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CERTIFICATE OF COMPLIANCE

The following product has been evaluated according to the 5th revised edition Amendment2 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 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	L15L6A01
Cell Model name	ICR18650S3, INR18650S3
Nominal voltage	10.8 V
Electric power capacity	48 Wh
Lithium equivalent content	1.23g

Conducted By: Min Je Woo

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문서번호	QDI-160531-B-L15L6A01	
Prepared	남익현	
Reviewed	우민제	
Approved	남대호	

UN38.3 Test Report

- L15L6A01 (Nom.48Wh, 10.8V) -

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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	12.580	308.40	12.562	308.38	99.86	0.006	Pass	12.426	308.38	98.92	0.000	Pass	12.422	308.37	99.97	0.003	Pass	12.416	308.36	99.95	0.003	Pass
2	12.544	308.15	12.520	308.14	99.81	0.003	Pass	12.386	308.13	98.93	0.003	Pass	12.376	308.11	99.92	0.006	Pass	12.371	308.10	99.96	0.003	Pass
3	12.540	308.37	12.524	308.36	99.87	0.003	Pass	12.393	308.36	98.95	0.000	Pass	12.382	308.35	99.91	0.003	Pass	12.378	308.34	99.97	0.003	Pass
4	12.542	308.30	12.526	308.30	99.87	0.000	Pass	12.400	308.28	98.99	0.006	Pass	12.388	308.28	99.90	0.000	Pass	12.375	308.27	99.90	0.003	Pass

B. 50th cycle fully charged state

5	12.561	307.92	12.546	307.90	99.88	0.006	Pass	12.419	307.90	98.99	0.000	Pass	12.415	307.89	99.97	0.003	Pass	12.409	307.87	99.95	0.006	Pass
6	12.563	308.55	12.541	308.53	99.82	0.006	Pass	12.405	308.53	98.92	0.000	Pass	12.392	308.52	99.90	0.003	Pass	12.388	308.52	99.97	0.000	Pass
7	12.568	308.02	12.551	308.01	99.86	0.003	Pass	12.414	308.01	98.91	0.000	Pass	12.403	308.00	99.91	0.003	Pass	12.396	307.98	99.94	0.006	Pass
8	12.569	307.92	12.555	307.92	99.89	0.000	Pass	12.417	307.91	98.90	0.003	Pass	12.407	307.90	99.92	0.003	Pass	12.398	307.88	99.93	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	12.416	55.04	Pass
2	12.371	55.21	Pass
3	12.378	54.63	Pass
4	12.375	56.29	Pass

B. 50th cycle fully charged state

5	12.409	56.00	Pass
6	12.388	55.10	Pass
7	12.396	55.19	Pass
8	12.398	55.72	Pass

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

A. 1st cycle fully charged state

9	12.541	24.79	Pass
10	12.547	24.69	Pass
11	12.546	23.57	Pass
12	12.541	23.78	Pass

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

B. 50th cycle fully charged state

13	12.523	23.73	Pass
14	12.525	23.97	Pass
15	12.520	24.13	Pass
16	12.527	23.76	Pass

2-3. T6/T8 Test Result (ICR18650S3, INR18650S3)

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

