



CONFIDENTIAL

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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>L17L6P71</b>
Cell Model name	<b>ICP583864L1</b>
Nominal voltage	<b>11.40 V</b>
Electric power capacity	<b>48 Wh</b>

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# UN38.3 Test Report

## - L17L6P71 (Nom.48Wh, 11.40V) -

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2017. 06. 27



# 1. UN38.3 Test Condition

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>	T1~T5 : Sequence Tests <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℃	<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 (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 = 4080 mA Voltage = 13.05 V	Current = 204 mA
Discharge	CC	Current = 816 mA	Voltage = 9.0 V

### 2. Cycle Condition

	Mode	Condition	End Condition
Charge	CC / CV	Current = 4080 mA Voltage = 13.05 V	Current = 204 mA
Discharge	CC	Current = 816 mA	Voltage = 9.0 V

### 3. Test Condition

	Mode	Condition
Test 7. Overcharge	CC / CV	Max. Charge Current = 4488 mA CC/CV 2Imax (8976mA) 22 V cut-off 24Hr
Test 8. Forced Discharge	CC	Max. Discharge Current = 3060 mA Duration Time = 40 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	13.033	228.25	13.019	228.25	99.89	0.000	Pass	12.804	228.24	98.35	0.004	Pass	12.795	228.22	99.93	0.009	Pass	12.783	228.21	99.91	0.004	Pass
2	13.029	228.14	13.014	228.13	99.88	0.004	Pass	12.798	228.10	98.34	0.013	Pass	12.789	228.09	99.93	0.004	Pass	12.769	228.07	99.84	0.009	Pass
3	13.026	228.03	13.012	228.01	99.89	0.009	Pass	12.795	227.99	98.33	0.009	Pass	12.783	227.98	99.91	0.004	Pass	12.766	227.98	99.87	0.000	Pass
4	13.031	228.19	13.019	228.18	99.91	0.004	Pass	12.799	228.16	98.31	0.009	Pass	12.786	228.15	99.90	0.004	Pass	12.768	228.12	99.86	0.013	Pass

## B. 50th cycle fully charged state

5	13.021	228.16	13.009	228.15	99.91	0.004	Pass	12.813	228.15	98.49	0.000	Pass	12.805	228.14	99.94	0.004	Pass	12.796	228.13	99.93	0.004	Pass
6	13.028	227.99	13.011	227.97	99.87	0.009	Pass	12.805	227.96	98.42	0.004	Pass	12.797	227.94	99.94	0.009	Pass	12.789	227.94	99.94	0.000	Pass
7	13.031	228.18	13.019	228.17	99.91	0.004	Pass	12.809	228.17	98.39	0.000	Pass	12.800	228.16	99.93	0.004	Pass	12.793	228.15	99.95	0.004	Pass
8	13.030	228.01	13.017	228.00	99.90	0.004	Pass	12.810	227.99	98.41	0.004	Pass	12.802	227.98	99.94	0.004	Pass	12.796	227.96	99.95	0.009	Pass

# 3-2. T5/T7 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	12.783	55.49	Pass
2	12.769	55.66	Pass
3	12.766	55.32	Pass
4	12.768	55.56	Pass

### B. 50th cycle fully charged state

5	12.796	55.86	Pass
6	12.789	56.19	Pass
7	12.793	55.49	Pass
8	12.796	55.37	Pass

## Over Charge (T7)

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

9	12.993	24.89	Pass
10	12.996	25.76	Pass
11	12.999	25.35	Pass
12	13.003	24.76	Pass

## Over Charge (T7)

NO.	Initial OCV(V)	Max. Temp (°C)	Result
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### B. 50th cycle fully charged state

13	13.005	25.23	Pass
14	12.998	25.61	Pass
15	13.001	24.86	Pass
16	12.997	25.36	Pass

# 3-3. T6/T8 Test Result (ICP583864L1)

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

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

C-1	3.814	22.56	Pass
C-2	3.804	23.15	Pass
C-3	3.814	22.98	Pass
C-4	3.814	24.12	Pass
C-5	3.809	23.44	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	3.320	45.13	Pass
C-7	3.318	46.54	Pass
C-8	3.318	27.00	Pass
C-9	3.310	44.22	Pass
C-10	3.311	47.69	Pass
C-11	3.289	46.43	Pass
C-12	3.286	48.14	Pass
C-13	3.292	31.07	Pass
C-14	3.284	44.67	Pass
C-15	3.281	46.62	Pass

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

C-16	3.566	48.70	Pass
C-17	3.563	55.33	Pass
C-18	3.510	57.67	Pass
C-19	3.568	54.25	Pass
C-20	3.555	58.19	Pass
C-21	3.512	57.17	Pass
C-22	3.549	57.81	Pass
C-23	3.511	50.06	Pass
C-24	3.514	53.55	Pass
C-25	3.556	49.70	Pass

