

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-190617-SB-EB-BA907ABY L	Test 1. Altitude Simulation	Pass
Date of test report	2019.06.17	Test 2. Thermal Test	Pass
Model name	EB-BA907ABY L	Test 3. Vibration	Pass
Type	Pouch	Test 4. Shock	Pass
Nominal voltage	3.85 V	Test 5. External Short Circuit	Pass
Capacity	17.33Wh	Test 6. Impact or Crush	Pass
Weight	62.609g	Test 7. Overcharge	Pass
Dimensions	77.30mmX64.36mmX5.28mm	Test 8. Forced Discharge	Pass

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Document Number	QDI-190617-SB-EB-BA907ABY L	
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UN38.3 Test Report

– EB-BA907ABY L (Nom. 17.33Wh, 3.85V) –

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2019. 06. 17

1. UN38.3 Test Condition

Rev.6 Amendment 1

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 (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	4.3164	62.609	4.3154	62.609	99.98	0.000	Pass	4.2507	62.599	98.50	0.016	Pass	4.2504	62.600	99.99	0.000	Pass	4.2503	62.600	100.00	0.000	Pass
2	4.3169	62.470	4.3158	62.473	99.97	0.000	Pass	4.2523	62.463	98.53	0.016	Pass	4.2520	62.463	99.99	0.000	Pass	4.2520	62.463	100.00	0.000	Pass
3	4.3216	62.297	4.3206	62.300	99.98	0.000	Pass	4.2552	62.289	98.49	0.018	Pass	4.2548	62.289	99.99	0.000	Pass	4.2549	62.289	100.00	0.000	Pass
4	4.3216	62.380	4.3205	62.383	99.97	0.000	Pass	4.2560	62.373	98.51	0.016	Pass	4.2559	62.372	100.00	0.002	Pass	4.2558	62.374	100.00	0.000	Pass
5	4.3212	62.318	4.3200	62.322	99.97	0.000	Pass	4.2557	62.311	98.51	0.018	Pass	4.2554	62.311	99.99	0.000	Pass	4.2554	62.313	100.00	0.000	Pass

B. 25th cycle fully charged state

6	4.3298	62.399	4.3292	62.402	99.99	0.000	Pass	4.2664	62.392	98.55	0.016	Pass	4.2661	62.394	99.99	0.000	Pass	4.2661	62.395	100.00	0.000	Pass
7	4.3332	62.469	4.3325	62.472	99.98	0.000	Pass	4.2689	62.462	98.53	0.016	Pass	4.2686	62.463	99.99	0.000	Pass	4.2685	62.462	100.00	0.002	Pass
8	4.3311	62.558	4.3304	62.561	99.98	0.000	Pass	4.2650	62.552	98.49	0.014	Pass	4.2647	62.552	99.99	0.000	Pass	4.2647	62.552	100.00	0.000	Pass
9	4.3232	62.410	4.3225	62.413	99.98	0.000	Pass	4.2594	62.402	98.54	0.018	Pass	4.2590	62.404	99.99	0.000	Pass	4.2590	62.404	100.00	0.000	Pass
10	4.3331	62.475	4.3323	62.478	99.98	0.000	Pass	4.2648	62.467	98.44	0.018	Pass	4.2647	62.467	100.00	0.000	Pass	4.2646	62.468	100.00	0.000	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	4.2503	57.93	Pass
2	4.2520	58.22	Pass
3	4.2549	56.21	Pass
4	4.2558	56.99	Pass
5	4.2554	57.35	Pass

B. 25th cycle fully charged state

6	4.2661	58.05	Pass
7	4.2685	58.27	Pass
8	4.2647	56.28	Pass
9	4.2590	56.99	Pass
10	4.2646	57.91	Pass

Over Charge (T7)

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

11	4.3195	24.92	Pass
12	4.3169	24.82	Pass
13	4.3185	24.72	Pass
14	4.3203	24.45	Pass

Over Charge (T7)

NO.	Initial OCV(V)	Max. Temp (°C)	Result
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B. 25th cycle fully charged state

15	4.3290	24.62	Pass
16	4.3300	24.21	Pass
17	4.3272	24.28	Pass
18	4.3297	24.01	Pass

2-3. T6/T8 Test Result (P536576A1)

Cell Document Number	QDI-190613-C-P536576A1
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Crush (T6)			
NO.	Initial OCV(V)	Max. Temp (°C)	Result

A. 1st cycle 50% charged state

C-1	3.8466	21.76	Pass
C-2	3.8467	21.29	Pass
C-3	3.8461	21.81	Pass
C-4	3.8485	21.54	Pass
C-5	3.8473	21.49	Pass

B. 25st cycle 50% charged state

C-6	3.8787	22.16	Pass
C-7	3.8734	21.82	Pass
C-8	3.8702	21.31	Pass
C-9	3.8707	21.38	Pass
C-10	3.8803	21.63	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	3.4604	61.08	Pass
C-7	3.4581	62.66	Pass
C-8	3.4590	67.84	Pass
C-9	3.4559	64.29	Pass
C-10	3.4588	67.54	Pass
C-11	3.4605	63.10	Pass
C-12	3.4608	63.32	Pass
C-13	3.4617	61.11	Pass
C-14	3.4531	64.24	Pass
C-15	3.4558	65.37	Pass

B. 25th cycle fully discharged state

C-16	3.3803	68.06	Pass
C-17	3.3995	65.35	Pass
C-18	3.3777	69.06	Pass
C-19	3.3868	65.34	Pass
C-20	3.4058	67.20	Pass
C-21	3.3929	66.90	Pass
C-22	3.3983	66.92	Pass
C-23	3.3888	66.43	Pass
C-24	3.3853	68.37	Pass
C-25	3.3809	66.00	Pass

