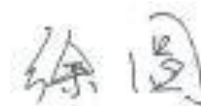


# UN38.3 Test Summary

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.

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	LG Chem (Nanjing) I&E Materials Co., Ltd NO.17 Hengyi Road, Nanjing Economic & Technological Development Zone, Nanjing, Jiangsu, China Telephone : +86-025-85603000-8288      E-mail : xuyuannj@lgchem.com      Website : <a href="http://www.lgchem.com">www.lgchem.com</a>		
Description		List of Test Completed	
Test Report Number	QDI-181113-B-L18L4P71, ASM P/N SB10K97642	Test 1. Altitude Simulation	Pass
Date of test report	2018.11.13	Test 2. Thermal Test	Pass
Model name	L18L4P71, ASM P/N SB10K97642	Test 3. Vibration	Pass
Type	Pouch	Test 4. Shock	Pass
Nominal voltage	15.40 V	Test 5. External Short Circuit	Pass
Capacity	51.00Wh	Test 6. Impact or Crush	Pass
Weight	206.94g	Test 7. Overcharge	Pass
Dimensions	248.30mmX99.15mmX5.25mm	Test 8. Forced Discharge	Pass

Approved By: Yuan Xu  
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 Cyl NPI&CE lab part DQA Team  
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Document Number	QDI-181113-B-L18L4P71, ASM P/N SB10K97642	
Prepared	qianjunli	钱俊丽
Approved	Xuyuan	徐园

# UN38.3 Test Report

## - L18L4P71, ASM P/N SB10K97642 (Nom. 51.00Wh, 15.40V) -

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2018. 11. 13

# 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] --&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 1gn) app. 50Hz (until 8gn) 200Hz (maintaining 8gn), 1.6mm total excursion	- 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%	
Test 4. Shock	Half sine shock 1) Peak acceleration - For cells & single cell batteries : 150gn - For batteries (whichever is smaller) : 150gn or $\sqrt{\frac{100850}{Mass(kg)}} gn$ 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℃	- 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)

# 2-1. T1-T4 Test Result

Before			Altitude (T1)					Thermal (T2)					Vibration (T3)					Shock (T4)				
NO.	OCV	Mass	OCV	Mass	After OCV(%)	Mass Loss(%)	Result	OCV	Mass	After OCV(%)	Mass Loss(%)	Result	OCV	Mass	After OCV(%)	Mass Loss(%)	Result	OCV	Mass	After OCV(%)	Mass Loss(%)	Result

## A. 1st cycle fully charged state

1	16.8496	206.44	16.8443	206.42	99.97	0.010	Pass	16.5846	206.40	98.46	0.010	Pass	16.5786	206.40	99.96	0.000	Pass	16.5758	206.41	99.98	0.000	Pass
2	16.8601	206.54	16.8534	206.52	99.96	0.010	Pass	16.5897	206.51	98.44	0.005	Pass	16.5823	206.52	99.96	0.000	Pass	16.5803	206.51	99.99	0.005	Pass
3	16.8458	206.88	16.8396	206.86	99.96	0.010	Pass	16.5769	206.84	98.44	0.010	Pass	16.5692	206.83	99.95	0.005	Pass	16.5679	206.84	99.99	0.000	Pass
4	16.8420	206.88	16.8370	206.86	99.97	0.010	Pass	16.5767	206.85	98.45	0.005	Pass	16.5697	206.85	99.96	0.000	Pass	16.5683	206.85	99.99	0.000	Pass

## B. 50th cycle fully charged state

5	17.0218	206.27	17.0167	206.24	99.97	0.015	Pass	16.7291	206.25	98.31	0.000	Pass	16.7215	206.23	99.95	0.010	Pass	16.7196	206.24	99.99	0.000	Pass
6	17.0076	206.94	17.0019	206.93	99.97	0.005	Pass	16.7159	206.92	98.32	0.005	Pass	16.7072	206.91	99.95	0.005	Pass	16.7058	206.92	99.99	0.000	Pass
7	17.0210	206.68	17.0157	206.65	99.97	0.015	Pass	16.7248	206.65	98.29	0.000	Pass	16.7169	206.65	99.95	0.000	Pass	16.7159	206.65	99.99	0.000	Pass
8	17.0074	206.82	17.0017	206.79	99.97	0.015	Pass	16.7149	206.80	98.31	0.000	Pass	16.7075	206.79	99.96	0.005	Pass	16.7072	206.79	100.00	0.000	Pass

# 2-2. 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	16.5758	58.46	Pass
2	16.5803	58.41	Pass
3	16.5679	57.99	Pass
4	16.5683	57.53	Pass

### B. 50th cycle fully charged state

5	16.7196	58.45	Pass
6	16.7058	58.44	Pass
7	16.7159	58.01	Pass
8	16.7072	57.68	Pass

## Overcharge (T7)

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

9	17.2841	23.81	Pass
10	17.2804	23.61	Pass
11	16.8559	23.51	Pass
12	16.8509	23.35	Pass

### B. 50th cycle fully charged state

13	17.0159	23.41	Pass
14	17.0049	23.11	Pass
15	17.0159	23.17	Pass
16	17.0084	22.90	Pass

# 2-3. T6/T8 Test Result (P4341B0A1)

Cell Document Number	QDI-181102-C-P4341B0A1
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Crush (T6)			
NO.	Initial OCV(V)	Max. Temp (°C)	Result

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

C-1	3.8440	21.32	Pass
C-2	3.8446	22.71	Pass
C-3	3.8445	23.77	Pass
C-4	3.8452	22.66	Pass
C-5	3.8442	22.62	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      B. 50th cycle fully discharged state**

C-6	3.4352	88.82	Pass	C-16	3.6140	92.00	Pass
C-7	3.4376	81.28	Pass	C-17	3.6126	69.46	Pass
C-8	3.4340	79.12	Pass	C-18	3.6184	89.50	Pass
C-9	3.4353	77.48	Pass	C-19	3.6167	80.62	Pass
C-10	3.4362	93.31	Pass	C-20	3.6175	82.24	Pass
C-11	3.4396	77.86	Pass	C-21	3.6168	81.03	Pass
C-12	3.4393	79.30	Pass	C-22	3.6146	92.75	Pass
C-13	3.4380	91.72	Pass	C-23	3.6183	81.21	Pass
C-14	3.4358	72.61	Pass	C-24	3.6148	79.02	Pass
C-15	3.4362	66.15	Pass	C-25	3.6101	77.85	Pass

# 3. Sample Image

