

UN38.3 Test Summary

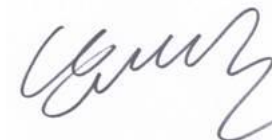
The following product has been evaluated according to the 6th revised edition of the UN Manual of Tests and Criteria.
We, LG Chem, Ltd., hereby certify that this battery meets the requirements of the regulation for transportation of lithium-ion cells, batteries and single cell batteries.

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Description		List of Test Completed	
Test Report Number	QDI-170809-B-L17L3PB0	Test 1. Altitude Simulation	Pass
Date of test report	2017.08.09	Test 2. Thermal Test	Pass
Model name	L17L3PB0	Test 3. Vibration	Pass
Type	Pouch	Test 4. Shock	Pass
Nominal voltage	11.4 V	Test 5. External Short Circuit	Pass
Capacity	42.0 Wh	Test 6. Impact or Crush	Pass
Weight	183.0 g	Test 7. Overcharge	Pass
Dimensions	202.00mm X 112.00mm X 5.50mm	Test 8. Forced Discharge	Pass

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UN38.3 Test Report

- L17L3PB0 (Nom.42Wh, 11.4V) -

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2017. 08. 09



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 = 3684 mA Voltage = 13.05 V	Current = 181 mA
Discharge	CC	Current = 726 mA	Voltage = 9.0 V

2. Cycle Condition

	Mode	Condition	End Condition
Charge	CC / CV	Current = 3684 mA Voltage = 13.05 V	Current = 181 mA
Discharge	CC	Current = 726 mA	Voltage = 9.0 V

3. Test Condition

	Mode	Condition
Test 7. Overcharge	CC / CV	Max. Charge Current = 4052 mA CC/CV 2Imax (8104mA) 22 V cut-off 24Hr
Test 8. Forced Discharge	CC	Max. Discharge Current = 3630 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	13.045	183.60	13.045	183.60	100.00	0.000	Pass	12.800	183.59	98.12	0.004	Pass	12.790	183.58	99.92	0.007	Pass	12.782	183.57	99.94	0.005	Pass
2	13.046	183.58	13.037	183.57	99.93	0.005	Pass	12.860	183.56	98.64	0.004	Pass	12.850	183.56	99.92	0.001	Pass	12.836	183.56	99.89	0.002	Pass
3	13.045	183.62	13.025	183.61	99.85	0.005	Pass	12.810	183.61	98.35	0.001	Pass	12.800	183.60	99.92	0.004	Pass	12.783	183.59	99.87	0.005	Pass
4	13.047	183.57	13.037	183.57	99.92	0.000	Pass	12.860	183.56	98.64	0.007	Pass	12.840	183.54	99.84	0.008	Pass	12.830	183.54	99.92	0.004	Pass

B. 50th cycle fully charged state

5	13.048	183.57	13.038	183.55	99.92	0.011	Pass	12.880	183.54	98.79	0.004	Pass	12.860	183.53	99.84	0.006	Pass	12.858	183.52	99.98	0.007	Pass
6	13.046	183.58	13.036	183.55	99.92	0.016	Pass	12.850	183.54	98.57	0.003	Pass	12.830	183.54	99.84	0.004	Pass	12.812	183.54	99.86	0.001	Pass
7	13.046	183.60	13.028	183.58	99.86	0.011	Pass	12.860	183.57	98.71	0.004	Pass	12.850	183.56	99.92	0.007	Pass	12.840	183.56	99.92	0.001	Pass
8	13.045	183.62	13.035	183.60	99.92	0.011	Pass	12.860	183.59	98.66	0.003	Pass	12.840	183.58	99.84	0.007	Pass	12.833	183.57	99.95	0.004	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	12.782	56.32	Pass
2	12.836	55.09	Pass
3	12.783	55.57	Pass
4	12.830	55.32	Pass

B. 50th cycle fully charged state

5	12.858	56.29	Pass
6	12.812	54.74	Pass
7	12.840	55.45	Pass
8	12.833	56.27	Pass

Over Charge (T7)

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

9	12.751	24.13	Pass
10	12.810	24.88	Pass
11	12.752	25.00	Pass
12	12.800	24.07	Pass

Over Charge (T7)

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

13	12.836	24.01	Pass
14	12.785	24.66	Pass
15	12.816	24.89	Pass
16	12.805	24.35	Pass

3-3. T6/T8 Test Result (ICP485490L1)

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

A. 1st cycle 50% charged state

C-1	3.815	22.53	Pass
C-2	3.824	22.91	Pass
C-3	3.816	23.40	Pass
C-4	3.824	22.60	Pass
C-5	3.819	23.26	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	3.058	42.98	Pass
C-7	3.059	44.21	Pass
C-8	3.068	44.11	Pass
C-9	3.064	42.84	Pass
C-10	3.059	42.70	Pass
C-11	3.063	43.76	Pass
C-12	3.059	41.95	Pass
C-13	3.058	42.39	Pass
C-14	3.065	41.24	Pass
C-15	3.059	41.52	Pass

B. 50th cycle fully discharged state

C-16	3.115	43.74	Pass
C-17	3.085	42.28	Pass
C-18	3.107	43.46	Pass
C-19	3.108	43.91	Pass
C-20	3.101	44.62	Pass
C-21	3.116	43.07	Pass
C-22	3.060	43.87	Pass
C-23	3.114	44.10	Pass
C-24	3.061	44.44	Pass
C-25	3.066	43.71	Pass

4. Sample Image

