

UN38.3 Test Summary

The following product has been evaluated according to the 5th revised edition Amendment 2 of the UN Manual of Tests and Criteria.

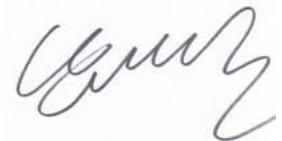
We, LG Chem, Ltd., hereby certify that this battery meets the requirements of the regulation for transportation of lithium-ion cells, batteries and single cell batteries.

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Description		List of Test Completed	
Test Report Number	QDI-170706-B-L17L2PB3	Test 1. Altitude Simulation	Pass
Date of test report	2017.07.06	Test 2. Thermal Test	Pass
Model name	L17L2PB3	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	142.0 g	Test 7. Overcharge	Pass
Dimensions	118.18mm X 118.39mm X 8.40mm	Test 8. Forced Discharge	Pass

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UN38.3 Test Report

- L17L2PB3 (Nom.30Wh, 7.6V) -

Index

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

2017. 07. 06



1. UN38.3 Test Condition

Rev.5 / Amd.2

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"> - 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%) 	<p>T1~T5 : Sequence Tests</p> <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		
Test 4. Shock	Half sine shock (peak acceleration : 150gn, pulse duration : 6msec) x 6 (±x, y, z), direction x 3 cycle		
Test 5. External Short Circuit	100mΩ ext. short-circuit at 55±2℃ 1hr continue after returning at 55±2℃	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - 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)	<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. General Information

1. Standard charge / discharge Condition

	Mode	Condition	End Condition
Charge	CC / CV	Current = 1920 mA Voltage = 8.7 V	Current = 195 mA
Discharge	CC	Current = 780 mA	Voltage = 6.0 V

2. Cycle Condition

	Mode	Condition	End Condition
Charge	CC / CV	Current = 1920 mA Voltage = 8.7 V	Current = 195 mA
Discharge	CC	Current = 780 mA	Voltage = 6.0 V

3. Test Condition

	Mode	Condition
Test 7. Overcharge	CC / CV	Max. Charge Current = 1920 mA CC/CV 2Imax (3840mA) 17.4 V cut-off 24Hr
Test 8. Forced Discharge	CC	Max. Discharge Current = 3900 mA Duration Time = 60 min

3-1. 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	8.673	142.35	8.672	142.30	99.99	0.035	Pass	8.570	142.29	98.82	0.007	Pass	8.552	142.29	99.79	0.000	Pass	8.549	142.28	99.96	0.007	Pass
2	8.677	142.30	8.667	142.29	99.88	0.007	Pass	8.571	142.28	98.89	0.007	Pass	8.532	142.28	99.54	0.000	Pass	8.530	142.28	99.98	0.000	Pass
3	8.670	142.37	8.668	142.37	99.98	0.000	Pass	8.541	142.31	98.53	0.042	Pass	8.539	142.31	99.98	0.000	Pass	8.536	142.29	99.96	0.014	Pass
4	8.686	142.37	8.669	142.37	99.80	0.000	Pass	8.542	142.35	98.54	0.014	Pass	8.540	142.34	99.98	0.007	Pass	8.534	142.33	99.93	0.007	Pass

B. 50th cycle fully charged state

5	8.687	142.38	8.680	142.38	99.92	0.000	Pass	8.543	142.30	98.42	0.056	Pass	8.540	142.29	99.96	0.007	Pass	8.527	142.28	99.85	0.007	Pass
6	8.674	142.34	8.666	142.34	99.91	0.000	Pass	8.542	142.34	98.57	0.000	Pass	8.539	142.29	99.96	0.035	Pass	8.539	142.28	100.00	0.007	Pass
7	8.682	142.38	8.679	142.38	99.97	0.000	Pass	8.554	142.33	98.56	0.035	Pass	8.542	142.30	99.86	0.021	Pass	8.528	142.29	99.84	0.007	Pass
8	8.681	142.38	8.677	142.38	99.95	0.000	Pass	8.551	142.30	98.55	0.056	Pass	8.545	142.30	99.93	0.000	Pass	8.538	142.29	99.92	0.007	Pass

3-2. T5/T7 Test Result

EXT.Short Circuit (T5)			
NO.	Initial OCV(V)	Max. Temp (°C)	Result

A. 1st cycle fully charged state

1	8.549	56.31	Pass
2	8.530	56.58	Pass
3	8.536	56.65	Pass
4	8.534	55.87	Pass

B. 50th cycle fully charged state

5	8.527	55.51	Pass
6	8.539	56.20	Pass
7	8.528	56.58	Pass
8	8.538	55.18	Pass

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

A. 1st cycle fully charged state

9	8.645	24.53	Pass
10	8.641	25.58	Pass
11	8.644	25.66	Pass
12	8.643	25.94	Pass

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

B. 50th cycle fully charged state

13	8.620	26.08	Pass
14	8.627	24.36	Pass
15	8.628	25.97	Pass
16	8.626	25.78	Pass

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

Crush (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

