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## CERTIFICATE OF COMPLIANCE

The following product has been evaluated according to the 5<sup>th</sup> revised edition Amendment2 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 and batteries and single cell batteries.




<input type="checkbox"/> Lithium-ion cell <input checked="" type="checkbox"/> Lithium-ion battery <input type="checkbox"/> Lithium-ion single cell battery	
Model name	<b>L14L2P22</b>
Cell Model name	<b>ICP595490A1</b>
Nominal voltage	<b>7.6 V</b>
Electric power capacity	<b>35 Wh</b>
Lithium equivalent content	<b>1.386 g</b>

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**SolutionPartner**

# UN Test Report

## - L14L2P22(Nom.35Wh, 7.6V)-

### 목 차

1. UN Transportation Regulation Test
  2. Test Procedure
  3. Test Result
  4. Sample Image
- Appendix. Drop Test Report

2014. 12. 04



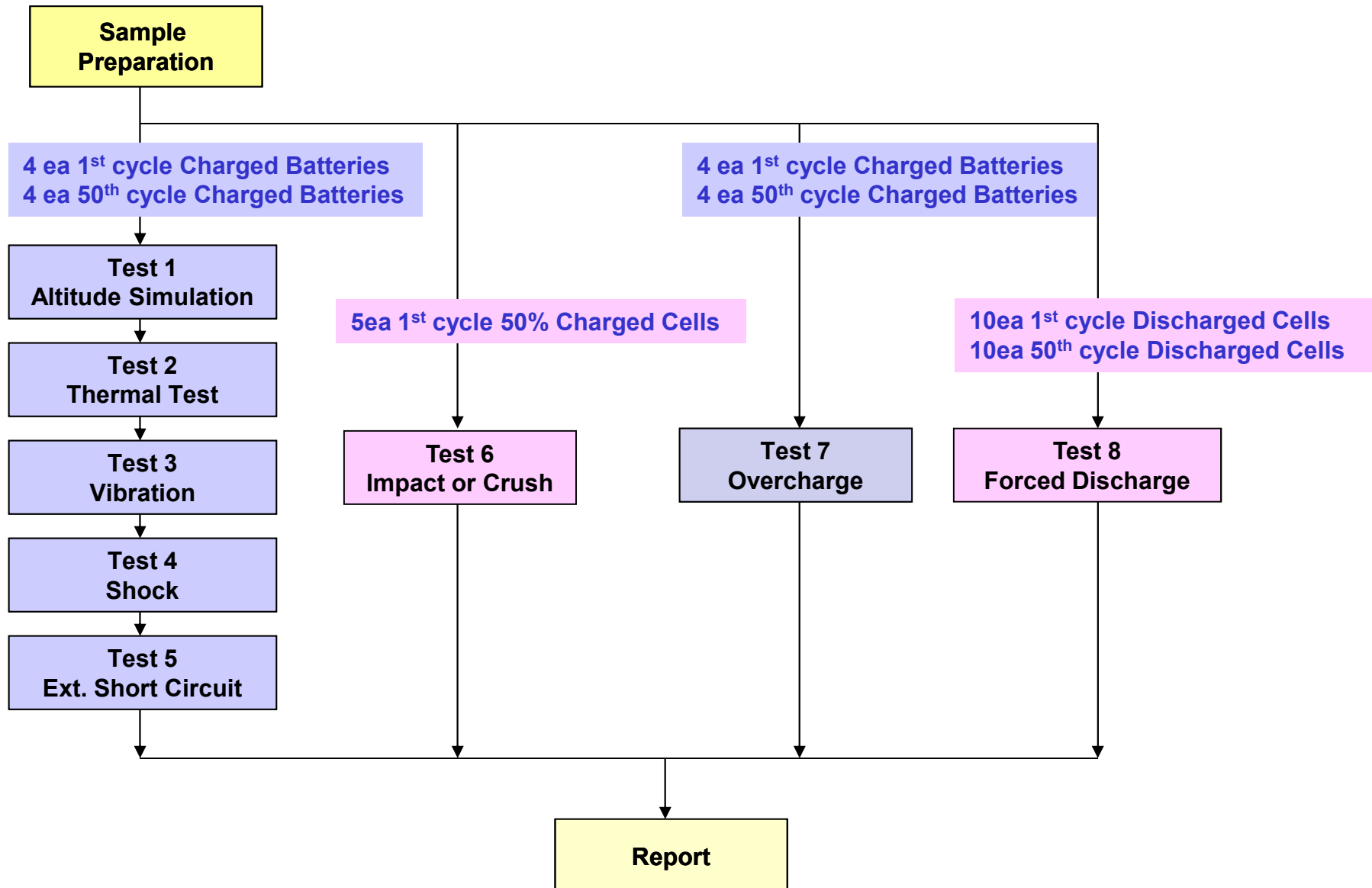
# 1. UN Transportation Regulation Test

Test	Condition	Requirements
Test 1. Altitude Simulation	Storing at (low pressure) 11.6kPa for 6hr at 20+/-5 °C	- Measuring mass before/ after each test (If M<1g, less than 0.5%, If 1g≤M≤75g, less than 0.2%, If 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
Test 2. Thermal Test	[72±2 °C, 6hr ↔ -40 ± 2 °C, 6hr, interval max. 30min] x 10 cycle Storing at 20±5 °C 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 °C 1hr continue after returning at 55±2 °C	
Test 6. Impact for cylindrical cells (> 18mm diameter)	Φ=15.8mm bar, 9.1kg mass, 61±2.5cm height	- No disassembly, no fire within 6 hours after the test - Temp. monitoring (max. 170 °C)
Test 6. Crush for cylindrical cells (≤ 18mm 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)	- No disassembly, no fire within 7 days after the test
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 samples.

