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CERTIFICATE OF COMPLIANCE

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.

<input type="checkbox"/> Lithium-ion cell <input checked="" type="checkbox"/> Lithium-ion battery <input type="checkbox"/> Lithium-ion single cell battery	
Model name	L18L3PF3
Cell Model name	P595490B4
Nominal voltage	11.34V
Electric power capacity	52.50Wh

Approved By: Xuyuan



Assistant Manager

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Document Number	QDI-181015-B-L18L3PF3	
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UN38.3 Test Report

– L18L3PF3 (Nom. 52.50Wh, 11.34V) –

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2018. 10. 15

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°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 $\sqrt{\frac{100850}{Mass(kg)}} gn$ 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	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	12.5009	218.67	12.4946	218.62	99.95	0.023	Pass	12.2409	218.59	97.97	0.014	Pass	12.2300	218.60	99.91	0.000	Pass	12.2279	218.60	99.98	0.000	Pass
2	12.5043	218.61	12.5003	218.56	99.97	0.023	Pass	12.2475	218.53	97.98	0.014	Pass	12.2369	218.54	99.91	0.000	Pass	12.2340	218.54	99.98	0.000	Pass
3	12.5046	218.04	12.5014	218.01	99.97	0.014	Pass	12.2497	217.97	97.99	0.018	Pass	12.2386	217.99	99.91	0.000	Pass	12.2369	217.99	99.99	0.000	Pass
4	12.4906	218.46	12.4864	218.42	99.97	0.018	Pass	12.2367	218.38	98.00	0.018	Pass	12.2267	218.38	99.92	0.000	Pass	12.2241	218.39	99.98	0.000	Pass

B. 50th cycle fully charged state

5	12.5261	218.33	12.5183	218.30	99.94	0.014	Pass	12.2763	218.27	98.07	0.014	Pass	12.2662	218.27	99.92	0.000	Pass	12.2620	218.28	99.97	0.000	Pass
6	12.5276	218.61	12.5129	218.58	99.88	0.014	Pass	12.2707	218.56	98.06	0.009	Pass	12.2617	218.57	99.93	0.000	Pass	12.2569	218.56	99.96	0.005	Pass
7	12.5468	218.37	12.5189	218.33	99.78	0.018	Pass	12.2731	218.31	98.04	0.009	Pass	12.2619	218.31	99.91	0.000	Pass	12.2602	218.29	99.99	0.009	Pass
8	12.5379	218.50	12.5204	218.45	99.86	0.023	Pass	12.2755	218.44	98.04	0.005	Pass	12.2661	218.45	99.92	0.000	Pass	12.2640	218.43	99.98	0.009	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	12.2279	58.89	Pass
2	12.2340	58.61	Pass
3	12.2369	58.09	Pass
4	12.2241	57.57	Pass

B. 50th cycle fully charged state

5	12.2620	58.29	Pass
6	12.2569	58.05	Pass
7	12.2602	57.50	Pass
8	12.2640	57.19	Pass

Overcharge (T7)

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

9	12.4917	25.12	Pass
10	12.4932	25.02	Pass
11	12.4967	25.02	Pass
12	12.5039	24.96	Pass

B. 50th cycle fully charged state

13	12.4798	25.02	Pass
14	12.5291	24.82	Pass
15	12.5379	24.88	Pass
16	12.5291	24.62	Pass

2-3. T6/T8 Test Result (P595490B4)

Crush (T6)

NO.	Initial OCV(V)	Max. Temp (°C)	Result
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A. 1st cycle 50% charged state

C-1	3.827	20.73	Pass
C-2	3.826	20.37	Pass
C-3	3.826	19.75	Pass
C-4	3.826	20.11	Pass
C-5	3.252	20.30	Pass

Forced Discharge (T8)

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

C-6	3.243	82.06	Pass	C-16	3.325	77.94	Pass
C-7	3.240	73.57	Pass	C-17	3.323	80.22	Pass
C-8	3.239	72.69	Pass	C-18	3.334	88.16	Pass
C-9	3.241	79.03	Pass	C-19	3.334	80.73	Pass
C-10	3.241	74.51	Pass	C-20	3.325	76.07	Pass
C-11	3.244	78.94	Pass	C-21	3.330	80.85	Pass
C-12	3.251	76.06	Pass	C-22	3.332	78.83	Pass
C-13	3.243	77.02	Pass	C-23	3.334	75.14	Pass
C-14	3.243	77.20	Pass	C-24	3.330	82.70	Pass
C-15	3.242	68.57	Pass	C-25	3.342	78.34	Pass

B. 50th cycle fully discharged state

3. Sample Image

