2017.07.31	Test 2. Thermal Test	Pass
Model name	L17L3P54	Test 3. Vibration	Pass
Type	Pouch	Test 4. Shock	Pass
Nominal voltage	11.4 V	Test 5. External Short Circuit	Pass
Capacity	42.0 Wh	Test 6. Impact or Crush	Pass
Weight	186.0 g	Test 7. Overcharge	Pass
Dimensions	273.10mm X 96.10mm X 5.80mm	Test 8. Forced Discharge	Pass

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# UN38.3 Test Report

## - L17L3P54 (Nom.42Wh, 11.4V) -

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2017. 07. 31



# 1. UN38.3 Test Condition

Rev.6

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 1) Peak acceleration - For cells & single cell batteries : 150gn - For batteries (whichever is smaller) : 150gn or $\sqrt{\frac{100850}{Mass(kg)}} gn$ 2) Pulse duration : 6msec 3) 6 direction (±x, y, z) x 3 cycle		
Test 5. External Short Circuit	1) Samples to be heated to 57±4℃ in chamber (Measured on external case) 2) Less than 0.1Ω, ext. short-circuit at 57±4℃ 3) 1hr continue after returning to 57±4℃		
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 = 3630mA Voltage = 13.05 V	Current = 181 mA
Discharge	CC	Current = 726 mA	Voltage = 9.0 V

### 2. Cycle Condition

	Mode	Condition	End Condition
Charge	CC / CV	Current = 3630mA Voltage = 13.05 V	Current = 181 mA
Discharge	CC	Current = 726 mA	Voltage = 9.0 V

### 3. Test Condition

	Mode	Condition
Test 7. Overcharge	CC / CV	Max. Charge Current = 6250 mA CC/CV 2Imax (12500mA) 22 V cut-off 24Hr
Test 8. Forced Discharge	CC	Max. Discharge Current = 3630 mA Duration Time = 60.0 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	13.045	185.60	13.045	185.60	100.00	0.002	Pass	12.800	185.59	98.12	0.002	Pass	12.790	185.58	99.92	0.006	Pass	12.780	185.57	99.92	0.005	Pass
2	13.047	185.58	13.037	185.57	99.92	0.003	Pass	12.860	185.56	98.64	0.006	Pass	12.850	185.56	99.92	0.001	Pass	12.840	185.56	99.92	0.002	Pass
3	13.045	185.62	13.025	185.61	99.85	0.004	Pass	12.810	185.61	98.35	0.002	Pass	12.800	185.60	99.92	0.004	Pass	12.780	185.59	99.84	0.005	Pass
4	13.047	185.57	13.037	185.57	99.92	0.002	Pass	12.860	185.56	98.64	0.004	Pass	12.840	185.54	99.84	0.008	Pass	12.830	185.54	99.92	0.004	Pass

## B. 50th cycle fully charged state

5	13.048	185.57	13.038	185.55	99.92	0.011	Pass	12.880	185.54	98.79	0.004	Pass	12.860	185.53	99.84	0.006	Pass	12.860	185.52	100.00	0.006	Pass
6	13.046	185.58	13.036	185.55	99.92	0.016	Pass	12.850	185.54	98.57	0.003	Pass	12.830	185.54	99.84	0.004	Pass	12.810	185.54	99.84	0.001	Pass
7	13.048	185.60	13.028	185.58	99.85	0.011	Pass	12.860	185.57	98.71	0.004	Pass	12.850	185.56	99.92	0.006	Pass	12.840	185.56	99.92	0.001	Pass
8	13.045	185.62	13.035	185.60	99.92	0.011	Pass	12.860	185.59	98.66	0.003	Pass	12.840	185.58	99.84	0.007	Pass	12.830	185.57	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	12.780	56.32	Pass
2	12.840	55.09	Pass
3	12.780	55.57	Pass
4	12.830	55.32	Pass

### B. 50th cycle fully charged state

5	12.860	56.29	Pass
6	12.810	54.74	Pass
7	12.840	55.45	Pass
8	12.830	56.27	Pass

## Over Charge (T7)

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

9	12.750	24.13	Pass
10	12.810	24.88	Pass
11	12.750	25.00	Pass
12	12.800	24.07	Pass

## Over Charge (T7)

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

13	12.836	24.01	Pass
14	12.786	24.66	Pass
15	12.816	24.89	Pass
16	12.806	24.35	Pass

# 3-3. T6/T8 Test Result (ICP485490L1)

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

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

C-1	3.815	22.53	Pass
C-2	3.824	22.91	Pass
C-3	3.816	23.40	Pass
C-4	3.824	22.60	Pass
C-5	3.819	23.26	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	3.058	42.98	Pass
C-7	3.059	44.21	Pass
C-8	3.068	44.11	Pass
C-9	3.064	42.84	Pass
C-10	3.059	42.70	Pass
C-11	3.063	43.76	Pass
C-12	3.059	41.95	Pass
C-13	3.058	42.39	Pass
C-14	3.065	41.24	Pass
C-15	3.059	41.52	Pass

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

C-16	3.115	43.74	Pass
C-17	3.085	42.28	Pass
C-18	3.107	43.46	Pass
C-19	3.108	43.91	Pass
C-20	3.101	44.62	Pass
C-21	3.116	43.07	Pass
C-22	3.060	43.87	Pass
C-23	3.114	44.10	Pass
C-24	3.061	44.44	Pass
C-25	3.066	43.71	Pass

# 4. Sample Image

