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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.

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Description		List of Test Completed	
Test Report Number	QDI-190724-SB-BL-T39	Test 1. Altitude Simulation	Pass
Date of test report	2019.07.24	Test 2. Thermal Test	Pass
Model name	BL-T39	Test 3. Vibration	Pass
Type	Pouch	Test 4. Shock	Pass
Nominal voltage	3.85 V	Test 5. External Short Circuit	Pass
Capacity	11.60Wh	Test 6. Impact or Crush	Pass
Weight	Max 43.0g	Test 7. Overcharge	Pass
Dimensions	Max 42.0mmX91.0mmX4.5mm	Test 8. Forced Discharge	Pass

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UN38.3 Test Report
- BL-T39 (Nom. 11.60Wh, 3.85V) -

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2019. 07. 24

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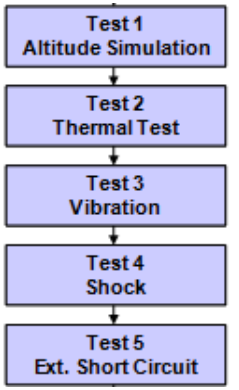
1. UN38.3 Test Condition

Test item	Test Condition	Requirements	Etc.
Test 1. Altitude Simulation	Storing at (low pressure)11.6kPa for 6hr at 20+/-5℃	- After OCV (%) ≥ 90% - No leakage, no venting, no disassembly, no rupture, no fire - Mass loss limit (leakage) 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%)	T1~T5 : Sequence Tests 
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℃	- 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	- 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)	- 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	- 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	4.352	41.837	4.352	41.836	100.00	0.002	Pass	4.272	41.829	98.16	0.017	Pass	4.271	41.829	99.98	0.000	Pass	4.271	41.829	100.00	0.000	Pass
2	4.352	41.858	4.351	41.858	99.98	0.000	Pass	4.273	41.851	98.21	0.017	Pass	4.272	41.851	99.98	0.000	Pass	4.272	41.850	100.00	0.002	Pass
3	4.349	41.851	4.348	41.851	99.98	0.000	Pass	4.272	41.842	98.25	0.022	Pass	4.271	41.843	99.98	0.000	Pass	4.271	41.844	100.00	0.000	Pass
4	4.350	41.902	4.350	41.901	100.00	0.002	Pass	4.272	41.894	98.21	0.017	Pass	4.271	41.894	99.98	0.000	Pass	4.271	41.894	100.00	0.000	Pass
5	4.350	41.590	4.349	41.587	99.98	0.007	Pass	4.271	41.580	98.21	0.017	Pass	4.271	41.581	100.00	0.000	Pass	4.270	41.581	99.98	0.000	Pass
6	4.350	41.798	4.349	41.796	99.98	0.005	Pass	4.272	41.790	98.23	0.014	Pass	4.271	41.791	99.98	0.000	Pass	4.271	41.791	100.00	0.000	Pass
7	4.350	41.831	4.350	41.829	100.00	0.005	Pass	4.272	41.822	98.21	0.017	Pass	4.272	41.823	100.00	0.000	Pass	4.271	41.823	99.98	0.000	Pass
8	4.349	41.789	4.349	41.787	100.00	0.005	Pass	4.272	41.779	98.23	0.019	Pass	4.271	41.799	99.98	0.000	Pass	4.271	41.780	100.00	0.045	Pass
9	4.350	41.878	4.349	41.876	99.98	0.005	Pass	4.272	41.868	98.23	0.019	Pass	4.271	41.868	99.98	0.000	Pass	4.271	41.869	100.00	0.000	Pass
10	4.350	41.983	4.349	41.983	99.98	0.000	Pass	4.272	41.976	98.23	0.017	Pass	4.271	41.977	99.98	0.000	Pass	4.271	41.976	100.00	0.002	Pass

2-2. T5/T7 Test Result

EXT.Short Circuit (T5)			
NO.	Initial OCV(V)	Max. Temp (℃)	Result
A. 1st cycle fully charged state			
1	4.271	58.02	Pass
2	4.272	57.74	Pass
3	4.271	57.37	Pass
4	4.271	56.88	Pass
5	4.270	56.44	Pass
6	4.271	58.25	Pass
7	4.271	57.96	Pass
8	4.271	57.47	Pass
9	4.271	56.95	Pass
10	4.271	56.28	Pass

Over Charge (T7)			
NO.	Initial OCV(V)	Max. Temp (℃)	Result
A. 1st cycle fully charged state			
11	4.362	23.11	Pass
12	4.359	23.01	Pass
13	4.361	22.97	Pass
14	4.359	22.90	Pass

Over Charge (T7)			
NO.	Initial OCV(V)	Max. Temp (℃)	Result
B. 50th cycle fully charged state			
15	4.368	22.50	Pass
16	4.368	22.50	Pass
17	4.370	22.46	Pass
18	4.368	22.40	Pass

2-3. T6/T8 Test Result (P454291A1)

Crush (T6)

A. 1st cycle 50% charged state

NO.	Initial OCV(V)	Max. Temp (℃)	Result
C-1	3.857	19.73	Pass
C-2	3.856	19.52	Pass
C-3	3.857	19.13	Pass
C-4	3.857	19.18	Pass
C-5	3.854	19.18	Pass

Forced Discharge (T8)

A. 1st cycle fully discharged state / B. 50th cycle fully discharged state

NO.	Initial OCV(V)	Max. Temp (℃)	Result	NO.	Initial OCV(V)	Max. Temp (℃)	Result
C-6	3.476	65.31	Pass	C-16	3.698	74.50	Pass
C-7	3.469	64.14	Pass	C-17	3.695	72.44	Pass
C-8	3.461	66.34	Pass	C-18	3.699	71.01	Pass
C-9	3.465	65.56	Pass	C-19	3.725	66.88	Pass
C-10	3.473	68.14	Pass	C-20	3.704	75.49	Pass
C-11	3.472	68.09	Pass	C-21	3.702	71.29	Pass
C-12	3.474	66.92	Pass	C-22	3.702	73.97	Pass
C-13	3.466	69.56	Pass	C-23	3.700	73.35	Pass
C-14	3.479	65.60	Pass	C-24	3.699	69.65	Pass
C-15	3.473	65.88	Pass	C-25	3.703	72.61	Pass

3. Sample Image