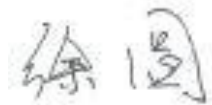


UN38.3 Test Summary

The following product has been evaluated according to the 6th revised edition Amendment 1 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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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-191119-B-L19L6P72	Test 1. Altitude Simulation	Pass
Date of test report	2019.11.19	Test 2. Thermal Test	Pass
Model name	L19L6P72	Test 3. Vibration	Pass
Type	Pouch	Test 4. Shock	Pass
Nominal voltage	11.55 V	Test 5. External Short Circuit	Pass
Capacity	68.00Wh	Test 6. Impact or Crush	Pass
Weight	273.92g	Test 7. Overcharge	Pass
Dimensions	242.20mmX86.15mmX9.10mm	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-191119-B-L19L6P72	
Prepared	qianjunli	钱俊丽
Approved	Xuyuan	徐园

UN38.3 Test Report

- L19L6P72 (Nom. 68.00Wh, 11.55V) -

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2019. 11. 19

1. UN38.3 Test Condition

Rev.6 Amendment 1

Test item	Test Condition	Requirements	Etc.
Test 1. Altitude Simulation	Storing at (low pressure)11.6kPa for 6hr at 20+/-5°C		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°C,6hr ↔ -40±2°C,6hr, interval max. 30min] x 10cycle Storing at 20±5°C 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"> - After OCV (%) ≥ 90% - No leakage, no venting, no disassembly, no rupture, no fire - Mass loss limit (leakage) <ol style="list-style-type: none"> 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 $\sqrt{\frac{100850}{Mass(kg)}} gn$ 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°C in chamber (Measured on external case) 2) Less than 0.1Ω, ext. short-circuit at 57±4°C 3) 1hr continue after returning to 57±4°C	<ul style="list-style-type: none"> - No disassembly, no rupture, no fire within 6 hours after the test - Max. Temp ≤ 170°C 	
Test 6. Impact	Φ=15.8±0.1mm bar, 9.1±0.1kg mass, 61±2.5cm height	<ul style="list-style-type: none"> - No disassembly, no fire within 6 hours after the test - Max. Temp ≤ 170°C 	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"> - 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	<ul style="list-style-type: none"> - 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 (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	13.0320	273.31	12.6204	273.30	96.84	0.004	Pass	12.3907	273.26	98.18	0.015	Pass	12.3939	273.23	100.00	0.011	Pass	12.3865	273.24	99.94	0.000	Pass
2	13.0371	273.60	12.6258	273.59	96.85	0.004	Pass	12.3948	273.54	98.17	0.018	Pass	12.3989	273.52	100.00	0.007	Pass	12.3910	273.53	99.94	0.000	Pass
3	13.0426	273.92	12.6305	273.92	96.84	0.000	Pass	12.3934	273.86	98.12	0.022	Pass	12.3980	273.84	100.00	0.007	Pass	12.3900	273.85	99.94	0.000	Pass
4	13.0500	273.25	12.6392	273.24	96.85	0.004	Pass	12.4013	273.16	98.12	0.029	Pass	12.4058	273.18	100.00	0.000	Pass	12.3987	273.19	99.94	0.000	Pass

B. 25th cycle fully charged state

5	13.0625	272.85	12.6514	272.84	96.85	0.004	Pass	12.4134	272.80	98.12	0.015	Pass	12.4188	272.78	100.00	0.007	Pass	12.4100	272.79	99.93	0.000	Pass
6	13.0559	273.48	12.6439	273.48	96.84	0.000	Pass	12.4076	273.43	98.13	0.018	Pass	12.4110	273.42	100.00	0.004	Pass	12.3330	273.42	99.37	0.000	Pass
7	13.0655	273.28	12.6557	273.28	96.86	0.000	Pass	12.4269	273.23	98.19	0.018	Pass	12.4315	273.22	100.00	0.004	Pass	12.4246	273.23	99.94	0.000	Pass
8	13.0515	273.08	12.6403	273.07	96.85	0.004	Pass	12.4171	273.03	98.23	0.015	Pass	12.4209	273.01	100.00	0.007	Pass	12.4137	273.02	99.94	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	12.3865	58.74	Pass
2	12.3910	58.46	Pass
3	12.3900	57.08	Pass
4	12.3987	57.09	Pass

B. 25th cycle fully charged state

5	12.4100	58.55	Pass
6	12.3330	58.17	Pass
7	12.4246	57.09	Pass
8	12.4137	57.51	Pass

Over Charge (T7)

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

9	13.0478	23.71	Pass
10	13.0478	23.45	Pass
11	13.0442	23.71	Pass
12	13.0443	23.21	Pass

Over Charge (T7)

NO.	Initial OCV(V)	Max. Temp (°C)	Result
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B. 25th cycle fully charged state

13	13.0619	23.37	Pass
14	13.0640	23.11	Pass
15	13.0696	23.37	Pass
16	13.0697	23.15	Pass

2-3. T6/T8 Test Result (P4041B0A1)

Cell Document Number	QDI-190714-C-P4041B0A1
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Crush (T6)			
NO. 3.	Initial OCV(V)	Max. Temp (°C)	Result

A. 1st cycle 50% charged state

11	3.8509	21.93	Pass
12	3.8514	20.89	Pass
13	3.8506	20.59	Pass
14	3.8504	21.89	Pass
15	3.8504	21.33	Pass

B. 25th cycle 50% charged state

16	3.8678	21.36	Pass
17	3.8690	21.87	Pass
18	3.8658	21.22	Pass
19	3.8672	21.04	Pass
20	3.8690	21.06	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

21	3.4674	71.79	Pass
22	3.4624	75.57	Pass
23	3.4645	77.88	Pass
24	3.4646	72.05	Pass
25	3.4622	72.20	Pass
26	3.4624	82.20	Pass
27	3.4634	73.61	Pass
28	3.4638	70.35	Pass
29	3.4640	66.78	Pass
30	3.4643	74.46	Pass

B. 25th cycle fully discharged state

31	3.4675	71.89	Pass
32	3.4623	73.54	Pass
33	3.4645	79.86	Pass
34	3.4647	70.56	Pass
35	3.4632	70.63	Pass
36	3.4622	78.45	Pass
37	3.4633	77.22	Pass
38	3.4640	74.30	Pass
39	3.4642	79.53	Pass
40	3.4645	74.27	Pass

3. Sample Image

