

# UN38.3 Test Summary

The following product has been evaluated according to the 5th revised edition Amendment 2 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-EF02-150602-PKL15L4P71	Test 1. Altitude Simulation	Pass
Date of test report	2015.06.02	Test 2. Thermal Test	Pass
Model name	L15L4P71	Test 3. Vibration	Pass
Type	Pouch	Test 4. Shock	Pass
Nominal voltage	7.6 V	Test 5. External Short Circuit	Pass
Capacity	40.0 Wh	Test 6. Impact or Crush	Pass
Weight	175.0 g	Test 7. Overcharge	Pass
Dimensions	167.80mm X 150.50mm X 3.40mm	Test 8. Forced Discharge	Pass

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# UN Test Report

## -L15L4P71(Nom. 40Wh, 7.6V)-

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2015. 06. 02

# 1. UN Transportation Regulation Test

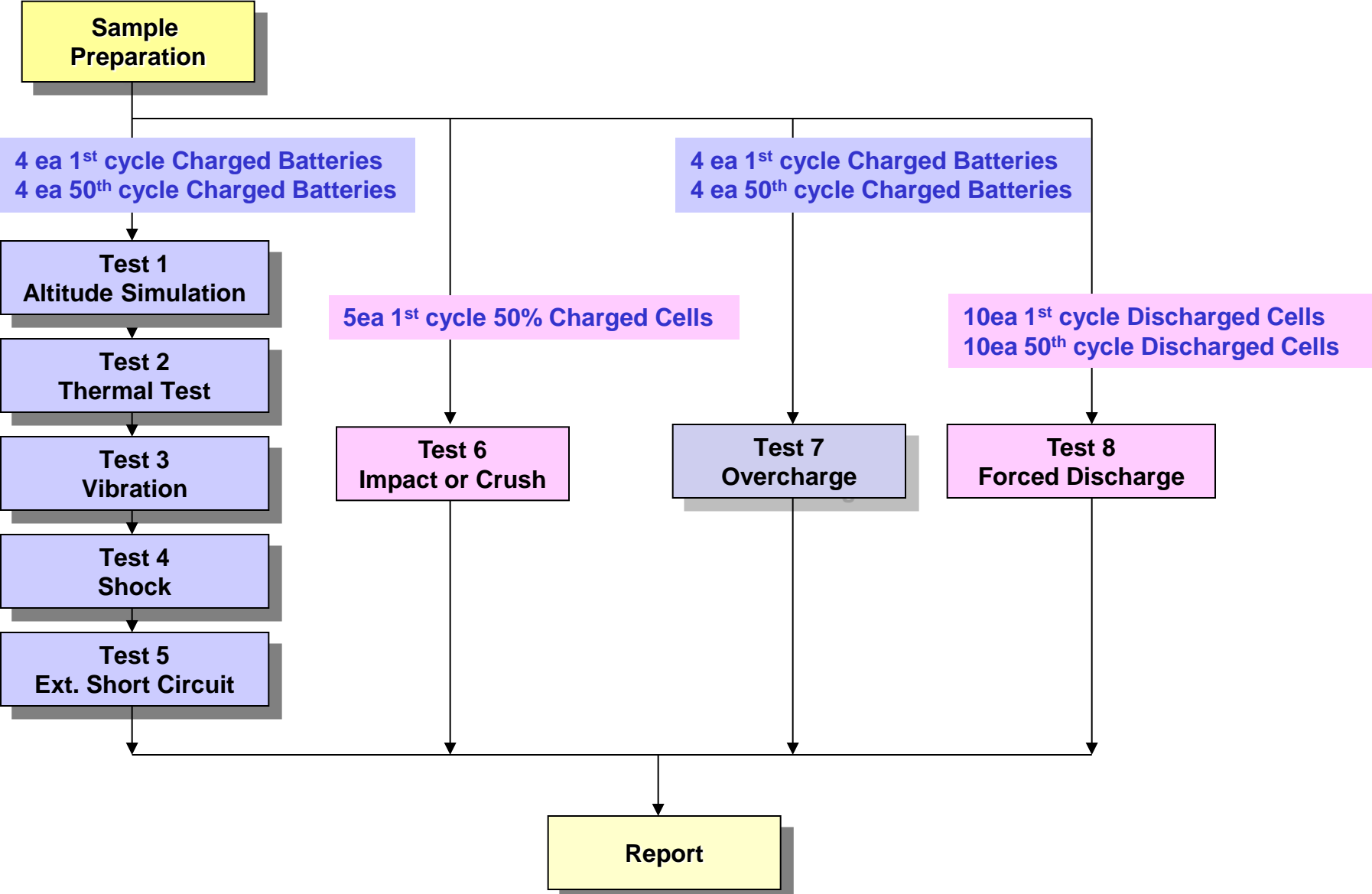
Rev.5 / Amd.2

Test	Condition	Requirements
Test 1. Altitude Simulation	Storing at (low pressure)11.6kPa for 6hr at 20+/-5℃	<ul style="list-style-type: none"> <li>- Measuring mass before/ after each test (If <math>M &lt; 1g</math>, less than 0.5%, If <math>1g \leq M \leq 75g</math>, less than 0.2%, If <math>M &gt; 75g</math>, less than 0.1%)</li> <li>- Measuring voltage before/ after each test (more than 90%)</li> <li>- No leakage, no venting, no disassembly, no rupture, no fire</li> <li>- No disassembly, no rupture, no fire within 6 hours after the test</li> <li>- Temp. monitoring (max. 170℃)</li> <li>- No disassembly, no fire within 6 hours after the test</li> <li>- Temp. monitoring (max. 170℃)</li> <li>- No disassembly, no fire within 7 days after the test</li> </ul>
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 (> 18mm diameter)	Φ=15.8mm bar, 9.1kg mass, 61±2.5cm height	
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)	
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 charged state**

