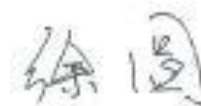


UN38.3 Test Summary

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 : www.lgchem.com		
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 : www.lgchem.com		
	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 : www.lgchem.com		
Description		List of Test Completed	
Test Report Number	QDI-180205-B-L17L6P51	Test 1. Altitude Simulation	Pass
Date of test report	2018.02.05	Test 2. Thermal Test	Pass
Model name	L17L6P51	Test 3. Vibration	Pass
Type	Pouch	Test 4. Shock	Pass
Nominal voltage	11.40 V	Test 5. External Short Circuit	Pass
Capacity	90.00Wh	Test 6. Impact or Crush	Pass
Weight	435.54g	Test 7. Overcharge	Pass
Dimensions	206.13mmX82.54mmX17.93mm	Test 8. Forced Discharge	Pass

Approved By: Yuan Xu
 Part Leader
 Cyl NPI&CE lab part DQA Team
 LG Chem, Ltd.
 E-mail: xuyuannj@lgchem.com



Document Number	QDI-180205-B-L17L6P51	
Prepared	qianjunli	钱俊丽
Approved	Xuyuan	徐园

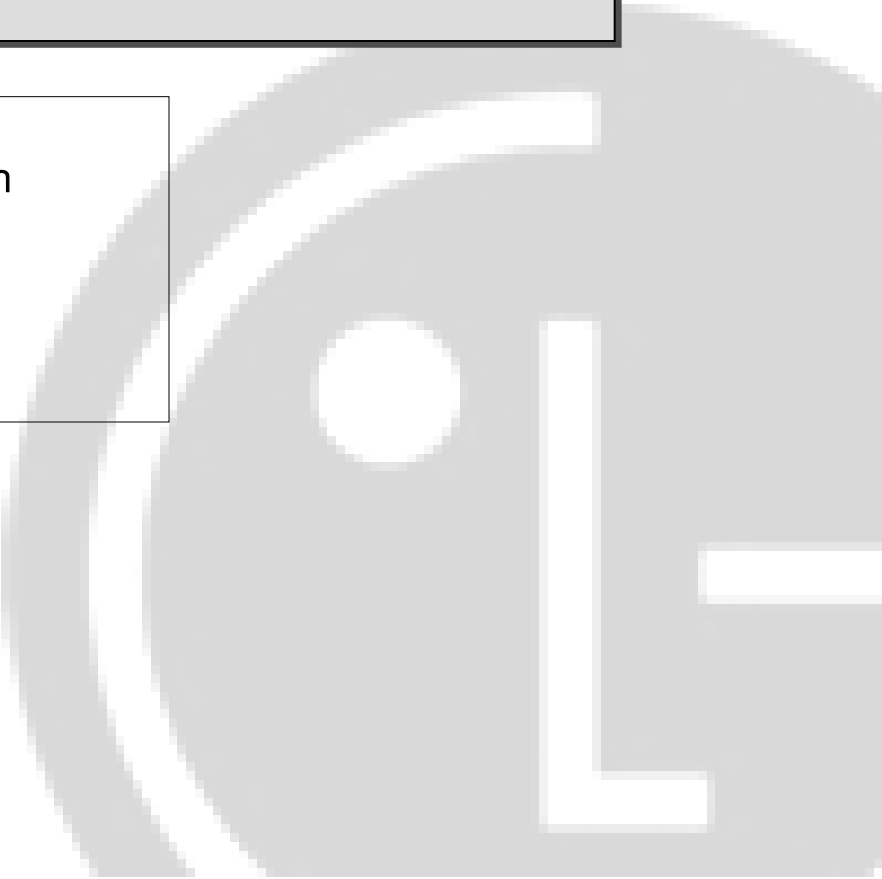
UN38.3 Test Report

- L17L6P51 (Nom. 90.00Wh, 11.40V) -

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- 2. Test Result
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2018. 02. 05



