


## UN38.3 Test Summary

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Test Laboratory information	LG Chem (Nanjing) I&E Materials Co., Ltd NO.17 Hengyi Road, Nanjing Economic & Technological Development Zone, Nanjing, Jiangsu, China Telephone : +86-025-85603000-8231      E-mail : njliying@lgchem.com      Website : www.lgensol.com		
Description		List of Test Completed	
Cell/Battery Type (Physical Description)	Lithium Ion battery cell (Pouch)	Revised edition	Revision 6 Amendment 1
Test Report Number	QDI-190212-B-AP18C8K	Test 1. Altitude Simulation	Pass
Date of test report	2019.02.12	Test 2. Thermal Test	Pass
Model name	AP18C8K	Test 3. Vibration	Pass
Nominal voltage (V)	11.25	Test 4. Shock	Pass
Capacity (mAh / Wh)	4343 / 48.85	Test 5. External Short Circuit	Pass
Weight (g)	212.79	Test 6. Crush	Pass
Dimensions (mm)	248.00 X 84.40 X 5.50	Test 7. Overcharge	Pass
Reference to assembled battery testing requirements	Not applicable	Test 8. Forced Discharge	Pass

Approved By: Ying Li  
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Document Number	QDI-190212-B-AP18C8K	
Prepared	qianjunli	钱俊丽
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# UN38.3 Test Report

- AP18C8K(11.25V, 4343mAh / 48.85Wh) -

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2. Test Result
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2019. 02. 12

# 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℃	<ul style="list-style-type: none"> <li>- After OCV (%) ≥ 90%</li> <li>- No leakage, no venting, no disassembly, no rupture, no fire</li> <li>- Mass loss limit (leakage)                             <ol style="list-style-type: none"> <li>1) If M&lt;1g, less than 0.5%,</li> <li>2) If 1g≤M≤75g, less than 0.2%,</li> <li>3) If M&gt;75g, less than 0.1%)</li> </ol> </li> </ul>	<p>T1~T5 : Sequence Tests</p> <pre> graph TD     T1[Test 1 Altitude Simulation] --&gt; T2[Test 2 Thermal Test]     T2 --&gt; T3[Test 3 Vibration]     T3 --&gt; T4[Test 4 Shock]     T4 --&gt; 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℃	<ul style="list-style-type: none"> <li>- No disassembly, no rupture, no fire within 6 hours after the test</li> <li>- Max. Temp ≤ 170℃</li> </ul>	
Test 6. Impact	Φ=15.8±0.1mm bar, 9.1±0.1kg mass, 61±2.5cm height	<ul style="list-style-type: none"> <li>- No disassembly, no fire within 6 hours after the test</li> <li>- Max. Temp ≤ 170℃</li> </ul>	for cylindrical cells (dia ≥ 18mm)
Test 6. Crush	Crushing rate :1.5cm/s, until 13kN±0.78kN or 100mV drop or 50% deformation		for cylindrical cells (dia < 18mm) 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"> <li>- No disassembly, no fire within 7 days after the test</li> </ul>	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"> <li>- No disassembly, no fire within 7 days after the test</li> </ul>	Resistance of Electric Loader $Rt = \frac{12V + Vc}{Max\ discharge\ current}$ - Rc-Rw

# 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	12.9247	212.68	12.9177	212.67	99.95	0.005	Pass	12.6442	212.65	97.88	0.009	Pass	12.6409	212.65	99.97	0.000	Pass	12.6357	212.65	99.96	0.000	Pass
2	12.9281	212.65	12.9210	212.64	99.95	0.005	Pass	12.6489	212.62	97.89	0.009	Pass	12.6452	212.62	99.97	0.000	Pass	12.6402	212.62	99.96	0.000	Pass
3	12.9278	212.69	12.9208	212.68	99.95	0.005	Pass	12.6477	212.66	97.89	0.009	Pass	12.6441	212.66	99.97	0.000	Pass	12.6391	212.66	99.96	0.000	Pass
4	12.8632	212.77	12.8568	212.76	99.95	0.005	Pass	12.6069	212.74	98.06	0.009	Pass	12.6031	212.73	99.97	0.005	Pass	12.5982	212.75	99.96	0.000	Pass

B. 25th cycle fully charged state

5	12.9325	212.75	12.9253	212.75	99.94	0.000	Pass	12.6590	212.74	97.94	0.005	Pass	12.6554	212.72	99.97	0.009	Pass	12.6504	212.73	99.96	0.000	Pass
6	12.9300	212.40	12.9228	212.40	99.94	0.000	Pass	12.6557	212.40	97.93	0.000	Pass	12.6520	212.38	99.97	0.009	Pass	12.6464	212.38	99.96	0.000	Pass
7	12.9311	212.79	12.9239	212.78	99.94	0.005	Pass	12.6567	212.76	97.93	0.009	Pass	12.6532	212.77	99.97	0.000	Pass	12.6479	212.77	99.96	0.000	Pass
8	12.9299	212.71	12.9230	212.69	99.95	0.009	Pass	12.6556	212.68	97.93	0.005	Pass	12.6524	212.69	99.97	0.000	Pass	12.6467	212.69	99.95	0.000	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	12.6357	58.04	Pass
2	12.6402	57.21	Pass
3	12.6391	57.15	Pass
4	12.5982	55.94	Pass

B. 25th cycle fully charged state

5	12.6504	57.95	Pass
6	12.6464	57.11	Pass
7	12.6479	56.55	Pass
8	12.6467	56.58	Pass

Over Charge (T7)			
NO.	Initial OCV(V)	Max. Temp (℃)	Result

A. 1st cycle fully charged state

9	12.9295	26.23	Pass
10	12.9301	26.63	Pass
11	12.9304	26.03	Pass
12	12.9276	25.76	Pass

Over Charge (T7)			
NO.	Initial OCV(V)	Max. Temp (℃)	Result

B. 25th cycle fully charged state

13	12.9336	26.03	Pass
14	12.9341	25.32	Pass
15	12.9370	25.69	Pass
16	12.9366	25.02	Pass

# 2-3. T6/T8 Test Result (P498170A1)

Cell Document Number	QDI-190211-C-P498170A1
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Crush (T6)			
NO.	Initial OCV(V)	Max. Temp (°C)	Result

A. 1st cycle 50% charged state

C-1	3.7904	18.58	Pass
C-2	3.7905	19.26	Pass
C-3	3.7906	19.47	Pass
C-4	3.7906	18.94	Pass
C-5	3.7905	19.24	Pass

B. 25st cycle 50% charged state

C-6	3.7935	19.05	Pass
C-7	3.7930	19.07	Pass
C-8	3.7946	19.05	Pass
C-9	3.7943	19.06	Pass
C-10	3.7977	19.19	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	3.2191	52.54	Pass
C-7	3.2211	42.95	Pass
C-8	3.2182	52.47	Pass
C-9	3.2162	42.89	Pass
C-10	3.2171	49.39	Pass
C-11	3.2143	43.53	Pass
C-12	3.2144	54.87	Pass
C-13	3.2140	46.02	Pass
C-14	3.2168	50.04	Pass
C-15	3.2199	44.75	Pass

B. 25th cycle fully discharged state

C-16	3.2332	48.64	Pass
C-17	3.2417	41.05	Pass
C-18	3.2481	53.25	Pass
C-19	3.2146	41.77	Pass
C-20	3.2120	51.01	Pass
C-21	3.2394	45.32	Pass
C-22	3.2645	69.26	Pass
C-23	3.2247	79.05	Pass
C-24	3.2252	75.36	Pass
C-25	3.2209	68.67	Pass

### 3. Sample Image

