문서번호	QAE-EF02-151224-B-L15L3A02	
Prepared	남익현	
	장승현	
Reviewed	남대호	
	박해나	
Approved	김병수	

SolutionPartner

UN38.3 Test Report
- L15L3A02 (Nom. 24.0Wh, 10.8V)-

목 차

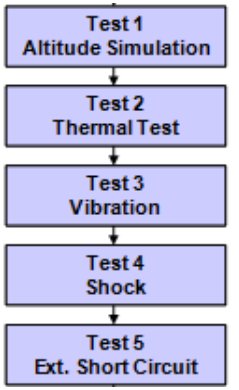
2015. 12. 24

LG Chem

* Lithium ion equivalent content = 1.877 g

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)

2-1. 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	12.554	163.00	12.552	162.990	99.98	0.006	Pass	12.372	162.98	98.57	0.006	Pass	12.368	162.97	99.97	0.006	Pass	12.362	162.96	99.95	0.006	Pass
2	12.558	163.28	12.547	163.280	99.91	0.000	Pass	12.362	163.26	98.53	0.012	Pass	12.354	163.26	99.94	0.000	Pass	12.348	163.25	99.95	0.006	Pass
3	12.554	163.10	12.542	163.100	99.90	0.000	Pass	12.359	163.09	98.54	0.006	Pass	12.359	163.08	100.00	0.006	Pass	12.347	163.07	99.90	0.006	Pass
4	12.557	163.08	12.545	163.070	99.90	0.006	Pass	12.359	163.06	98.52	0.006	Pass	12.347	163.06	99.90	0.000	Pass	12.338	163.06	99.93	0.000	Pass
B. 50th cycle fully charged state																						
5	12.551	163.64	12.540	163.63	99.91	0.006	Pass	12.356	163.63	98.53	0.000	Pass	12.356	163.63	100.00	0.000	Pass	12.355	163.63	99.99	0.000	Pass
6	12.557	163.43	12.557	163.42	100.00	0.006	Pass	12.379	163.41	98.58	0.006	Pass	12.374	163.41	99.96	0.000	Pass	12.362	163.40	99.90	0.006	Pass
7	12.558	163.70	12.548	163.70	99.92	0.000	Pass	12.369	163.69	98.57	0.006	Pass	12.362	163.69	99.94	0.000	Pass	12.355	163.67	99.94	0.012	Pass
8	12.557	163.85	12.552	163.85	99.96	0.000	Pass	12.374	163.83	98.58	0.012	Pass	12.370	163.83	99.97	0.000	Pass	12.367	163.82	99.98	0.006	Pass

2-2. T5/T7 Test Result

EXT.Short Circuit (T5)			
NO.	Initial OCV(V)	Max. Temp (℃)	Result
A. 1st cycle fully charged state			
1	12.362	56.70	Pass
2	12.348	56.72	Pass
3	12.347	55.83	Pass
4	12.338	56.04	Pass
B. 50th cycle fully charged state			
5	12.355	55.96	Pass
6	12.362	56.07	Pass
7	12.355	56.97	Pass
8	12.367	56.46	Pass

Over Charge (T7)			
NO.	Initial OCV(V)	Max. Temp (℃)	Result
A. 1st cycle fully charged state			
9	12.542	24.82	Pass
10	12.541	25.77	Pass
11	12.540	24.74	Pass
12	12.541	24.36	Pass

Over Charge (T7)			
NO.	Initial OCV(V)	Max. Temp (℃)	Result
B. 50th cycle fully charged state			
13	12.527	25.29	Pass
14	12.520	25.50	Pass
15	12.520	25.86	Pass
16	12.528	25.27	Pass

2-3. T6/T8 Test Result (ICR18650S3)

Impact (T6)

A. 1st cycle 50% charged state

NO.	Initial OCV(V)	Max. Temp (℃)	Result
C-1	3.647	17.86	Pass
C-2	3.647	18.66	Pass
C-3	3.647	19.22	Pass
C-4	3.647	19.82	Pass
C-5	3.647	19.49	Pass

Forced Discharge (T8)

A. 1st cycle fully discharged state

NO.	Initial OCV(V)	Max. Temp (℃)	Result
C-6	3.435	95.86	Pass
C-7	3.435	91.43	Pass
C-8	3.436	104.99	Pass
C-9	3.436	98.50	Pass
C-10	3.436	93.10	Pass
C-11	3.437	99.91	Pass
C-12	3.437	97.06	Pass
C-13	3.435	97.02	Pass
C-14	3.436	103.25	Pass
C-15	3.435	99.42	Pass

B. 50th cycle fully discharged state

NO.	Initial OCV(V)	Max. Temp (℃)	Result
C-16	3.435	94.44	Pass
C-17	3.436	93.95	Pass
C-18	3.436	98.90	Pass
C-19	3.435	102.69	Pass
C-20	3.436	95.74	Pass
C-21	3.436	95.66	Pass
C-22	3.436	93.42	Pass
C-23	3.437	98.34	Pass
C-24	3.437	96.99	Pass
C-25	3.436	100.33	Pass

3. Sample Image