

UN38.3 Test Summary


The following product has been evaluated according to the 5th revised edition Amendment 1 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.


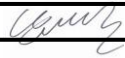

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Description		List of Test Completed	
Test Report Number	QAE-EF02-140102-PKL13L4P61	Test 1. Altitude Simulation	Pass
Date of test report	2014.01.02	Test 2. Thermal Test	Pass
Model name	L13L4P61	Test 3. Vibration	Pass
Type	Pouch	Test 4. Shock	Pass
Nominal voltage	7.4 V	Test 5. External Short Circuit	Pass
Capacity	44.4 Wh	Test 6. Impact or Crush	Pass
Weight	240.0 g	Test 7. Overcharge	Pass
Dimensions	218.00mm X 88.70mm X 7.10mm	Test 8. Forced Discharge	Pass

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UN Test Report

- L13L4P61(44.4 Wh, 7.4V) -

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2014. 01. 02

1. UN Transportation Regulation Test

Rev.5 / Amd.1

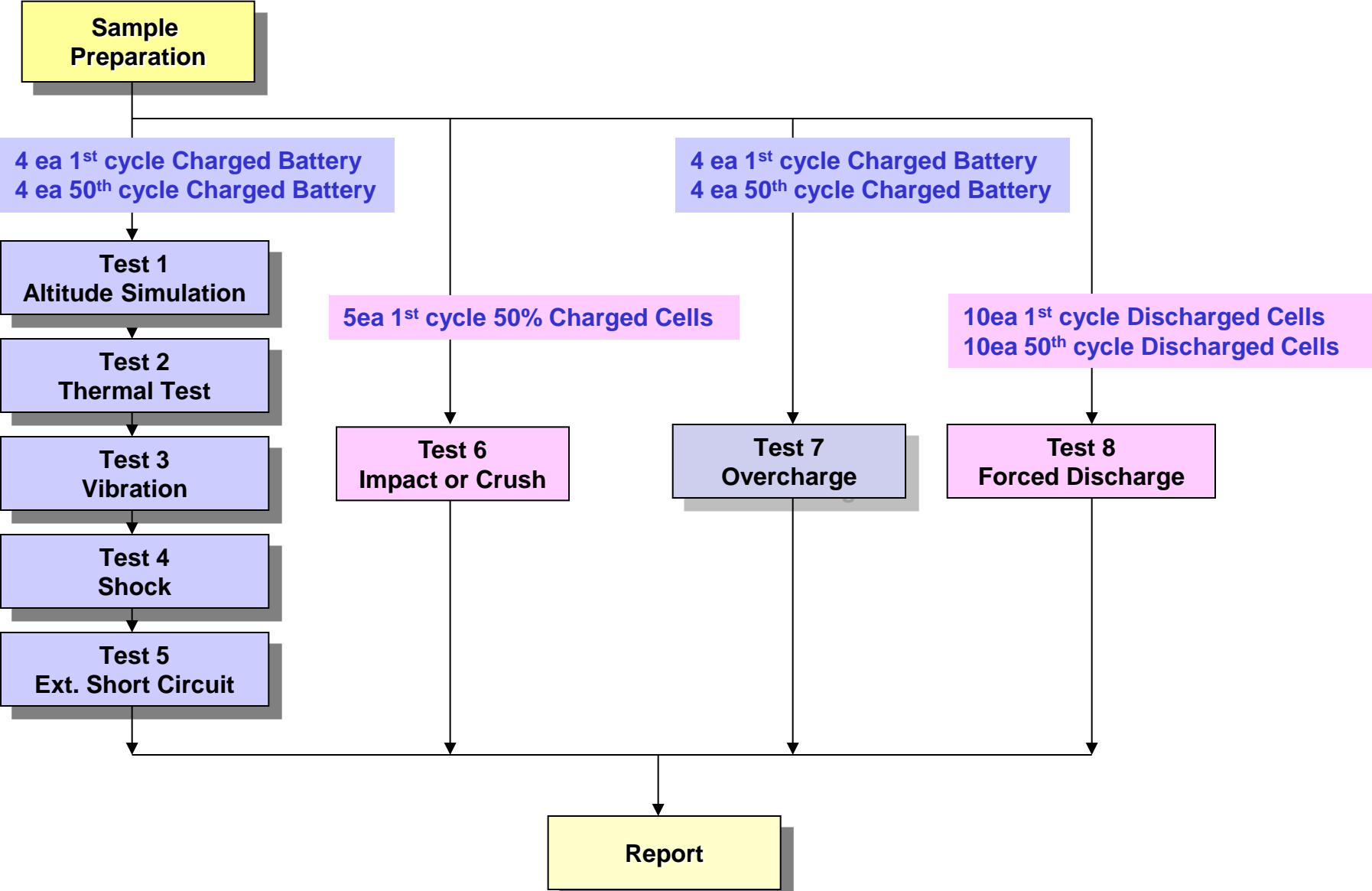
Test	Condition	Requirements
Test 1. Altitude Simulation	Storing at (low pressure)11.6kPa for 6hr at 20+/-5℃	<ul style="list-style-type: none"> - Measuring mass before/ after each test 1) $M < 1g$, less than 0.5% 2) $1g \leq M \leq 75g$, less than 0.2% 3) $M > 75g$, less than 0.1% - Measuring voltage before/after each test (more than 90%) - No leakage, no venting, no disassembly, no rupture, no fire - No disassembly, no rupture, no fire (after 6 hours) - Temp. monitoring (max. 170℃) - No disassembly, no rupture, no fire (after 6 hours) - Temp. monitoring (max. 170℃) - No disassembly, no fire (after 7 days) - Appearance picture before/ after test - No disassembly, no fire (after 7 days) - Temp. monitoring (max. 170℃)
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℃	
Test 6. Impact for cylindrical cells (> 20mm diameter)	Φ=15.8mm bar, 9.1kg mass, 61±2.5cm height	
Test 6. Crush for cylindrical cells (≤ 20mm diameter) for prismatic, pouch, coin/button cells	Crushing rate :1.5cm/s, until 13kN±0.78kN or 100mV drop or 50% deformation	
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 V (min.) = 22V. 2.If charge voltage > 18V, V (min.) = 1.2 x (max. charge voltage)	
Test 8. Forced Discharge	Discharge at max. discharge current (with 12V DC power supply), Duration time = rated capacity/initial test current	

