

# UN38.3 Test Summary

The following product has been evaluated according to the 6th revised edition of the UN Manual of Tests and Criteria.

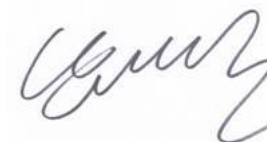
We, LG Chem, Ltd., hereby certify that this battery meets the requirements of the regulation for transportation of lithium-ion cells, batteries and single cell batteries.

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>		
Test Laboratory information	LG Chem, Ltd. / RESEARCH PARK 188 Munjiro, Yuseong-gu, Daejeon, 305-738, REPUBLIC OF KOREA Telephone : +82-10-3099-3724      E-mail : juhongpark@lgchem.com      Website : <a href="http://www.lgchem.com">www.lgchem.com</a>		
	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-181129-B-L17L2PB1	Test 1. Altitude Simulation	Pass
Date of test report	2018.11.29	Test 2. Thermal Test	Pass
Model name	L17L2PB1	Test 3. Vibration	Pass
Type	Pouch	Test 4. Shock	Pass
Nominal voltage	7.6 V	Test 5. External Short Circuit	Pass
Capacity	30.0 Wh	Test 6. Impact or Crush	Pass
Weight	139.0 g	Test 7. Overcharge	Pass
Dimensions	210.00mm X 57.00mm X 6.70mm	Test 8. Forced Discharge	Pass

Reviewed By: Joohong Park  
IT & New Application Part Leader  
Global Standard Certification Team  
LG Chem, Ltd.  
E-mail: juhongpark@lgchem.com



Approved By: DaeHo Nam  
Team Leader  
Global Standard Certification Team  
LG Chem, Ltd.  
E-mail: kkammy@lgchem.com



Document Number	QDI-181129-B-L17L2PB1	
Prepared	Taehyung Lee	이태형
Reviewed	MinJe Woo	
Approved	DaeHo Nam	

# UN38.3 Test Report

## - L17L2PB1 (Nom.30Wh, 7.60V) -

### Index

1. UN38.3 Test Condition
2. General Information
3. Test Result
4. Sample Image

2018. 11. 29



# 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)                             <ul 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> </ul> </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℃	<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 (dia ≥ 18mm)
Test 6. Crush	Crushing rate : 1.5cm/s, until 13kN±0.78kN or 100mV drop or 50% deformation		for cylindrical cells (dia < 18mm) 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 $R_t = \frac{12V + V_c}{Max\ discharge\ current}$ - Rc-Rw

# 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	8.263	139.08	8.258	139.06	99.94	0.014	Pass	8.103	139.03	98.12	0.022	Pass	8.091	139.02	99.85	0.007	Pass	8.091	139.01	100.00	0.007	Pass
2	8.238	139.17	8.232	139.17	99.93	0.000	Pass	8.069	139.15	98.02	0.014	Pass	8.054	139.14	99.81	0.007	Pass	8.054	139.14	100.00	0.000	Pass
3	8.259	139.02	8.247	139.01	99.85	0.007	Pass	8.134	139.00	98.63	0.007	Pass	8.131	138.98	99.96	0.014	Pass	8.130	139.97	99.99	0.000	Pass
4	8.203	138.93	8.199	138.91	99.95	0.014	Pass	8.094	138.91	98.72	0.000	Pass	8.093	138.90	99.99	0.007	Pass	8.093	138.90	100.00	0.000	Pass

B. 50th cycle fully charged state

5	8.248	139.30	8.239	139.28	99.89	0.014	Pass	8.127	139.27	98.64	0.007	Pass	8.127	139.26	100.00	0.007	Pass	8.126	139.24	99.99	0.014	Pass
6	8.198	138.75	8.184	138.74	99.83	0.007	Pass	8.103	138.74	99.01	0.000	Pass	8.021	138.71	98.99	0.022	Pass	8.001	138.70	99.75	0.007	Pass
7	8.237	139.08	8.231	139.07	99.93	0.007	Pass	8.136	139.06	98.85	0.007	Pass	8.132	139.04	99.95	0.014	Pass	8.132	139.04	100.00	0.000	Pass
8	8.436	138.89	8.430	138.88	99.93	0.007	Pass	8.034	139.04	95.30	0.000	Pass	8.029	139.02	99.94	0.014	Pass	8.028	139.01	99.99	0.007	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	8.433	57.42	Pass
2	8.433	57.32	Pass
3	8.433	57.59	Pass
4	8.433	57.29	Pass

B. 50th cycle fully charged state

5	8.426	57.37	Pass
6	8.426	57.28	Pass
7	8.426	57.56	Pass
8	8.426	57.25	Pass

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

A. 1st cycle fully charged state

9	8.535	22.30	Pass
10	8.528	22.20	Pass
11	8.547	22.30	Pass
12	8.527	22.20	Pass

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

B. 50th cycle fully charged state

13	8.532	22.00	Pass
14	8.530	22.14	Pass
15	8.547	21.94	Pass
16	8.542	22.00	Pass

# 2-3. T6/T8 Test Result (ICP595490L2)

Cell Document Number	QAE-EF02-151201-C-ICP595490L2
----------------------	-------------------------------

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

A. 1st cycle 50% charged state

C-1	3.871	22.13	Pass
C-2	3.868	22.33	Pass
C-3	3.871	22.51	Pass
C-4	3.872	22.85	Pass
C-5	3.870	23.40	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	3.320	43.79	Pass
C-7	3.330	43.28	Pass
C-8	3.333	42.94	Pass
C-9	3.323	43.84	Pass
C-10	3.331	44.13	Pass
C-11	3.311	42.94	Pass
C-12	3.319	43.15	Pass
C-13	3.311	43.98	Pass
C-14	3.311	42.86	Pass
C-15	3.345	45.19	Pass

B. 50th cycle fully discharged state

C-16	3.394	42.97	Pass
C-17	3.394	42.35	Pass
C-18	3.412	43.60	Pass
C-19	3.420	44.72	Pass
C-20	3.380	43.38	Pass
C-21	3.386	44.38	Pass
C-22	3.369	44.98	Pass
C-23	3.411	42.57	Pass
C-24	3.414	44.05	Pass
C-25	3.397	42.85	Pass

# 3. Sample Image

