

# 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-180205-B-L17L3PG1	Test 1. Altitude Simulation	Pass
Date of test report	2018.02.05	Test 2. Thermal Test	Pass
Model name	L17L3PG1	Test 3. Vibration	Pass
Type	Pouch	Test 4. Shock	Pass
Nominal voltage	11.34 V	Test 5. External Short Circuit	Pass
Capacity	52.50Wh	Test 6. Impact or Crush	Pass
Weight	223.26g	Test 7. Overcharge	Pass
Dimensions	218.0mmX112.0mmX6.7mm	Test 8. Forced Discharge	Pass

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Document Number	QDI-180205-B-L17L3PG1	
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# UN38.3 Test Report

## - L17L3PG1 (Nom. 52.50Wh, 11.34V) -

### Index

1. UN38.3 Test Condition
2. Test Result
3. Sample Image

2018. 02. 05



# 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℃	- After OCV (%) ≥ 90% - No leakage, no venting, no disassembly, no rupture, no fire - Mass loss limit (leakage) 1) If M<1g, less than 0.5%, 2) If 1g≤M≤75g, less than 0.2%, 3) If M>75g, less than 0.1%	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 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	- No disassembly, no fire within 6 hours after the test - Max. Temp ≤ 170℃	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)	- No disassembly, no fire within 7 days after the test	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	- No disassembly, no fire within 7 days after the test	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	OCV	Mass	After OCV(%)	Mass Loss(%)	Result	OCV	Mass	After OCV(%)	Mass Loss(%)	Result	OCV	Mass	After OCV(%)	Mass Loss(%)	Result	OCV	Mass	After OCV(%)	Mass Loss(%)	Result

## A. 1st cycle fully charged state

1	12.853	223.14	12.851	223.14	99.98	0.000	Pass	12.769	223.10	99.36	0.018	Pass	12.684	223.08	99.33	0.009	Pass	12.587	223.10	99.24	0.000	Pass
2	12.194	222.57	12.191	222.56	99.98	0.004	Pass	12.094	222.51	99.20	0.022	Pass	12.083	222.50	99.91	0.004	Pass	12.069	222.52	99.88	0.000	Pass
3	12.482	222.95	12.486	222.94	100.03	0.004	Pass	12.662	222.89	101.41	0.022	Pass	12.659	222.89	99.98	0.000	Pass	12.657	222.89	99.98	0.000	Pass
4	12.214	224.37	12.212	224.37	99.98	0.000	Pass	12.107	224.32	99.14	0.022	Pass	12.105	224.32	99.98	0.000	Pass	12.103	224.34	99.98	0.000	Pass

## B. 50th cycle fully charged state

5	12.370	222.79	12.375	222.79	100.04	0.000	Pass	12.617	222.75	101.96	0.018	Pass	12.614	222.75	99.98	0.000	Pass	12.611	222.770	99.98	0.000	Pass
6	12.374	222.87	12.378	222.86	100.03	0.004	Pass	12.194	222.78	98.51	0.036	Pass	12.200	222.78	100.05	0.000	Pass	12.201	222.790	100.01	0.000	Pass
7	12.866	223.03	12.864	223.02	99.98	0.004	Pass	12.672	222.98	98.51	0.018	Pass	12.670	222.98	99.98	0.000	Pass	12.666	222.970	99.97	0.004	Pass
8	12.540	223.43	12.540	223.42	100.00	0.004	Pass	12.324	223.36	98.28	0.027	Pass	12.327	223.36	100.02	0.000	Pass	12.327	223.380	100.00	0.000	Pass

# 2-2. T5/T7 Test Result

EXT.Short Circuit (T5)			
NO.	Initial OCV(V)	Max. Temp (°C)	Result

## A. 1st cycle fully charged state

1	12.587	59.04	Pass
2	12.069	58.02	Pass
3	12.657	58.09	Pass
4	12.103	57.24	Pass

## B. 50th cycle fully charged state

5	12.611	59.42	Pass
6	12.201	59.43	Pass
7	12.666	57.85	Pass
8	12.327	58.60	Pass

Overcharge (T7)			
NO.	Initial OCV(V)	Max. Temp (°C)	Result

## A. 1st cycle fully charged state

9	11.792	23.710	Pass
10	11.791	23.711	Pass
11	12.192	23.509	Pass
12	11.791	23.447	Pass

## B. 50th cycle fully charged state

13	12.215	26.027	Pass
14	12.799	23.611	Pass
15	12.388	26.800	Pass
16	12.382	23.207	Pass

# 2-3. T6/T8 Test Result (P595490B4)

<b>Cell Document Number</b>	<b>QDI-180205-C-P595490B4</b>
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<b>Crush (T6)</b>			
NO.	Initial OCV(V)	Max. Temp (°C)	Result

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

C-1	3.827	20.73	Pass
C-2	3.826	20.37	Pass
C-3	3.826	19.75	Pass
C-4	3.826	20.11	Pass
C-5	3.252	20.30	Pass

<b>Forced Discharge (T8)</b>							
NO.	Initial OCV(V)	Max. Temp (°C)	Result	NO.	Initial OCV(V)	Max. Temp (°C)	Result

**A. 1st cycle fully discharged state**

C-6	3.243	82.06	Pass
C-7	3.240	73.57	Pass
C-8	3.239	72.69	Pass
C-9	3.241	79.03	Pass
C-10	3.241	74.51	Pass
C-11	3.244	78.94	Pass
C-12	3.251	76.06	Pass
C-13	3.243	77.02	Pass
C-14	3.243	77.20	Pass
C-15	3.242	68.57	Pass

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

C-16	3.325	77.94	Pass
C-17	3.323	80.22	Pass
C-18	3.334	88.16	Pass
C-19	3.334	80.73	Pass
C-20	3.325	76.07	Pass
C-21	3.330	80.85	Pass
C-22	3.332	78.83	Pass
C-23	3.334	75.14	Pass
C-24	3.330	82.70	Pass
C-25	3.342	78.34	Pass

