

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-191114-B-AP19B8K	Test 1. Altitude Simulation	Pass
Date of test report	2019.11.14	Test 2. Thermal Test	Pass
Model name	AP19B8K	Test 3. Vibration	Pass
Type	Pouch	Test 4. Shock	Pass
Nominal voltage	11.25 V	Test 5. External Short Circuit	Pass
Capacity	43.08Wh	Test 6. Impact or Crush	Pass
Weight	186.66g	Test 7. Overcharge	Pass
Dimensions	248.25mmX84.60mmX5.50mm	Test 8. Forced Discharge	Pass

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Document Number	QDI-191114-B-AP19B8K	
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UN38.3 Test Report

– AP19B8K (Nom. 43.08Wh, 11.25V) –

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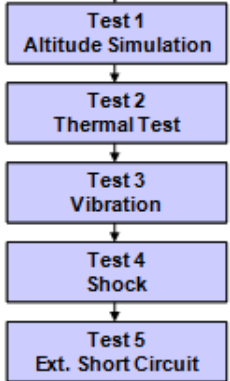
1. UN38.3 Test Condition
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2019. 11. 14



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	<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% 	T1~T5 : Sequence Tests 
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		
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		
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	12.5163	186.26	12.5104	186.25	99.95	0.005	Pass	12.1974	186.21	97.50	0.021	Pass	12.1966	186.21	99.99	0.000	Pass	12.1925	186.21	99.97	0.000	Pass
2	12.5284	186.53	12.5223	186.52	99.95	0.005	Pass	12.2058	186.48	97.47	0.021	Pass	12.2063	186.47	100.00	0.005	Pass	12.2028	186.47	99.97	0.000	Pass
3	12.5211	186.55	12.5130	186.54	99.94	0.005	Pass	12.2004	186.50	97.50	0.021	Pass	12.1991	186.49	99.99	0.005	Pass	12.1953	186.49	99.97	0.000	Pass
4	12.5183	186.28	12.5111	186.27	99.94	0.005	Pass	12.1968	186.23	97.49	0.021	Pass	12.1979	186.22	100.00	0.005	Pass	12.1937	186.22	99.97	0.000	Pass

B. 25th cycle fully charged state

5	12.5216	186.66	12.5148	186.65	99.95	0.005	Pass	12.1940	186.61	97.44	0.021	Pass	12.1935	186.60	100.00	0.005	Pass	12.1886	186.61	99.96	0.000	Pass
6	12.5290	186.34	12.5220	186.33	99.94	0.005	Pass	12.1973	186.29	97.41	0.021	Pass	12.1981	186.29	100.00	0.000	Pass	12.1934	186.29	99.96	0.000	Pass
7	12.5369	186.36	12.5302	186.35	99.95	0.005	Pass	12.1999	186.31	97.36	0.021	Pass	12.2013	186.30	100.00	0.005	Pass	12.1970	186.31	99.96	0.000	Pass
8	12.5340	186.60	12.5274	186.59	99.95	0.005	Pass	12.1998	186.55	97.38	0.021	Pass	12.2008	186.54	100.00	0.005	Pass	12.1967	186.54	99.97	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	12.1925	58.42	Pass
2	12.2028	58.51	Pass
3	12.1953	57.34	Pass
4	12.1937	57.54	Pass

B. 25th cycle fully charged state

5	12.1886	58.34	Pass
6	12.1934	58.47	Pass
7	12.1970	57.32	Pass
8	12.1967	57.03	Pass

Over Charge (T7)

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

9	12.4845	25.02	Pass
10	12.4903	24.86	Pass
11	12.4984	25.12	Pass
12	12.4964	24.72	Pass

Over Charge (T7)

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

13	12.5253	24.88	Pass
14	12.5216	23.31	Pass
15	12.5030	24.88	Pass
16	12.5068	24.65	Pass

2-3. T6/T8 Test Result (P438170A1)

Cell Document Number

QDI-191107-C-P438170A1

Crush (T6)

NO. 3.	Initial OCV(V)	Max. Temp (°C)	Result
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A. 1st cycle 50% charged state

11	3.7933	22.86	Pass
12	3.7936	21.68	Pass
13	3.7927	21.35	Pass
14	3.7928	23.71	Pass
15	3.7931	24.27	Pass

B. 25th cycle 50% charged state

16	3.8048	22.85	Pass
17	3.8084	23.76	Pass
18	3.8032	21.33	Pass
19	3.8073	22.93	Pass
20	3.8081	21.72	Pass

Forced Discharge (T8)

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

21	3.2780	77.76	Pass	31	3.2936	87.16	Pass
22	3.2802	69.18	Pass	32	3.2376	78.26	Pass
23	3.2818	76.30	Pass	33	3.2381	80.33	Pass
24	3.2838	71.60	Pass	34	3.2355	72.20	Pass
25	3.2828	66.15	Pass	35	3.2317	76.36	Pass
26	3.2666	74.52	Pass	36	3.2336	83.08	Pass
27	3.2752	76.86	Pass	37	3.2357	74.09	Pass
28	3.2763	74.24	Pass	38	3.2803	76.15	Pass
29	3.2790	81.92	Pass	39	3.2452	83.73	Pass
30	3.2786	77.63	Pass	40	3.2307	75.61	Pass

B. 25th cycle fully discharged state

3. Sample Image