\* 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.2)

## 2. Test Procedure



# 3-1. T1-T4 Test Result

Before				Altitude (T1)					Thermal (T2)					Vibration (T3)					Shock (T4)				
	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	8.671	156.61	8.666	156.59	99.94	0.013	Pass	8.552	156.58	98.68	0.006	Pass	8.550	156.57	99.98	0.006	Pass	8.547	156.57	99.96	0.000	Pass
	2	8.641	156.69	8.633	156.67	99.91	0.013	Pass	8.528	156.67	98.78	0.000	Pass	8.527	156.67	99.99	0.000	Pass	8.524	156.67	99.96	0.000	Pass
	3	8.653	156.50	8.643	156.48	99.88	0.013	Pass	8.539	156.48	98.80	0.000	Pass	8.536	156.48	99.96	0.000	Pass	8.533	156.47	99.96	0.006	Pass
	4	8.653	156.37	8.634	156.37	99.78	0.000	Pass	8.523	156.36	98.71	0.006	Pass	8.521	156.36	99.98	0.000	Pass	8.518	156.36	99.96	0.000	Pass
	Ave.	8.655	156.54	8.644	156.53	99.88	0.010	-	8.536	156.52	98.74	0.003	-	8.534	156.52	99.98	0.002	-	8.531	156.52	99.96	0.002	-

## B. 50th cycle fully state

Charge	5	8.664	156.70	8.654	156.70	99.88	0.000	Pass	8.553	156.70	98.83	0.000	Pass	8.550	156.69	99.96	0.006	Pass	8.547	156.68	99.96	0.006	Pass
	6	8.665	156.81	8.651	156.81	99.84	0.000	Pass	8.541	156.80	98.73	0.006	Pass	8.540	156.79	99.99	0.006	Pass	8.540	156.79	100.00	0.000	Pass
	7	8.666	156.78	8.656	156.77	99.88	0.006	Pass	8.545	156.76	98.72	0.006	Pass	8.542	156.76	99.96	0.000	Pass	8.538	156.75	99.95	0.006	Pass
	8	8.656	156.13	8.648	156.12	99.91	0.006	Pass	8.544	156.12	98.80	0.000	Pass	8.541	156.11	99.96	0.006	Pass	8.538	156.10	99.96	0.006	Pass
	Ave.	8.663	156.61	8.652	156.60	99.88	0.003	-	8.546	156.60	98.77	0.003	-	8.543	156.59	99.97	0.005	-	8.541	156.58	99.97	0.005	-

### 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)				
	NO.	Initial OCV(V)	Max. Temp (°C)	Result

## A. 1st cycle fully state

Charge	1	8.547	56.62	Pass
	2	8.524	55.41	Pass
	3	8.533	55.82	Pass
	4	8.518	54.99	Pass
	MAX.	8.547	56.62	-

Test Condition
- 100mΩ ext. short-circuit at 55± 2 °C

Over Charge (T7)				
	NO.	Initial OCV(V)	Max. Temp (°C)	Result

## A. 1st cycle fully state

Charge	9	8.650	23.75	Pass
	10	8.649	23.68	Pass
	11	8.646	24.43	Pass
	12	8.648	23.56	Pass
	MAX.	8.650	24.43	-

Test Condition
- Max. Charge Current : 2305mA - CC/CV 2Imax(4610mA) 17.4V cut-off 24Hr

EXT.Short Circuit (T5)				
	NO.	Initial OCV(V)	Max. Temp (°C)	Result

## B. 50th cycle fully state

Charge	5	8.547	56.53	Pass
	6	8.540	56.40	Pass
	7	8.538	55.70	Pass
	8	8.538	55.82	Pass
	MAX.	8.547	56.53	-

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

Over Charge (T7)				
	NO.	Initial OCV(V)	Max. Temp (°C)	Result

## B. 50th cycle fully state

Charge	13	8.624	24.91	Pass
	14	8.621	23.31	Pass
	15	8.629	24.84	Pass
	16	8.621	25.09	Pass
	MAX.	8.629	25.09	-

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

# 3-3. T6/T8 Test Result (ICP595490A1)

Crush (T6)				
Direction	NO.	Initial OCV(V)	Max. Temp (°C)	Result

## A. 1st cycle 50% charged state (Direction :Flat)

Flat	C-1	3.816	22.57	Pass
	C-2	3.817	22.44	Pass
	C-3	3.816	22.42	Pass
	C-4	3.817	22.47	Pass
	C-5	3.816	22.48	Pass
<b>MAX.</b>		3.817	22.57	-

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)			
NO.	Initial OCV(V)	Max. Temp (°C)	Result

## A. 1st cycle fully Discharged state

C-6	3.112	46.32	Pass
C-7	3.110	45.74	Pass
C-8	3.109	44.21	Pass
C-9	3.115	47.13	Pass
C-10	3.109	48.21	Pass
C-11	3.116	47.56	Pass
C-12	3.108	47.46	Pass
C-13	3.114	47.20	Pass
C-14	3.110	48.49	Pass
C-15	3.114	47.32	Pass
<b>MAX.</b>	3.116	48.49	-

## B. 50th cycle fully discharged state

C-16	3.221	44.84	Pass
C-17	3.222	44.26	Pass
C-18	3.218	43.21	Pass
C-19	3.220	44.56	Pass
C-20	3.217	45.26	Pass
C-21	3.225	45.52	Pass
C-22	3.219	46.79	Pass
C-23	3.220	44.52	Pass
C-24	3.222	44.82	Pass
C-25	3.216	42.69	Pass
<b>MAX.</b>	3.225	46.82	-

Test Condition
- Discharge at max. discharge current (with 12V DC power supply) : 4500mA Duration time: rated capacity (60.0min )

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

# 4. Sample Image

