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CERTIFICATE OF COMPLIANCE

The following product has been evaluated according to the 6th revised edition 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, 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	L17L3P61
Cell Model name	P4043B0A1
Nominal voltage	11.58 V
Electric power capacity	36 Wh

Reviewed By: MinJe Woo

Approved By: DaeHo Nam



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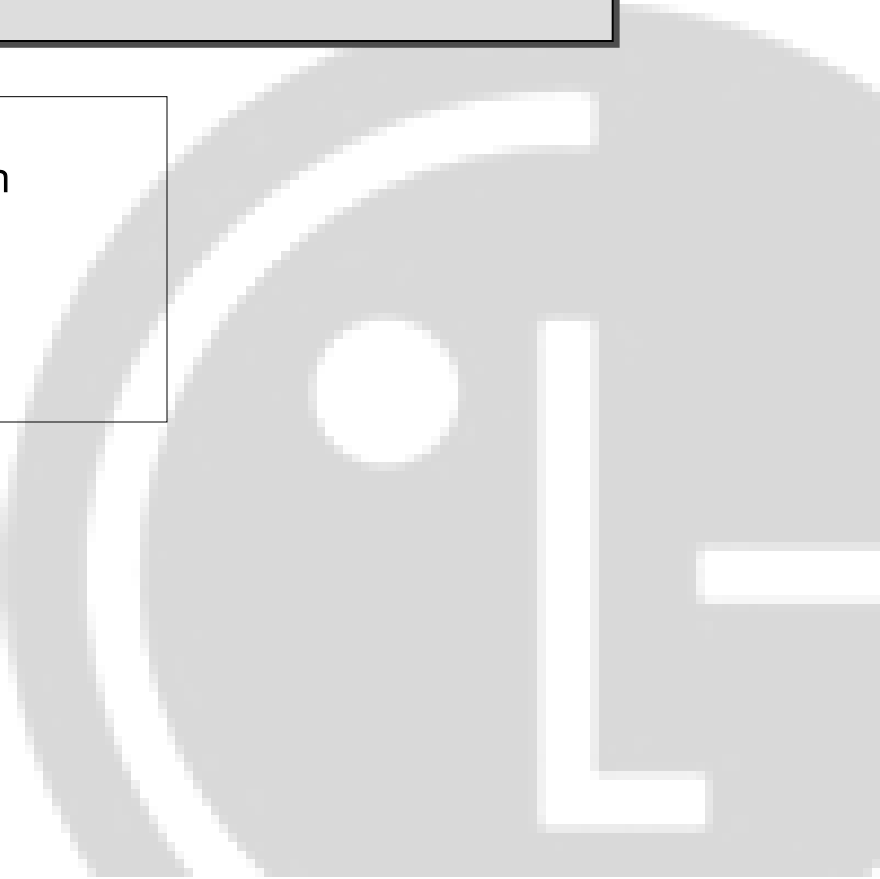
UN38.3 Test Report

- L17L3P61 (Nom.36Wh, 11.58V) -

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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℃		T1~T5 : Sequence Tests <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	<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% 	
Test 4. Shock	Half sine shock 1) Peak acceleration - For cells & single cell batteries : 150gn - For batteries (whichever is smaller) : 150gn or $\sqrt{\frac{100850}{\text{Mass}(kg)}} \text{ gn}$ 2) Pulse duration : 6msec 3) 6 direction (±x, y, z) x 3 cycle		
Test 5. External Short Circuit	1) Samples to be heated to 57±4℃ in chamber (Measured on external case) 2) Less than 0.1Ω, ext. short-circuit at 57±4℃ 3) 1hr continue after returning to 57±4℃	<ul style="list-style-type: none"> - No disassembly, no rupture, no fire within 6 hours after the test - Max. Temp ≤ 170℃ 	
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. General Information

1. Standard charge / discharge Condition

	Mode	Condition	End Condition
Charge	CC / CV	Current = 2149 mA Voltage = 13.20 V	Current = 154 mA
Discharge	CC	Current = 614 mA	Voltage = 9.0 V

2. Cycle Condition

	Mode	Condition	End Condition
Charge	CC / CV	Current = 2149 mA Voltage = 13.20 V	Current = 154 mA
Discharge	CC	Current = 614 mA	Voltage = 9.0 V

