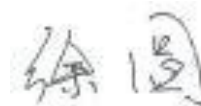


# UN38.3 Test Summary

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.

Manufacture's contact information	LG Chem, Ltd. 128 Yeoui-Daero, Yeongdeungpo-gu, SEOUL, 150-721, REPUBLIC OF KOREA Telephone : +86-10-7742-5427      E-mail : kkammy@lgchem.com      Website : <a href="http://www.lgchem.com">www.lgchem.com</a>		
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	LG Chem (Nanjing) I&E Materials Co., Ltd NO.17 Hengyi Road, Nanjing Economic & Technological Development Zone, Nanjing, Jiangsu, China Telephone : +86-025-85603000-8288      E-mail : xuyuannj@lgchem.com      Website : <a href="http://www.lgchem.com">www.lgchem.com</a>		
Description		List of Test Completed	
Test Report Number	QDI-180803-B-L18L3PD1	Test 1. Altitude Simulation	Pass
Date of test report	2018.08.03	Test 2. Thermal Test	Pass
Model name	L18L3PD1	Test 3. Vibration	Pass
Type	Pouch	Test 4. Shock	Pass
Nominal voltage	11.58 V	Test 5. External Short Circuit	Pass
Capacity	57.00Wh	Test 6. Impact or Crush	Pass
Weight	234.90g	Test 7. Overcharge	Pass
Dimensions	266.75mmX86.15mmX5.45mm	Test 8. Forced Discharge	Pass

Approved By: Yuan Xu  
 Part Leader  
 Cyl NPI&CE lab part DQA Team  
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Document Number	QDI-180803-B-L18L3PD1	
Prepared	qianjunli	钱俊丽
Approved	Xuyuan	徐园

