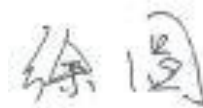


UN38.3 Test Summary

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.

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-190424-B-L18L3PF7	Test 1. Altitude Simulation	Pass
Date of test report	2019.04.24	Test 2. Thermal Test	Pass
Model name	L18L3PF7	Test 3. Vibration	Pass
Type	Pouch	Test 4. Shock	Pass
Nominal voltage	11.55 V	Test 5. External Short Circuit	Pass
Capacity	42.00Wh	Test 6. Impact or Crush	Pass
Weight	173.98g	Test 7. Overcharge	Pass
Dimensions	262.30mmX61.15mmX6.2mm	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-190424-B-L18L3PF7	
Prepared	qianjunli	钱俊丽
Approved	Xuyuan	徐园

UN38.3 Test Report

- L18L3PF7 (Nom. 42.00Wh, 11.55V) -

Index

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

2019. 04. 24

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 10 cycle 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 $\sqrt{\frac{100850}{\text{Mass}(kg)}} \text{ gn}$ 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°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	13.0388	173.84	13.0357	173.83	99.98	0.006	Pass	12.3817	173.81	94.98	0.012	Pass	12.3808	173.83	99.99	0.000	Pass	12.3773	173.83	99.97	0.000	Pass
2	12.6547	173.18	12.6475	173.18	99.94	0.000	Pass	12.3922	173.15	97.98	0.017	Pass	12.3892	173.15	99.98	0.000	Pass	12.3865	173.16	99.98	0.000	Pass
3	13.0655	174.64	13.0608	174.63	99.96	0.006	Pass	12.4012	174.61	94.95	0.011	Pass	12.4003	174.63	99.99	0.000	Pass	12.3950	174.63	99.96	0.000	Pass
4	12.6549	174.37	12.6492	174.38	99.95	0.000	Pass	12.4019	174.33	98.04	0.029	Pass	12.3998	174.36	99.98	0.000	Pass	12.3970	174.36	99.98	0.000	Pass

B. 25th cycle fully charged state

5	12.6796	173.91	12.6696	173.90	99.92	0.006	Pass	12.4310	173.87	98.12	0.017	Pass	12.4283	173.87	99.98	0.000	Pass	12.4247	173.87	99.97	0.000	Pass
6	12.6768	173.88	12.6666	173.86	99.92	0.012	Pass	12.4320	173.85	98.15	0.006	Pass	12.4289	173.85	99.98	0.000	Pass	12.4258	173.85	99.98	0.000	Pass
7	12.6758	173.56	12.6646	173.55	99.91	0.006	Pass	12.4273	173.53	98.13	0.012	Pass	12.4242	173.53	99.98	0.000	Pass	12.4222	173.53	99.98	0.000	Pass
8	12.6693	173.19	12.6597	173.18	99.92	0.006	Pass	12.4230	173.15	98.13	0.017	Pass	12.4184	173.16	99.96	0.000	Pass	12.4169	173.15	99.99	0.006	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	12.3773	58.08	Pass
2	12.3865	58.59	Pass
3	12.3950	57.57	Pass
4	12.3970	57.70	Pass

B. 25th cycle fully charged state

5	12.4247	58.21	Pass
6	12.4258	58.56	Pass
7	12.4222	57.57	Pass
8	12.4169	57.68	Pass

Over Charge (T7)

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

A. 1st cycle fully charged state

9	12.5848	23.81	Pass
10	12.5861	23.65	Pass
11	12.6293	23.71	Pass
12	12.6276	23.41	Pass

Over Charge (T7)

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

B. 25th cycle fully charged state

13	12.6568	23.67	Pass
14	12.6560	23.21	Pass
15	12.4524	23.37	Pass
16	12.6481	23.04	Pass

2-3. T6/T8 Test Result (P515874A1)

Cell Document Number	QDI-190424-C-P515874A1
-----------------------------	-------------------------------

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

A. 1st cycle 50% charged state

C-1	3.8622	22.05	Pass
C-2	3.8595	21.93	Pass
C-3	3.8601	22.20	Pass
C-4	3.8605	21.91	Pass
C-5	3.8605	21.60	Pass

B. 25st cycle 50% charged state

C-6	3.8848	22.67	Pass
C-7	3.8948	22.93	Pass
C-8	3.8927	23.66	Pass
C-9	3.9025	22.70	Pass
C-10	3.9008	22.49	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	3.4512	76.57	Pass
C-7	3.4476	84.48	Pass
C-8	3.4499	74.25	Pass
C-9	3.4479	86.64	Pass
C-10	3.4444	87.24	Pass
C-11	3.4486	88.98	Pass
C-12	3.4494	94.88	Pass
C-13	3.4473	98.78	Pass
C-14	3.4474	80.82	Pass
C-15	3.4476	91.91	Pass

B. 25th cycle fully discharged state

C-16	3.3099	85.68	Pass
C-17	3.3265	87.77	Pass
C-18	3.3447	78.69	Pass
C-19	3.3233	91.07	Pass
C-20	3.2874	88.42	Pass
C-21	3.3175	85.95	Pass
C-22	3.3065	75.17	Pass
C-23	3.3134	91.80	Pass
C-24	3.3378	78.91	Pass
C-25	3.3591	86.30	Pass

3. Sample Image