* Tests through T1-T5 shall be conducted in sequence with the same battery.

* We declare that the above-mentioned test is the result of being checked according to UN Test

(Manual of Test and Criteria ST/SG/AC.10/11/Rev.5/Amd.1)

2. Test Procedure



3-1. T1-T4 Test Result

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

A. 1st cycle fully state

Charge	1	8.342	240.466	8.329	240.460	99.84	0.002	Pass	8.250	240.437	99.05	0.010	Pass	8.236	240.426	99.83	0.005	Pass	8.220	240.414	99.81	0.005	Pass
	2	8.346	240.855	8.334	240.846	99.86	0.004	Pass	8.252	240.829	99.01	0.007	Pass	8.237	240.826	99.82	0.001	Pass	8.228	240.817	99.90	0.004	Pass
	3	8.348	240.208	8.339	240.190	99.90	0.007	Pass	8.262	240.170	99.08	0.008	Pass	8.247	240.147	99.81	0.010	Pass	8.230	240.136	99.80	0.005	Pass
	4	8.349	240.682	8.335	240.659	99.83	0.010	Pass	8.257	240.637	99.07	0.009	Pass	8.247	240.630	99.88	0.003	Pass	8.231	240.626	99.80	0.002	Pass
	Ave.	8.346	240.553	8.334	240.539	99.86	0.006	-	8.255	240.518	99.05	0.009	-	8.242	240.507	99.83	0.005	-	8.227	240.498	99.83	0.004	-

B. 50th cycle fully state

Charge	5	8.340	240.016	8.324	240.001	99.81	0.006	Pass	8.244	239.987	99.04	0.006	Pass	8.229	239.981	99.82	0.003	Pass	8.216	239.962	99.84	0.008	Pass
	6	8.349	240.157	8.333	240.156	99.81	0.000	Pass	8.250	240.135	99.00	0.009	Pass	8.235	240.121	99.82	0.006	Pass	8.224	240.108	99.86	0.005	Pass
	7	8.336	240.788	8.325	240.773	99.87	0.006	Pass	8.242	240.765	99.01	0.003	Pass	8.232	240.743	99.88	0.009	Pass	8.218	240.734	99.82	0.004	Pass
	8	8.339	240.937	8.326	240.934	99.84	0.001	Pass	8.242	240.911	99.00	0.010	Pass	8.228	240.906	99.83	0.002	Pass	8.219	240.881	99.89	0.010	Pass
	Ave.	8.341	240.474	8.327	240.466	99.83	0.004	-	8.245	240.450	99.01	0.007	-	8.231	240.438	99.84	0.005	-	8.219	240.421	99.85	0.007	-

