

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-190729-B-AP19A8K	Test 1. Altitude Simulation	Pass
Date of test report	2019.07.29	Test 2. Thermal Test	Pass
Model name	AP19A8K	Test 3. Vibration	Pass
Type	Pouch	Test 4. Shock	Pass
Nominal voltage	11.55 V	Test 5. External Short Circuit	Pass
Capacity	40.22Wh	Test 6. Impact or Crush	Pass
Weight	166.50g	Test 7. Overcharge	Pass
Dimensions	205.88mmX84.60mmX5.70mm	Test 8. Forced Discharge	Pass

Approved By: Yuan Xu
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Document Number	QDI-190729-B-AP19A8K	
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UN38.3 Test Report

– AP19A8K (Nom. 40.22Wh, 11.55V) –

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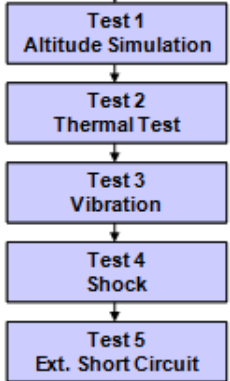
1. UN38.3 Test Condition
2. Test Result
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2019. 07. 29



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) <ul 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	<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	12.6963	166.22	12.6946	166.19	99.99	0.018	Pass	12.4989	166.19	98.46	0.000	Pass	12.4980	166.19	99.99	0.000	Pass	12.4942	166.19	99.97	0.000	Pass
2	12.6896	166.14	12.6894	166.11	100.00	0.018	Pass	12.4906	166.11	98.43	0.000	Pass	12.4910	166.11	100.00	0.000	Pass	12.4883	166.11	99.98	0.000	Pass
3	12.6971	166.04	12.6971	166.02	100.00	0.012	Pass	12.4968	166.02	98.42	0.000	Pass	12.4978	166.01	100.00	0.006	Pass	12.4920	166.01	99.95	0.000	Pass
4	12.6995	166.50	12.6991	166.48	100.00	0.012	Pass	12.4958	166.46	98.40	0.012	Pass	12.4963	166.48	100.00	0.000	Pass	12.4923	166.46	99.97	0.012	Pass

B. 25th cycle fully charged state

5	12.7462	166.26	12.7406	166.24	99.96	0.012	Pass	12.5177	166.23	98.25	0.006	Pass	12.5172	166.23	100.00	0.000	Pass	12.5137	166.23	99.97	0.000	Pass
6	12.7446	165.70	12.7377	165.67	99.95	0.018	Pass	12.5196	165.67	98.29	0.000	Pass	12.5196	165.67	100.00	0.000	Pass	12.5166	165.67	99.98	0.000	Pass
7	12.7296	166.11	12.7230	166.09	99.95	0.012	Pass	12.5069	166.09	98.30	0.000	Pass	12.5064	166.09	100.00	0.000	Pass	12.5040	166.09	99.98	0.000	Pass
8	12.7374	166.00	12.7306	165.98	99.95	0.012	Pass	12.5122	165.98	98.28	0.000	Pass	12.5114	165.98	99.99	0.000	Pass	12.5091	165.98	99.98	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	12.4942	58.51	Pass
2	12.4883	58.40	Pass
3	12.4920	58.35	Pass
4	12.4923	57.69	Pass

B. 25th cycle fully charged state

5	12.5137	58.42	Pass
6	12.5166	58.35	Pass
7	12.5040	57.34	Pass
8	12.5091	57.64	Pass

Over Charge (T7)

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

9	12.6918	24.42	Pass
10	12.6850	24.35	Pass
11	12.6948	24.21	Pass
12	12.6885	24.11	Pass

Over Charge (T7)

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

13	12.7428	23.98	Pass
14	12.7370	23.71	Pass
15	12.7426	23.77	Pass
16	12.7406	23.65	Pass

2-3. T6/T8 Test Result (P495871A1)

Cell Document Number

QDI-190718-C-P495871A1

Crush (T6)

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

11	3.8568	23.10	Pass
12	3.8542	24.18	Pass
13	3.8546	23.35	Pass
14	3.8553	23.35	Pass
15	3.8541	22.88	Pass

B. 25th cycle 50% charged state

16	3.8707	22.36	Pass
17	3.8760	22.20	Pass
18	3.8722	22.75	Pass
19	3.8733	23.19	Pass
20	3.8737	22.08	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	3.4905	77.77	Pass	31	3.4780	77.77	Pass
22	3.4832	78.16	Pass	32	3.4720	85.62	Pass
23	3.4842	79.10	Pass	33	3.4739	78.97	Pass
24	3.4793	74.98	Pass	34	3.4692	76.24	Pass
25	3.4902	75.20	Pass	35	3.4699	77.28	Pass
26	3.4910	79.03	Pass	36	3.4725	81.56	Pass
27	3.4855	81.16	Pass	37	3.4662	78.26	Pass
28	3.4841	77.59	Pass	38	3.4643	81.62	Pass
29	3.4786	76.19	Pass	39	3.4675	81.99	Pass
30	3.4890	85.02	Pass	40	3.4769	79.97	Pass

B. 25th cycle fully discharged state

3. Sample Image

