UN38.3 Test Summary

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 battery meets the requirements of the regulation for transportation of lithium-ion cells, batteries and single cell batteries.

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Description		List of Test Completed	
Test Report Number	QDI-161122-B-L16L2PB3	Test 1. Altitude Simulation	Pass
Date of test report	2016.11.22	Test 2. Thermal Test	Pass
Model name	L16L2PB3	Test 3. Vibration	Pass
Type	Pouch	Test 4. Shock	Pass
Nominal voltage	7.6 V	Test 5. External Short Circuit	Pass
Capacity	35.0 Wh	Test 6. Impact or Crush	Pass
Weight	150.0 g	Test 7. Overcharge	Pass
Dimensions	201.00mm X 57.00mm X 6.60mm	Test 8. Forced Discharge	Pass

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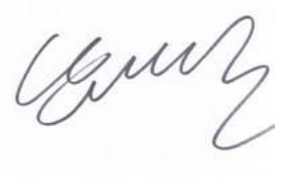

Document Number	QDI-161122-B-L16L2PB3	
Prepared	MyeongHoon Choi	
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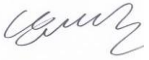
Approved	DaeHo Nam	

UN38.3 Test Report
- L16L2PB3 (Nom.35Wh, 7.6V)-

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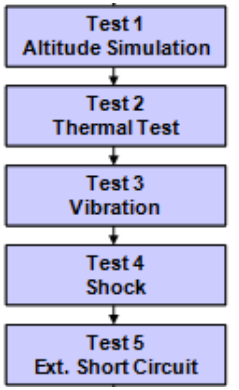
2016. 11. 22

LG Chem

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℃	- After OCV (%) ≥ 90% - No leakage, no venting, no disassembly, no rupture, no fire - Mass loss limit (leakage) 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%	T1~T5 : Sequence Tests 
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℃	- 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	- 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)	- 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	- 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 = 4480 mA Voltage = 8.7 V	Current = 225 mA
Discharge	CC	Current = 896 mA	Voltage = 6.0 V

2. Cycle Condition

	Mode	Condition	End Condition
Charge	CC / CV	Current = 4480 mA Voltage = 8.7 V	Current = 225 mA
Discharge	CC	Current = 896 mA	Voltage = 6.0 V

3. Test Condition

	Mode	Condition
Test 7. Overcharge	CC / CV	Max. Charge Current = 4500 mA CC/CV 2Imax (9000mA) 17.4 V cut-off 24Hr
Test 8. Forced Discharge	CC	Max. Discharge Current = 9000 mA Duration Time = 30 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	8.679	150.24	8.676	150.24	99.97	0.000	**Pass**	8.583	150.23	98.93	0.007	**Pass**	8.581	150.22	99.98	0.007	**Pass**	8.577	150.22	99.95	0.000	**Pass**
2	8.680	150.22	8.673	150.22	99.92	0.000	**Pass**	8.584	150.21	98.97	0.007	**Pass**	8.581	150.21	99.97	0.000	**Pass**	8.574	150.20	99.92	0.007	**Pass**
3	8.672	150.49	8.665	150.49	99.92	0.000	**Pass**	8.578	150.48	99.00	0.007	**Pass**	8.575	150.47	99.97	0.007	**Pass**	8.571	150.47	99.95	0.000	**Pass**
4	8.679	150.73	8.671	150.72	99.91	0.007	**Pass**	8.575	150.71	98.89	0.007	**Pass**	8.574	150.70	99.99	0.007	**Pass**	8.568	150.70	99.93	0.000	**Pass**
B. 50th cycle fully charged state																						
5	8.672	150.00	8.669	149.99	99.97	0.007	**Pass**	8.577	149.98	98.94	0.007	**Pass**	8.571	149.98	99.93	0.000	**Pass**	8.568	149.97	99.96	0.007	**Pass**
6	8.685	150.68	8.677	150.68	99.91	0.000	**Pass**	8.583	150.67	98.92	0.007	**Pass**	8.578	150.66	99.94	0.007	**Pass**	8.573	150.66	99.94	0.000	**Pass**
7	8.685	150.53	8.678	150.52	99.92	0.007	**Pass**	8.588	150.51	98.96	0.007	**Pass**	8.587	150.50	99.99	0.007	**Pass**	8.578	150.50	99.90	0.000	**Pass**
8	8.689	150.60	8.687	150.60	99.98	0.000	**Pass**	8.592	150.59	98.91	0.007	**Pass**	8.589	150.58	99.97	0.007	**Pass**	8.587	150.58	99.98	0.000	**Pass**

3-2. T5/T7 Test Result

EXT.Short Circuit (T5)			
NO.	Initial OCV(V)	Max. Temp (℃)	Result
A. 1st cycle fully charged state			
1	8.577	54.80	Pass
2	8.574	54.83	Pass
3	8.571	55.25	Pass
4	8.568	55.73	Pass
B. 50th cycle fully charged state			
5	8.568	55.65	Pass
6	8.573	54.78	Pass
7	8.578	55.62	Pass
8	8.587	55.88	Pass

Over Charge (T7)			
NO.	Initial OCV(V)	Max. Temp (℃)	Result
A. 1st cycle fully charged state			
9	8.640	24.68	Pass
10	8.642	25.06	Pass
11	8.646	24.94	Pass
12	8.647	23.60	Pass

Over Charge (T7)			
NO.	Initial OCV(V)	Max. Temp (℃)	Result
B. 50th cycle fully charged state			
13	8.623	23.57	Pass
14	8.620	23.71	Pass
15	8.624	24.30	Pass
16	8.629	23.96	Pass

3-3. T6/T8 Test Result (ICP595490A1)

Crush (T6)

NO.	Initial OCV(V)	Max. Temp (℃)	Result
A. 1st cycle 50% charged state			
C-1	3.822	20.45	**Pass**
C-2	3.823	20.52	**Pass**
C-3	3.823	21.43	**Pass**
C-4	3.824	20.80	**Pass**
C-5	3.824	22.09	**Pass**

Forced Discharge (T8)

NO.	Initial OCV(V)	Max. Temp (℃)	Result	NO.	Initial OCV(V)	Max. Temp (℃)	Result
A. 1st cycle fully discharged state				**B. 50th cycle fully discharged state**			
C-6	3.221	103.92	**Pass**	**C-16**	3.314	85.24	**Pass**
C-7	3.218	116.05	**Pass**	**C-17**	3.309	98.81	**Pass**
C-8	3.230	105.14	**Pass**	**C-18**	3.320	106.37	**Pass**
C-9	3.219	98.71	**Pass**	**C-19**	3.331	103.76	**Pass**
C-10	3.231	113.00	**Pass**	**C-20**	3.316	73.64	**Pass**
C-11	3.221	94.48	**Pass**	**C-21**	3.318	105.77	**Pass**
C-12	3.212	103.91	**Pass**	**C-22**	3.312	103.81	**Pass**
C-13	3.208	105.73	**Pass**	**C-23**	3.313	87.25	**Pass**
C-14	3.248	97.84	**Pass**	**C-24**	3.316	89.89	**Pass**
C-15	3.256	99.20	**Pass**	**C-25**	3.313	94.44	**Pass**

4. Sample Image