Requirement

- Measuring mass before/after each test (If $M > 75g$, less than 0.1%, $1g \leq M \leq 75$, less than 0.2%, $M < 1g$, less than 0.5%)
- Measuring voltage before/after each test (more than 90%, only charged samples)
- No leakage, no venting, no disassembly, no rupture, no fire

3-2. T5/T7 Test Result

EXT.Short Circuit (T5)

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

Charge	1	8.220	55.82	Pass
	2	8.228	55.57	Pass
	3	8.230	55.74	Pass
	4	8.231	55.97	Pass
	MAX.	8.231	55.97	-

Test Condition

- 100mΩ ext. short-circuit at 55±2°C

Over Charge (T7)

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

Charge	9	8.380	25.63	Pass
	10	8.372	25.38	Pass
	11	8.387	25.96	Pass
	12	8.345	25.50	Pass
	MAX.	8.387	25.96	-

Test Condition

- Max. Charge Current : 4200 mA
 - CC/CV 2I_{max}(8400mA) 16.8 V cut-off 24Hr

EXT.Short Circuit (T5)

	Pack NO.	Initial OCV(V)	Max. Temp (°C)	Result
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B. 50th cycle fully state

Charge	5	8.216	54.29	Pass
	6	8.224	54.30	Pass
	7	8.218	54.46	Pass
	8	8.219	54.17	Pass
	MAX.	8.224	54.46	-

Requirement

- Temperature ≤ 170 (°C)
 - No disassembly, no rupture, no fire within 6 hours after the test

Over Charge (T7)

	Pack NO.	Initial OCV(V)	Max. Temp (°C)	Result
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B. 50th cycle fully state

Charge	13	8.226	25.33	Pass
	14	8.300	25.28	Pass
	15	8.293	25.45	Pass
	16	8.334	25.24	Pass
	MAX.	8.334	25.45	-

Requirement

- No disassembly, no fire within 7 day after the test

3-3. T6 Test Result (ICP288694L1)

Crush (T6)

Pack NO.	Initial OCV(V)	Max. Temp (°C)	Result
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A. 1st cycle 50% charged state (Direction :Flat)

Flat	Pack NO.	Initial OCV(V)	Max. Temp (°C)	Result
	1	3.759	56.92	Pass
	2	3.761	56.77	Pass
	3	3.761	55.63	Pass
	4	3.761	55.51	Pass
	5	3.759	56.10	Pass
	MAX.	3.761	56.92	-

Test Condition

- Crushing rate :1.5cm/s, until 13kN±0.78kN or 100mV drop or 50% deformation

Requirement

- Temperature ≤ 170 (°C)
- No disassembly, no fire within 6 hours after the test

Forced Discharge (T8)

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

1	3.283	107.76	Pass
2	3.285	86.22	Pass
3	3.282	105.38	Pass
4	3.286	94.52	Pass
5	3.287	81.85	Pass
6	3.284	81.85	Pass
7	3.284	100.36	Pass
8	3.278	100.62	Pass
9	3.283	93.10	Pass
10	3.284	88.07	Pass
MAX.	3.287	107.76	-

B. 50th cycle fully discharged state

1	3.689	91.01	Pass
2	3.689	107.96	Pass
3	3.691	91.72	Pass
4	3.691	81.48	Pass
5	3.690	95.17	Pass
6	3.690	91.73	Pass
7	3.691	103.54	Pass
8	3.690	98.49	Pass
9	3.693	95.26	Pass
10	3.694	107.61	Pass
MAX.	3.694	107.96	-

