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## CERTIFICATE OF COMPLIANCE

The following product has been evaluated according to the 5<sup>th</sup> 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.


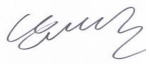
<input type="checkbox"/> Lithium-ion cell <input checked="" type="checkbox"/> Lithium-ion battery <input type="checkbox"/> Lithium-ion single cell battery	
Model name	<b>L16L4PB2</b>
Cell Model name	<b>ICP485490L1</b>
Nominal voltage	<b>15.2 V</b>
Electric power capacity	<b>55 Wh</b>
Lithium equivalent content	<b>1.085 g</b>

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# UN38.3 Test Report

## - L16L4PB2 (Nom.55Wh, 15.2V) -

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2016. 09. 29

# 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"> <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 <math>M &lt; 1g</math>, less than 0.5%,</li> <li>2) If <math>1g \leq M \leq 75g</math>, less than 0.2%,</li> <li>3) If <math>M &gt; 75g</math>, 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 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"> <li>- No disassembly, no fire within 6 hours after the test</li> <li>- Max. Temp ≤ 170℃</li> </ul>	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"> <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 1/Ω = (max. discharge current) / (12 + Initial OCV)

## 2. General Information

### 1. Standard charge / discharge Condition

	Mode	Condition	End Condition
Charge	CC / CV	Current = 3630 mA Voltage = 17.4 V	Current = 181 mA
Discharge	CC	Current = 726 mA	Voltage = 12.8 V

### 2. Cycle Condition

	Mode	Condition	End Condition
Charge	CC / CV	Current = 3630 mA Voltage = 17.4 V	Current = 181 mA
Discharge	CC	Current = 726 mA	Voltage = 12.8 V

### 3. Test Condition

	Mode	Condition
Test 7. Overcharge	CC / CV	Max. Charge Current = 3630 mA CC/CV 2Imax (7.26A) 22V cut-off 24Hr
Test 8. Forced Discharge	CC	Max. Discharge Current = 3630 mA Duration Time = 60 min

# 3-1. 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	17.383	246.53	17.351	246.52	99.82	0.004	Pass	17.178	246.51	99.00	0.004	Pass	16.981	246.49	98.85	0.008	Pass	16.689	246.48	98.28	0.004	Pass
2	17.359	247.07	17.333	247.07	99.85	0.000	Pass	17.159	247.06	99.00	0.004	Pass	16.961	247.06	98.85	0.000	Pass	16.663	247.04	98.24	0.008	Pass
3	17.347	247.18	17.322	247.17	99.86	0.004	Pass	17.161	247.15	99.07	0.008	Pass	16.962	247.15	98.84	0.000	Pass	16.671	247.14	98.28	0.004	Pass
4	17.355	246.20	17.331	246.20	99.86	0.000	Pass	17.158	246.18	99.00	0.008	Pass	16.961	246.18	98.85	0.000	Pass	16.671	246.16	98.29	0.008	Pass

## B. 50th cycle fully charged state

5	17.367	246.97	17.345	246.96	99.87	0.004	Pass	17.186	246.96	99.08	0.000	Pass	16.991	246.95	98.87	0.004	Pass	16.687	246.93	98.21	0.008	Pass
6	17.365	246.36	17.342	246.34	99.87	0.008	Pass	17.173	246.34	99.03	0.000	Pass	16.977	246.32	98.86	0.008	Pass	16.683	246.30	98.27	0.008	Pass
7	17.351	246.61	17.333	246.61	99.90	0.000	Pass	17.169	246.60	99.05	0.004	Pass	16.965	246.59	98.81	0.004	Pass	16.675	246.57	98.29	0.008	Pass
8	17.366	246.20	17.347	246.19	99.89	0.004	Pass	17.188	246.19	99.08	0.000	Pass	16.991	246.17	98.85	0.008	Pass	16.701	246.16	98.29	0.004	Pass

# 3-2. T5/T7 Test Result

EXT.Short Circuit (T5)			
NO.	Initial OCV(V)	Max. Temp (°C)	Result

## A. 1st cycle fully charged state

1	16.689	55.38	Pass
2	16.663	53.50	Pass
3	16.671	55.41	Pass
4	16.671	53.94	Pass

## B. 50th cycle fully charged state

5	16.687	54.69	Pass
6	16.683	53.58	Pass
7	16.675	53.77	Pass
8	16.701	54.92	Pass

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

## A. 1st cycle fully charged state

9	17.340	24.87	Pass
10	17.349	25.61	Pass
11	17.342	25.97	Pass
12	17.347	24.40	Pass

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

## B. 50th cycle fully charged state

13	17.321	25.66	Pass
14	17.328	26.26	Pass
15	17.325	24.94	Pass
16	17.323	25.12	Pass

# 3-3. T6/T8 Test Result (ICP485490L1)

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

**A. 1st cycle 50% charged state**

C-1	3.815	22.53	Pass
C-2	3.824	22.91	Pass
C-3	3.816	23.40	Pass
C-4	3.824	22.60	Pass
C-5	3.819	23.26	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	3.058	42.98	Pass
C-7	3.059	44.21	Pass
C-8	3.068	44.11	Pass
C-9	3.064	42.84	Pass
C-10	3.059	42.70	Pass
C-11	3.063	43.76	Pass
C-12	3.059	41.95	Pass
C-13	3.058	42.39	Pass
C-14	3.065	41.24	Pass
C-15	3.059	41.52	Pass

**B. 50th cycle fully discharged state**

C-16	3.115	43.74	Pass
C-17	3.085	42.28	Pass
C-18	3.107	43.46	Pass
C-19	3.108	43.91	Pass
C-20	3.101	44.62	Pass
C-21	3.116	43.07	Pass
C-22	3.060	43.87	Pass
C-23	3.114	44.10	Pass
C-24	3.061	44.44	Pass
C-25	3.066	43.71	Pass

# 4. Sample Image

