



LG Chem, Ltd.

128, Yeoui-daero, Yeongdeungpo-gu,
Seoul, Korea

Certification & Evaluation Team
Tel: 82-42-870-6195, Fax: 82-42-863-0182
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CERTIFICATE OF COMPLIANCE

The following product has been evaluated according to the 5th revised edition Amendment 2 of the UN Manual of Tests and Criteria.

We, LG Chem. Ltd hereby certify that this cell meets the requirements of the regulation for transportation of lithium-ion cells and batteries.



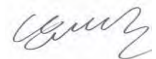
<input checked="" type="checkbox"/> Lithium-ion cell <input type="checkbox"/> Lithium-ion battery <input type="checkbox"/> Lithium-ion single cell battery	
Model name	ICP456674L1
Capacity	Min. 3390mAh
Nominal voltage	3.87 V
Type of Cell	Polymer

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	QDI-160113-C-ICP456674L1	
Prepared	남익현	
Reviewed	우민제	
Approved	남대호	

UN38.3 Test Report

- ICP456674L1 (Min. 3390mAh) -

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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≤M≤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 1g) 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	4.366	49.849	4.365	49.848	99.98	0.002	Pass	4.315	49.844	98.85	0.008	Pass	4.313	49.841	99.95	0.006	Pass	4.313	49.841	100.00	0.000	Pass
2	4.364	49.242	4.364	49.241	100.00	0.002	Pass	4.310	49.240	98.76	0.002	Pass	4.308	49.235	99.95	0.010	Pass	4.307	49.234	99.98	0.002	Pass
3	4.366	49.280	4.365	49.280	99.98	0.000	Pass	4.310	49.278	98.74	0.004	Pass	4.308	49.276	99.95	0.004	Pass	4.307	49.275	99.98	0.002	Pass
4	4.367	49.719	4.365	49.718	99.95	0.002	Pass	4.307	49.717	98.67	0.002	Pass	4.306	49.712	99.98	0.010	Pass	4.305	49.712	99.98	0.000	Pass
5	4.369	49.370	4.369	49.369	100.00	0.002	Pass	4.310	49.365	98.65	0.008	Pass	4.309	49.361	99.98	0.008	Pass	4.308	49.360	99.98	0.002	Pass
6	4.365	49.454	4.365	49.453	100.00	0.002	Pass	4.310	49.448	98.74	0.010	Pass	4.310	49.444	100.00	0.008	Pass	4.309	49.443	99.98	0.002	Pass
7	4.362	49.840	4.362	49.840	100.00	0.000	Pass	4.309	49.836	98.78	0.008	Pass	4.307	49.834	99.95	0.004	Pass	4.307	49.834	100.00	0.000	Pass
8	4.363	49.594	4.363	49.594	100.00	0.000	Pass	4.308	49.593	98.74	0.002	Pass	4.308	49.588	100.00	0.010	Pass	4.308	49.588	100.00	0.000	Pass
9	4.366	49.119	4.365	49.119	99.98	0.000	Pass	4.311	49.114	98.76	0.010	Pass	4.311	49.110	100.00	0.008	Pass	4.310	49.109	99.98	0.002	Pass
10	4.366	49.266	4.365	49.265	99.98	0.002	Pass	4.311	49.262	98.76	0.006	Pass	4.310	49.257	99.98	0.010	Pass	4.310	49.256	100.00	0.002	Pass

2-2. T5/T6/T8 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	4.313	91.37	Pass
2	4.307	83.70	Pass
3	4.307	80.43	Pass
4	4.305	82.18	Pass
5	4.308	82.86	Pass
6	4.309	77.34	Pass
7	4.307	81.74	Pass
8	4.308	76.70	Pass
9	4.310	85.61	Pass
10	4.310	86.55	Pass

Crush (T6)

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

11	3.886	22.69	Pass
12	3.886	22.50	Pass
13	3.882	22.41	Pass
14	3.883	22.52	Pass
15	3.886	22.57	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

16	2.796	41.47	Pass
17	2.802	43.23	Pass
18	2.787	42.39	Pass
19	2.809	41.50	Pass
20	2.787	41.47	Pass
21	2.791	42.04	Pass
22	2.814	41.87	Pass
23	2.791	43.46	Pass
24	2.789	42.13	Pass
25	2.816	42.79	Pass

B. 50th cycle fully discharged state

26	2.888	42.25	Pass
27	2.879	41.22	Pass
28	2.897	41.76	Pass
29	2.878	43.72	Pass
30	2.885	44.15	Pass
31	2.904	42.17	Pass
32	2.863	41.07	Pass
33	2.837	43.59	Pass
34	2.919	40.95	Pass
35	2.828	43.90	Pass

3. Sample Image