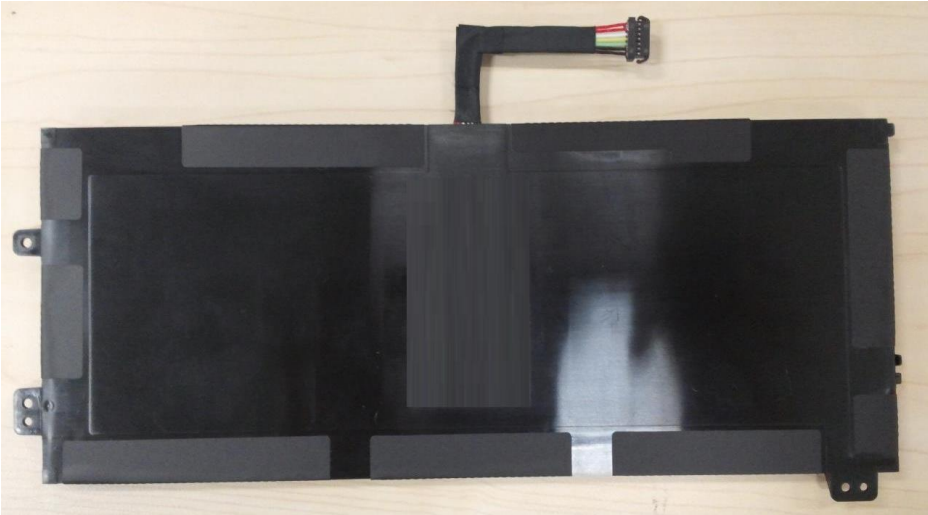
Test Condition

- Discharge at max. discharge current (with 12V DC power supply)
Duration time: rated capacity

Requirement

- No disassembly, no fire within 7 days after the test

4. Sample Image



Appendix 1. 1.2m Drop Test Report

A. Test Result

No	Name of Test Items	Standard requirement or The Clause Number of Standard	Test Result		Conclusion
1	1.2m Drop Test	* UNITED NATIONS "Recommendations on the TRANSPORT OF DANGEROUS GOODS" Model Regulations(16 th) special provisions 188	Face	The package is not cracked, the contents are not damaged and not shifted.	Passed
			Edge	The package is not cracked, the contents are not damaged and not shifted.	
			Angle	The package is not cracked, the contents are not damaged and not shifted.	
2	Gross Weight Measure	* UNITED NATIONS "Recommendations on the TRANSPORT OF DANGEROUS GOODS" Model Regulations(16 th) special provisions 188	502.5g		Passed

B. Sample Description

Dimensions	25.0 * 15.0 * 4.0	Net Weight of Batteries	481.8g	Battery Type	Rechargeable Li-Polymer Battery
Gross weight	502.5g	Battery number	2Pcs/Carton	** Description	Carton box

C. Image After Test



* Recommendations on the transport of dangerous goods as below
 Each package of cells or batteries, or the completed package must be capable of withstanding a 1.2 m drop test in any orientation without:

- 1) damage to cells or batteries contained therein
- 2) shifting of the contents so as to allow battery to battery (or cell to cell) contact
- 3) release of contents.

** Description: Description about the protection of short-circuit

Appendix 2. 1.2m Drop Test Report

A. Test Result

No	Name of Test Items	Standard requirement or The Clause Number of Standard	Test Result		Conclusion
1	1.2m Drop Test	* UNITED NATIONS "Recommendations on the TRANSPORT OF DANGEROUS GOODS" Model Regulations(16 th) special provisions 188	Face	The package is not cracked, the contents are not damaged and not shifted.	Passed
			Edge	The package is not cracked, the contents are not damaged and not shifted.	
			Angle	The package is not cracked, the contents are not damaged and not shifted.	
2	Gross Weight Measure	* UNITED NATIONS "Recommendations on the TRANSPORT OF DANGEROUS GOODS" Model Regulations(16 th) special provisions 188	6.21kg		Passed

B. Sample Description

Dimensions	39.0 * 30.0 * 20.0	Net Weight of Batteries	6.03kg	Battery Type	Rechargeable Li-Polymer Battery
Gross weight	6.21kg	Battery number	25Pcs/Carton	** Description	Carton box

C. Image After Test



* Recommendations on the transport of dangerous goods as below
 Each package of cells or batteries, or the completed package must be capable of withstanding a 1.2 m drop test in any orientation without:
 1) damage to cells or batteries contained therein
 2) shifting of the contents so as to allow battery to battery (or cell to cell) contact
 3) release of contents.

** Description: Description about the protection of short-circuit