

UN38.3 Test Summary

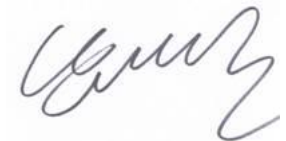
The following product has been evaluated according to the 6th revised edition of the UN Manual of Tests and Criteria.
We, LG Chem, Ltd., hereby certify that this battery meets the requirements of the regulation for transportation of lithium-ion cells, batteries and single cell batteries.

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Description		List of Test Completed	
Test Report Number	QDI-170822-B-L17L2PB6	Test 1. Altitude Simulation	Pass
Date of test report	2017.08.22	Test 2. Thermal Test	Pass
Model name	L17L2PB6	Test 3. Vibration	Pass
Type	Pouch	Test 4. Shock	Pass
Nominal voltage	7.72 V	Test 5. External Short Circuit	Pass
Capacity	39.0 Wh	Test 6. Impact or Crush	Pass
Weight	191.0 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

- L17L2PB6 (Nom.39.0Wh, 7.72V) -

Index

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

2017. 08. 22



1. UN38.3 Test Condition

Rev.6

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 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℃ 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℃		
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 = 2460 mA Voltage = 8.8 V	Current = 246 mA
Discharge	CC	Current = 984 mA	Voltage = 6.0 V

2. Cycle Condition

	Mode	Condition	End Condition
Charge	CC / CV	Current = 2460 mA Voltage = 8.8 V	Current = 246 mA
Discharge	CC	Current = 984 mA	Voltage = 6.0 V

3. Test Condition

	Mode	Condition
Test 7. Overcharge	CC / CV	Max. Charge Current = 5784 mA CC/CV 2Imax (11568mA) 22 V cut-off 24Hr
Test 8. Forced Discharge	CC	Max. Discharge Current = 6700 mA Duration Time = 44.0 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	8.775	190.61	8.773	190.60	99.98	0.005	Pass	8.683	190.59	98.97	0.005	Pass	8.681	190.57	99.98	0.010	Pass	8.679	190.56	99.98	0.005	Pass
2	8.773	190.59	8.771	190.57	99.98	0.010	Pass	8.681	190.57	98.97	0.000	Pass	8.680	190.56	99.99	0.005	Pass	8.678	190.56	99.98	0.000	Pass
3	8.782	190.62	8.780	190.61	99.98	0.005	Pass	8.678	190.60	98.84	0.005	Pass	8.675	190.59	99.97	0.005	Pass	8.672	190.57	99.97	0.010	Pass
4	8.773	190.58	8.772	190.57	99.99	0.005	Pass	8.680	190.55	98.95	0.010	Pass	8.677	190.55	99.97	0.000	Pass	8.674	190.54	99.97	0.005	Pass

B. 50th cycle fully charged state

5	8.738	190.59	8.735	190.59	99.97	0.000	Pass	8.631	190.58	98.81	0.005	Pass	8.609	190.57	99.75	0.005	Pass	8.607	190.55	99.98	0.010	Pass
6	8.741	190.61	8.740	190.60	99.99	0.005	Pass	8.630	190.58	98.74	0.010	Pass	8.604	190.56	99.70	0.010	Pass	8.601	190.56	99.97	0.000	Pass
7	8.736	190.62	8.734	190.61	99.98	0.005	Pass	8.629	190.60	98.80	0.005	Pass	8.605	190.59	99.72	0.005	Pass	8.603	190.58	99.98	0.005	Pass
8	8.738	190.62	8.735	190.60	99.97	0.010	Pass	8.631	190.59	98.81	0.005	Pass	8.603	190.58	99.68	0.005	Pass	8.600	190.56	99.97	0.010	Pass

3-2. 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	8.679	54.73	Pass
2	8.678	54.69	Pass
3	8.672	56.03	Pass
4	8.674	55.36	Pass

B. 50th cycle fully charged state

5	8.607	55.89	Pass
6	8.601	54.78	Pass
7	8.603	56.12	Pass
8	8.600	55.35	Pass

Over Charge (T7)

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

9	8.781	24.47	Pass
10	8.773	25.21	Pass
11	8.778	24.59	Pass
12	8.776	24.79	Pass

Over Charge (T7)

NO.	Initial OCV(V)	Max. Temp (°C)	Result
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B. 50th cycle fully charged state

13	8.731	25.32	Pass
14	8.729	24.59	Pass
15	8.734	25.61	Pass
16	8.737	25.28	Pass

3-3. T6/T8 Test Result (ICP595490C2)

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

A. 1st cycle 50% charged state

C-1	3.894	21.28	Pass
C-2	3.898	21.45	Pass
C-3	3.901	21.34	Pass
C-4	3.887	21.49	Pass
C-5	3.891	21.38	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	3.119	42.74	Pass
C-7	3.112	42.87	Pass
C-8	3.082	40.83	Pass
C-9	3.112	41.56	Pass
C-10	3.087	41.29	Pass
C-11	3.079	41.32	Pass
C-12	3.110	40.56	Pass
C-13	3.085	43.44	Pass
C-14	3.116	42.94	Pass
C-15	3.110	42.90	Pass

B. 50th cycle fully discharged state

C-16	3.126	42.99	Pass
C-17	3.117	40.38	Pass
C-18	3.126	43.11	Pass
C-19	3.106	41.94	Pass
C-20	3.138	40.67	Pass
C-21	3.122	42.08	Pass
C-22	3.148	41.68	Pass
C-23	3.155	43.03	Pass
C-24	3.148	41.46	Pass
C-25	3.109	40.88	Pass

4. Sample Image

