



LG Chem, Ltd.
128, Yeoui-daero, Yeongdeungpo-gu,
Seoul, Korea

Certification & Evaluation Team
Tel: 82-42-870-6195, Fax: 82-42-863-0182
If any of pages is not legible or has not been received,
please notify our office for re-transmission

CERTIFICATE OF COMPLIANCE

The following product has been evaluated according to the 5th revised edition Amendment2 of the UN38.3 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 and batteries and single cell batteries.




<input type="checkbox"/> Lithium-ion cell <input checked="" type="checkbox"/> Lithium-ion battery <input type="checkbox"/> Lithium-ion single cell battery	
Model name	L15L3A03
Cell Model name	ICR18650S3
Nominal voltage	10.8 V
Electric power capacity	24 Wh
Lithium Equivalent Content	1.980 g

Conducted By: Dae Ho Nam

Manager
Certification & Evaluation
LG Chem, Ltd.
E-mail: kkammy@lgchem.com

Reviewed By: Byung Soo Kim

General Manager
Certification & Evaluation
LG Chem, Ltd.
E-mail: bskim@lgchem.com

문서번호	QAE-EF02-151223-B-L15L3A03	
Prepared	남익현	
	장승현	
Reviewed	남대호	
	박해나	
Approved	김병수	

UN38.3 Test Report

- L15L3A03 (Nom. 24.0Wh, 10.8V) -

목 차

1. UN38.3 Test Condition
2. Test Result
3. Sample Image

2015. 12. 23



* Lithium ion equivalent content = 1.877 g

1. UN38.3 Test Condition

Rev.5 / Amd.2

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"> - 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 $1g \leq M \leq 75g$, less than 0.2%, 3) If $M > 75g$, less than 0.1% 	<p>T1~T5 : Sequence Tests</p> <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℃,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 (peak acceleration : 150gn, pulse duration : 6msec) x 6 (±x, y, z), direction x 3 cycle		
Test 5. External Short Circuit	100mΩ ext. short-circuit at 55±2℃ 1hr continue after returning at 55±2℃		
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℃ 	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	12.579	165.93	12.576	165.91	99.98	0.012	Pass	12.394	165.89	98.55	0.012	Pass	12.386	165.87	99.94	0.012	Pass	12.386	165.85	100.00	0.012	Pass
2	12.548	165.21	12.548	165.20	100.00	0.006	Pass	12.371	165.18	98.59	0.012	Pass	12.365	165.18	99.95	0.000	Pass	12.359	165.17	99.95	0.006	Pass
3	12.545	165.30	12.536	165.30	99.93	0.000	Pass	12.354	165.29	98.55	0.006	Pass	12.343	165.28	99.91	0.006	Pass	12.335	165.28	99.94	0.000	Pass
4	12.557	165.34	12.552	165.34	99.96	0.000	Pass	12.369	165.32	98.54	0.012	Pass	12.358	165.31	99.91	0.006	Pass	12.346	165.29	99.90	0.012	Pass

B. 50th cycle fully charged state

5	12.552	165.22	12.551	165.22	99.99	0.000	Pass	12.367	165.20	98.53	0.012	Pass	12.356	165.20	99.91	0.000	Pass	12.354	165.20	99.98	0.000	Pass
6	12.552	165.42	12.545	165.41	99.94	0.006	Pass	12.358	165.39	98.51	0.012	Pass	12.358	165.38	100.00	0.006	Pass	12.346	165.38	99.90	0.000	Pass
7	12.560	165.44	12.560	165.43	100.00	0.006	Pass	12.379	165.42	98.56	0.006	Pass	12.377	165.41	99.98	0.006	Pass	12.368	165.40	99.93	0.006	Pass
8	12.558	165.34	12.552	165.33	99.95	0.006	Pass	12.374	165.32	98.58	0.006	Pass	12.366	165.30	99.94	0.012	Pass	12.356	165.29	99.92	0.006	Pass

2-2. T5/T7 Test Result

EXT.Short Circuit (T5)

NO.	Initial OCV(V)	Max. Temp (°C)	Result
-----	----------------	----------------	--------

A. 1st cycle fully charged state

1	12.386	54.87	Pass
2	12.359	56.19	Pass
3	12.335	56.70	Pass
4	12.346	55.16	Pass

B. 50th cycle fully charged state

5	12.354	54.76	Pass
6	12.346	56.08	Pass
7	12.368	55.36	Pass
8	12.356	56.30	Pass

Over Charge (T7)

NO.	Initial OCV(V)	Max. Temp (°C)	Result
-----	----------------	----------------	--------

A. 1st cycle fully charged state

9	12.548	25.26	Pass
10	12.545	24.03	Pass
11	12.541	24.61	Pass
12	12.549	24.23	Pass

Over Charge (T7)

NO.	Initial OCV(V)	Max. Temp (°C)	Result
-----	----------------	----------------	--------

B. 50th cycle fully charged state

13	12.523	24.09	Pass
14	12.526	24.94	Pass
15	12.522	24.07	Pass
16	12.521	24.59	Pass

2-3. T6/T8 Test Result (ICR18650S3)

Impact (T6)			
NO.	Initial OCV(V)	Max. Temp (°C)	Result

A. 1st cycle 50% charged state

C-1	3.647	17.86	Pass
C-2	3.647	18.66	Pass
C-3	3.647	19.22	Pass
C-4	3.647	19.82	Pass
C-5	3.647	19.49	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	3.435	95.86	Pass
C-7	3.435	91.43	Pass
C-8	3.436	104.99	Pass
C-9	3.436	98.50	Pass
C-10	3.436	93.10	Pass
C-11	3.437	99.91	Pass
C-12	3.437	97.06	Pass
C-13	3.435	97.02	Pass
C-14	3.436	103.25	Pass
C-15	3.435	99.42	Pass

B. 50th cycle fully discharged state

C-16	3.435	94.44	Pass
C-17	3.436	93.95	Pass
C-18	3.436	98.90	Pass
C-19	3.435	102.69	Pass
C-20	3.436	95.74	Pass
C-21	3.436	95.66	Pass
C-22	3.436	93.42	Pass
C-23	3.437	98.34	Pass
C-24	3.437	96.99	Pass
C-25	3.436	100.33	Pass

3. Sample Image