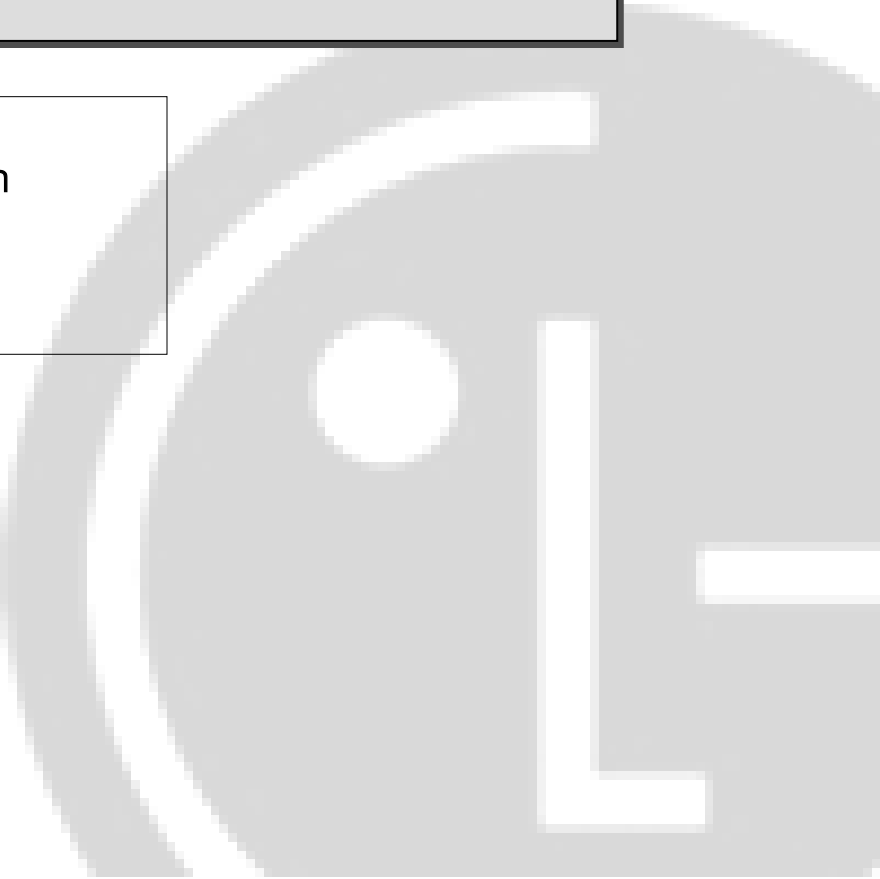
# UN38.3 Test Report

## - L18L3PD1 (Nom. 57.00Wh, 11.58V) -

### Index

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

2018. 08. 03



# 1. UN38.3 Test Condition

Test item	Test Condition	Requirements	Etc.
Test 1. Altitude Simulation	Storing at (low pressure) 11.6kPa for 6hr at 20+/-5℃		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	<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>	
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℃	<ul style="list-style-type: none"> <li>- No disassembly, no rupture, no fire within 6 hours after the test</li> <li>- Max. Temp ≤ 170℃</li> </ul>	
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	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	13.0278	233.21	13.0244	233.16	99.97	0.021	Pass	12.8102	233.11	98.36	0.021	Pass	12.8076	233.12	99.98	0.000	Pass	12.8064	233.14	99.99	0.000	Pass
2	13.0280	233.63	13.0246	233.59	99.97	0.017	Pass	12.8121	233.54	98.37	0.021	Pass	12.8092	233.55	99.98	0.000	Pass	12.8083	233.56	99.99	0.000	Pass
3	13.0118	234.90	13.0077	234.85	99.97	0.021	Pass	12.7697	234.81	98.17	0.017	Pass	12.7661	234.81	99.97	0.000	Pass	12.7639	234.83	99.98	0.000	Pass
4	13.0243	233.12	13.0213	233.08	99.98	0.017	Pass	12.8070	233.03	98.35	0.021	Pass	12.8041	233.04	99.98	0.000	Pass	12.8031	233.05	99.99	0.000	Pass

## B. 50th cycle fully charged state

5	13.0157	233.42	13.0146	233.39	99.99	0.013	Pass	12.8135	233.35	98.45	0.017	Pass	12.8107	233.37	99.98	0.000	Pass	12.8098	233.38	99.99	0.000	Pass
6	13.0158	233.18	13.0149	233.19	99.99	0.000	Pass	12.8116	233.13	98.44	0.026	Pass	12.8088	233.15	99.98	0.000	Pass	12.8076	233.15	99.99	0.000	Pass
7	13.0145	233.82	13.0137	233.80	99.99	0.009	Pass	12.8124	233.76	98.45	0.017	Pass	12.8097	233.78	99.98	0.000	Pass	12.8086	233.78	99.99	0.000	Pass
8	13.0156	232.85	13.0143	232.85	99.99	0.000	Pass	12.8097	232.80	98.43	0.021	Pass	12.8076	232.81	99.98	0.000	Pass	12.8063	232.81	99.99	0.000	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	12.8064	57.68	Pass
2	12.8083	57.11	Pass
3	12.7639	56.79	Pass
4	12.8031	56.20	Pass

### B. 50th cycle fully charged state

5	12.8098	57.71	Pass
6	12.8076	56.84	Pass
7	12.8086	56.84	Pass
8	12.8063	56.16	Pass

## Overcharge (T7)

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

9	12.9787	22.10	Pass
10	12.9727	21.90	Pass
11	12.5645	21.80	Pass
12	13.0073	21.64	Pass

### B. 50th cycle fully charged state

13	12.9950	21.50	Pass
14	12.9986	21.50	Pass
15	13.0016	21.35	Pass
16	12.9721	21.29	Pass

# 2-3. T6/T8 Test Result (ICP478873L1)

<b>Cell Document Number</b>	<b>QDI-160908-C-ICP478873L1</b>
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<b>Crush (T6)</b>			
NO.	Initial OCV(V)	Max. Temp (°C)	Result

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

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

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

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

<b>C-1</b>	3.864	22.06	<b>Pass</b>
<b>C-2</b>	3.861	22.98	<b>Pass</b>
<b>C-3</b>	3.860	22.79	<b>Pass</b>
<b>C-4</b>	3.864	22.06	<b>Pass</b>
<b>C-5</b>	3.863	22.34	<b>Pass</b>

<b>C-6</b>	3.017	41.15	<b>Pass</b>	<b>C-16</b>	3.080	41.19	<b>Pass</b>
<b>C-7</b>	3.027	42.45	<b>Pass</b>	<b>C-17</b>	3.077	40.98	<b>Pass</b>
<b>C-8</b>	3.045	44.61	<b>Pass</b>	<b>C-18</b>	3.057	44.85	<b>Pass</b>
<b>C-9</b>	3.050	44.41	<b>Pass</b>	<b>C-19</b>	3.062	43.64	<b>Pass</b>
<b>C-10</b>	3.013	43.02	<b>Pass</b>	<b>C-20</b>	3.100	44.92	<b>Pass</b>
<b>C-11</b>	3.025	41.41	<b>Pass</b>	<b>C-21</b>	3.099	44.23	<b>Pass</b>
<b>C-12</b>	3.023	43.56	<b>Pass</b>	<b>C-22</b>	3.068	40.18	<b>Pass</b>
<b>C-13</b>	3.018	43.82	<b>Pass</b>	<b>C-23</b>	3.097	40.41	<b>Pass</b>
<b>C-14</b>	3.010	40.69	<b>Pass</b>	<b>C-24</b>	3.081	44.53	<b>Pass</b>
<b>C-15</b>	3.035	43.95	<b>Pass</b>	<b>C-25</b>	3.067	40.82	<b>Pass</b>

# 3. Sample Image