3. Test Condition

	Mode	Condition
Test 7. Overcharge	CC / CV	Max. Charge Current = 4052 mA CC/CV 2Imax (8104mA) 22V cut-off 24Hr
Test 8. Forced Discharge	CC	Max. Discharge Current = 3070.0 mA Duration Time = 60.0 min

3-1. T1-T4 Test Result

Before			Altitude (T1)					Thermal (T2)					Vibration (T3)					Shock (T4)				
Pack 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	13.171	152.10	13.163	152.09	99.94	0.007	Pass	12.923	152.08	98.18	0.007	Pass	12.913	152.07	99.92	0.007	Pass	12.905	152.06	99.94	0.007	Pass
2	13.172	152.05	13.168	152.04	99.97	0.007	Pass	12.967	152.03	98.47	0.007	Pass	12.959	152.02	99.94	0.007	Pass	12.947	152.01	99.91	0.007	Pass
3	13.174	152.04	13.168	152.04	99.95	0.000	Pass	12.951	152.03	98.35	0.007	Pass	12.939	152.02	99.91	0.007	Pass	12.931	152.02	99.94	0.000	Pass
4	13.189	152.06	13.180	152.06	99.93	0.000	Pass	12.983	152.06	98.51	0.000	Pass	12.978	152.05	99.96	0.007	Pass	12.969	152.03	99.93	0.013	Pass

B. 50th cycle fully charged state

5	13.174	152.05	13.169	152.05	99.96	0.000	Pass	12.979	152.04	98.56	0.007	Pass	12.968	152.03	99.92	0.007	Pass	12.959	152.01	99.93	0.013	Pass
6	13.174	152.10	13.164	152.10	99.92	0.000	Pass	12.965	152.08	98.49	0.013	Pass	12.956	152.07	99.93	0.007	Pass	12.948	152.05	99.94	0.013	Pass
7	13.173	152.08	13.169	152.07	99.97	0.007	Pass	12.956	152.06	98.38	0.007	Pass	12.945	152.05	99.92	0.007	Pass	12.934	152.04	99.92	0.007	Pass
8	13.179	152.05	13.172	152.04	99.95	0.007	Pass	12.946	152.04	98.28	0.000	Pass	12.939	152.03	99.95	0.007	Pass	12.933	152.02	99.95	0.007	Pass

3-2. T5/T7 Test Result

EXT.Short Circuit (T5)

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

1	12.905	56.94	Pass
2	12.947	56.67	Pass
3	12.931	56.56	Pass
4	12.969	57.60	Pass

B. 50th cycle fully charged state

5	12.959	56.65	Pass
6	12.948	56.43	Pass
7	12.934	57.54	Pass
8	12.933	57.64	Pass

Over Charge (T7)

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

9	13.145	24.36	Pass
10	13.141	24.21	Pass
11	13.141	24.76	Pass
12	13.143	25.01	Pass

Over Charge (T7)

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

13	13.124	24.57	Pass
14	13.122	24.78	Pass
15	13.127	25.06	Pass
16	13.121	25.40	Pass

3-3. T6/T8 Test Result (P4043B0A1)

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

A. 1st cycle 50% charged state

C-1	3.862	22.51	Pass
C-2	3.862	22.38	Pass
C-3	3.862	22.68	Pass
C-4	3.863	22.67	Pass
C-5	3.861	22.44	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	3.256	52.88	Pass
C-7	3.266	48.14	Pass
C-8	3.263	51.26	Pass
C-9	3.265	49.82	Pass
C-10	3.269	48.16	Pass
C-11	3.262	45.59	Pass
C-12	3.258	47.68	Pass
C-13	3.266	48.33	Pass
C-14	3.261	48.44	Pass
C-15	3.262	48.23	Pass

B. 50th cycle fully discharged state

C-16	3.263	41.60	Pass
C-17	3.261	42.02	Pass
C-18	3.264	42.49	Pass
C-19	3.268	41.59	Pass
C-20	3.267	40.32	Pass
C-21	3.269	40.19	Pass
C-22	3.267	41.92	Pass
C-23	3.269	41.30	Pass
C-24	3.267	40.31	Pass
C-25	3.262	41.53	Pass