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] --> T2[Test 2 Thermal Test] T2 --> T3[Test 3 Vibration] T3 --> T4[Test 4 Shock] T4 --> 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	- 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%	
Test 4. Shock	Half sine shock 1) Peak acceleration - For cells & single cell batteries : 150gn - For batteries (whichever is smaller) : 150gn or $\sqrt{\frac{100850}{\text{Mass}(kg)}} \text{ gn}$ 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℃	- No disassembly, no rupture, no fire within 6 hours after the test - Max. Temp ≤ 170℃	
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	12.893	435.54	12.892	435.53	99.99	0.002	Pass	12.738	435.47	98.81	0.014	Pass	12.738	435.49	100.00	0.000	Pass	12.735	435.48	99.98	0.002	Pass
2	12.893	434.65	12.891	434.63	99.98	0.005	Pass	12.732	434.57	98.77	0.014	Pass	12.730	434.60	99.98	0.000	Pass	12.727	434.58	99.98	0.005	Pass
3	12.898	434.78	12.895	434.77	99.98	0.002	Pass	12.736	434.71	98.77	0.014	Pass	12.735	434.75	99.99	0.000	Pass	12.732	434.72	99.98	0.007	Pass
4	12.895	435.53	12.894	435.51	99.99	0.005	Pass	12.749	435.46	98.88	0.011	Pass	12.747	435.47	99.98	0.000	Pass	12.743	435.47	99.97	0.000	Pass

B. 50th cycle fully charged state

5	12.919	435.41	12.918	435.40	99.99	0.002	Pass	12.771	435.35	98.86	0.011	Pass	12.770	435.36	99.99	0.000	Pass	12.767	435.36	99.98	0.000	Pass
6	12.922	435.35	12.921	435.33	99.99	0.005	Pass	12.776	435.29	98.88	0.009	Pass	12.776	435.31	100.00	0.000	Pass	12.772	435.30	99.97	0.002	Pass
7	12.919	435.28	12.917	435.27	99.98	0.002	Pass	12.769	435.22	98.85	0.011	Pass	12.768	435.23	99.99	0.000	Pass	12.764	435.24	99.97	0.000	Pass
8	12.920	435.18	12.918	435.16	99.98	0.005	Pass	12.772	435.12	98.87	0.009	Pass	12.769	435.13	99.98	0.000	Pass	12.767	435.14	99.98	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	12.735	58.38	Pass
2	12.727	58.12	Pass
3	12.732	57.48	Pass
4	12.743	57.14	Pass

B. 50th cycle fully charged state

5	12.767	58.36	Pass
6	12.772	58.13	Pass
7	12.764	57.55	Pass
8	12.767	57.15	Pass

Overcharge (T7)

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

9	12.884	22.10	Pass
10	12.894	22.00	Pass
11	12.892	21.90	Pass
12	12.891	22.24	Pass

B. 50th cycle fully charged state

13	12.910	21.70	Pass
14	12.921	21.70	Pass
15	12.921	21.55	Pass
16	12.923	22.00	Pass

2-3. T6/T8 Test Result (ICP596766L1)

Cell Document Number	QAE-EF02-150507-PO596766L1
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Crush (T6)			
NO.	Initial OCV(V)	Max. Temp (°C)	Result

Forced Discharge (T8)							
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

C-1	3.817	24.30	Pass
C-2	3.818	23.45	Pass
C-3	3.817	22.49	Pass
C-4	3.818	24.05	Pass
C-5	3.818	23.55	Pass

C-6	3.277	37.59	Pass	C-16	3.133	44.87	Pass
C-7	3.273	31.32	Pass	C-17	3.138	44.28	Pass
C-8	3.277	37.74	Pass	C-18	3.016	43.58	Pass
C-9	3.271	36.47	Pass	C-19	3.021	43.43	Pass
C-10	3.270	39.90	Pass	C-20	4.110	44.83	Pass
C-11	3.271	36.99	Pass	C-21	4.100	44.19	Pass
C-12	3.272	38.40	Pass	C-22	4.084	44.81	Pass
C-13	3.273	36.33	Pass	C-23	4.067	43.37	Pass
C-14	3.270	37.76	Pass	C-24	4.080	44.59	Pass
C-15	3.273	37.70	Pass	C-25	4.083	43.72	Pass

3. Sample Image

