UN38.3 Test Summary

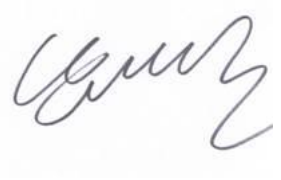
The following product has been evaluated according to the 6th revised edition of the UN Manual of Tests and Criteria.
We, LG Chem, ltd., hereby certify that this battery meets the requirements of the regulation for transportation of lithium-ion cells, batteries and single cell batteries.

Manufacture's contact information	LG Chem, ltd. 128 Yeoui-Daero, Yeongdeungpo-gu, SEOUL, 150-721, REPUBLIC OF KOREA Telephone : +86-10-7742-5427 E-mail : kkammy@lgchem.com Website : www.lgchem.com
Test Laboratory information	LG Chem, ltd. / RESEARCH PARK 188 Munjiro, Yuseong-gu, Daejeon, 305-738, REPUBLIC OF KOREA Telephone : +82-10-3099-3724 E-mail : juhongpark@lgchem.com Website : www.lgchem.com
	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 : www.lgchem.com

Description		List of Test Completed	
Test Report Number	QDI-170911-B-L17L3PE0	Test 1. Altitude Simulation	Pass
Date of test report	2017.09.11	Test 2. Thermal Test	Pass
Model name	L17L3PE0	Test 3. Vibration	Pass
Type	Pouch	Test 4. Shock	Pass
Nominal voltage	11.4 V	Test 5. External Short Circuit	Pass
Capacity	51.5 Wh	Test 6. Impact or Crush	Pass
Weight	239.0 g	Test 7. Overcharge	Pass
Dimensions	284.00mm X 74.50mm X 7.00mm	Test 8. Forced Discharge	Pass

Reviewed By: Joohong Park
IT & New Application Part Leader
Global Standard Certification Team
LG Chem, Ltd.
E-mail: juhongpark@lgchem.com

Approved By: DaeHo Nam
Team Leader
Global Standard Certification Team
LG Chem, Ltd.
E-mail: kkammy@lgchem.com



Document Number	QDI-170911-B-L17L3PE0	
Prepared	MyeongHoon Choi	
Reviewed	MinJe Woo	
Approved	DaeHo Nam	

UN38.3 Test Report
- L17L3PE0 (Nom.51.5Wh, 11.4V)-

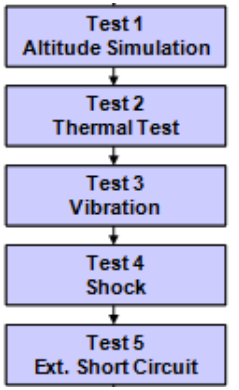
Index

2017. 09. 11

LG Chem

1. UN38.3 Test Condition

Rev.6

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 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. General Information

1. Standard charge / discharge Condition

	Mode	Condition	End Condition
Charge	CC / CV	Current = 4390 mA Voltage = 13.05 V	Current = 225 mA
Discharge	CC	Current = 900 mA	Voltage = 9.6 V

2. Cycle Condition

	Mode	Condition	End Condition
Charge	CC / CV	Current = 4390 mA Voltage = 13.05 V	Current = 225 mA
Discharge	CC	Current = 900 mA	Voltage = 9.6 V

3. Test Condition

	Mode	Condition
Test 7. Overcharge	CC / CV	Max. Charge Current = 5700 mA CC/CV 2Imax (11400mA) 22 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)				
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	13.027	239.13	13.016	239.12	99.92	0.004	**Pass**	12.811	239.11	98.43	0.004	**Pass**	12.806	239.10	99.96	0.004	**Pass**	12.805	239.10	99.99	0.000	**Pass**
2	13.048	239.12	13.045	239.11	99.98	0.004	**Pass**	12.844	239.10	98.46	0.004	**Pass**	12.837	239.09	99.95	0.004	**Pass**	12.836	239.07	99.99	0.008	**Pass**
3	13.043	239.12	13.042	239.11	99.99	0.004	**Pass**	12.837	239.10	98.43	0.004	**Pass**	12.828	239.08	99.93	0.008	**Pass**	12.825	239.06	99.98	0.008	**Pass**
4	13.013	239.11	13.011	239.10	99.98	0.004	**Pass**	12.809	239.09	98.45	0.004	**Pass**	12.805	239.08	99.97	0.004	**Pass**	12.801	239.07	99.97	0.004	**Pass**
B. 50th cycle fully charged state																						
5	13.054	238.97	13.045	238.97	99.93	0.000	**Pass**	12.842	238.96	98.44	0.004	**Pass**	12.839	238.95	99.98	0.004	**Pass**	12.829	238.95	99.92	0.000	**Pass**
6	13.029	238.92	13.019	238.92	99.92	0.000	**Pass**	12.817	238.91	98.45	0.004	**Pass**	12.811	238.91	99.95	0.000	**Pass**	12.809	238.90	99.98	0.004	**Pass**
7	13.027	238.90	13.025	238.88	99.98	0.008	**Pass**	12.823	238.87	98.45	0.004	**Pass**	12.814	238.87	99.93	0.000	**Pass**	12.806	238.86	99.94	0.004	**Pass**
8	13.031	238.87	13.026	238.87	99.96	0.000	**Pass**	12.822	238.86	98.43	0.004	**Pass**	12.818	238.85	99.97	0.004	**Pass**	12.808	238.85	99.92	0.000	**Pass**

3-2. T5/T7 Test Result

EXT.Short Circuit (T5)

Pack NO.	Initial OCV(V)	Max. Temp (℃)	Result
A. 1st cycle fully charged state			
1	12.805	56.32	Pass
2	12.836	55.09	Pass
3	12.825	55.57	Pass
4	12.801	55.32	Pass
B. 50th cycle fully charged state			
5	12.829	56.29	Pass
6	12.809	54.74	Pass
7	12.806	55.45	Pass
8	12.808	56.27	Pass

Over Charge (T7)

Pack NO.	Initial OCV(V)	Max. Temp (℃)	Result
A. 1st cycle fully charged state			
9	13.047	24.13	Pass
10	13.043	24.88	Pass
11	13.047	25.00	Pass
12	13.035	24.07	Pass

Over Charge (T7)

Pack NO.	Initial OCV(V)	Max. Temp (℃)	Result
B. 50th cycle fully charged state			
13	13.027	24.01	Pass
14	13.029	24.66	Pass
15	13.029	24.89	Pass
16	13.028	24.35	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