CONFIDENTIAL

LG Chem, Ltd.
NO.17, Hengyi Road , Nanjing Economical & Technological Development Zone, Nanjing, China
DQA Team
Tel: 025-8560-3000 , Fax: 025-8328-9793
If any of pages is not legible or has not been received, please notify our office for re-transmission

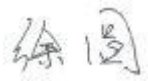
CERTIFICATE OF COMPLIANCE

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.

☐ Lithium-ion cell ☑ Lithium-ion battery ☐ Lithium-ion single cell battery	
Model name	**L18L3PG2**
Cell Model name	**ICP478873L1**
Nominal voltage	**11.58V**
Electric power capacity	**57.00Wh**

Approved By: Xuyuan



Assistant Manager
DQA Team
LG Chem, Ltd.
E-mail: Xuyuan@lgchem.com

Document Number	QDI-180917-B-L18L3PG2	
Prepared	qianjunli	
Approved	Xuyuan	

CONFIDENTIAL

UN38.3 Test Report
- L18L3PG2 (Nom. 57.00Wh, 11.58V) -

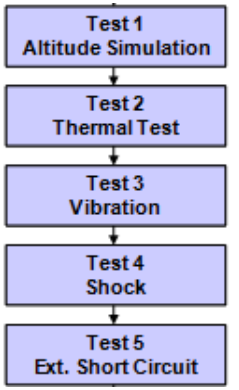
Index

1. UN38.3 Test Condition
2. Test Result
3. Sample Image

2018. 09. 17

LG Chem

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℃	- 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)

2-1. 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	12.4364	235.97	12.4343	235.94	99.98	0.013	**Pass**	12.3459	235.90	99.29	0.017	**Pass**	12.3442	235.92	99.99	0.000	**Pass**	12.3431	235.91	99.99	0.004	**Pass**
2	12.4585	235.71	12.4558	235.67	99.98	0.017	**Pass**	12.3667	235.64	99.28	0.013	**Pass**	12.3654	235.65	99.99	0.000	**Pass**	12.3644	235.64	99.99	0.004	**Pass**
3	12.4640	235.98	12.4615	235.93	99.98	0.021	**Pass**	12.3718	235.90	99.28	0.013	**Pass**	12.3707	235.91	99.99	0.000	**Pass**	12.3695	235.91	99.99	0.000	**Pass**
4	12.4642	235.71	12.4616	235.66	99.98	0.021	**Pass**	12.3728	235.64	99.29	0.008	**Pass**	12.3716	235.64	99.99	0.000	**Pass**	12.3704	235.65	99.99	0.000	**Pass**
B. 50th cycle fully charged state																						
5	12.4898	235.36	12.4873	235.32	99.98	0.017	**Pass**	12.3942	235.29	99.25	0.013	**Pass**	12.3931	235.30	99.99	0.000	**Pass**	12.3920	235.30	99.99	0.000	**Pass**
6	12.3008	235.81	12.3029	235.77	100.00	0.017	**Pass**	12.1728	235.74	98.94	0.013	**Pass**	12.1716	235.75	99.99	0.000	**Pass**	12.1678	235.75	99.97	0.000	**Pass**
7	12.2958	235.66	12.2974	235.63	100.00	0.013	**Pass**	12.1728	235.60	98.99	0.013	**Pass**	12.1658	235.61	99.94	0.000	**Pass**	12.1620	235.61	99.97	0.000	**Pass**
8	12.4728	235.80	12.4708	235.76	99.98	0.017	**Pass**	12.3776	235.73	99.25	0.013	**Pass**	12.3769	235.73	99.99	0.000	**Pass**	12.3752	235.73	99.99	0.000	**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	12.3431	58.30	**Pass**
2	12.3644	57.53	**Pass**
3	12.3695	57.71	**Pass**
4	12.3704	56.66	**Pass**
B. 50th cycle fully charged state			
5	12.3920	58.28	**Pass**
6	12.1678	57.74	**Pass**
7	12.1620	56.86	**Pass**
8	12.3752	56.51	**Pass**

Overcharge (T7)			
NO.	Initial OCV(V)	Max. Temp (℃)	Result
A. 1st cycle fully charged state			
9	12.4708	24.32	**Pass**
10	12.2265	24.01	**Pass**
11	12.2287	24.01	**Pass**
12	12.4469	23.75	**Pass**
B. 50th cycle fully charged state			
13	12.3029	23.71	**Pass**
14	12.4743	23.51	**Pass**
15	12.4798	23.57	**Pass**
16	12.4805	23.41	**Pass**

2-3. T6/T8 Test Result (ICP478873L1)

Crush (T6)

A. 1st cycle 50% charged state

NO.	Initial OCV(V)	Max. Temp (℃)	Result
C-1	3.864	22.06	Pass
C-2	3.861	22.98	Pass
C-3	3.860	22.79	Pass
C-4	3.864	22.06	Pass
C-5	3.863	22.34	Pass

Forced Discharge (T8)

A. 1st cycle fully discharged state / B. 50th cycle fully discharged state

NO.	Initial OCV(V)	Max. Temp (℃)	Result	NO.	Initial OCV(V)	Max. Temp (℃)	Result
C-6	3.017	41.15	Pass	C-16	3.080	41.19	Pass
C-7	3.027	42.45	Pass	C-17	3.077	40.98	Pass
C-8	3.045	44.61	Pass	C-18	3.057	44.85	Pass
C-9	3.050	44.41	Pass	C-19	3.062	43.64	Pass
C-10	3.013	43.02	Pass	C-20	3.100	44.92	Pass
C-11	3.025	41.41	Pass	C-21	3.099	44.23	Pass
C-12	3.023	43.56	Pass	C-22	3.068	40.18	Pass
C-13	3.018	43.82	Pass	C-23	3.097	40.41	Pass
C-14	3.010	40.69	Pass	C-24	3.081	44.53	Pass
C-15	3.035	43.95	Pass	C-25	3.067	40.82	Pass

3. Sample Image