Charge	1	8.680	175.00	8.678	174.99	99.98	0.006	Pass	8.569	174.98	98.74	0.006	Pass	8.568	174.97	99.99	0.006	Pass	8.567	174.97	99.99	0.000	Pass
	2	8.643	175.79	8.641	175.79	99.98	0.000	Pass	8.530	175.78	98.72	0.006	Pass	8.529	175.77	99.99	0.006	Pass	8.529	175.76	100.00	0.006	Pass
	3	8.645	175.96	8.643	175.95	99.98	0.006	Pass	8.534	175.94	98.74	0.006	Pass	8.533	175.93	99.99	0.006	Pass	8.532	175.92	99.99	0.006	Pass
	4	8.641	175.38	8.640	175.37	99.99	0.006	Pass	8.531	175.36	98.74	0.006	Pass	8.530	175.35	99.99	0.006	Pass	8.528	175.34	99.98	0.006	Pass
	Ave.	8.652	175.53	8.651	175.53	99.98	0.004	-	8.541	175.52	98.73	0.006	-	8.540	175.51	99.99	0.006	-	8.539	175.50	99.99	0.004	-

**B. 50th cycle fully charged state**

Charge	5	8.651	175.01	8.649	175.01	99.98	0.000	Pass	8.540	174.99	98.74	0.011	Pass	8.539	174.99	99.99	0.000	Pass	8.539	174.99	100.00	0.000	Pass
	6	8.669	175.73	8.668	175.73	99.99	0.000	Pass	8.559	175.71	98.74	0.011	Pass	8.557	175.71	99.98	0.000	Pass	8.556	175.70	99.99	0.006	Pass
	7	8.654	174.95	8.652	174.95	99.98	0.000	Pass	8.545	174.94	98.76	0.006	Pass	8.544	174.94	99.99	0.000	Pass	8.543	174.93	99.99	0.006	Pass
	8	8.650	175.06	8.648	175.05	99.98	0.006	Pass	8.540	175.04	98.75	0.006	Pass	8.539	175.03	99.99	0.006	Pass	8.538	175.03	99.99	0.000	Pass
	Ave.	8.656	175.19	8.654	175.19	99.98	0.001	-	8.546	175.17	98.75	0.009	-	8.545	175.17	99.99	0.001	-	8.544	175.16	99.99	0.003	-

<b>Requirement</b>	<ul style="list-style-type: none"> <li>- Measuring mass before/after each test (If M&gt;75g, less than 0.1%, 1g≤M≤75, less than 0.2%, M&lt;1g, less than 0.5%)</li> <li>- Measuring voltage before/after each test (more than 90%, only charged samples)</li> <li>- No leakage, no venting, no disassembly, no rupture, no fire</li> </ul>
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# 3-2. T5/T7 Test Result

## EXT.Short Circuit (T5)

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

Charge	1	8.567	56.51	Pass
	2	8.529	56.52	Pass
	3	8.532	55.97	Pass
	4	8.528	56.24	Pass
	MAX.	8.567	56.52	-

## Test Condition

- 100mΩ ext. short-circuit at 55±2°C

## Over Charge (T7)

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

Charge	9	8.674	24.60	Pass
	10	8.655	25.00	Pass
	11	8.652	24.95	Pass
	12	8.643	23.23	Pass
	MAX.	8.674	25.00	-

## Test Condition

- Max. Charge Current : 2670mA  
 - CC/CV 2I<sub>max</sub>(5340mA)17.4V cut-off 24Hr

## EXT.Short Circuit (T5)

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

Charge	5	8.539	56.62	Pass
	6	8.556	56.52	Pass
	7	8.543	55.79	Pass
	8	8.538	55.43	Pass
	MAX.	8.556	56.62	-

## 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
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### B. 50th cycle fully charged state

Charge	13	8.642	24.53	Pass
	14	8.670	23.22	Pass
	15	8.668	23.68	Pass
	16	8.655	23.04	Pass
	MAX.	8.670	24.53	-

## Requirement

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

# 3-3. T6/T8 Test Result (ICP297576L1)

## Crush (T6)

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

Flat	C-1	3.821	23.09	Pass
	C-2	3.818	23.04	Pass
	C-3	3.822	23.05	Pass
	C-4	3.820	23.13	Pass
	C-5	3.821	23.09	Pass
<b>MAX.</b>		3.822	23.13	-

## 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
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### A. 1st cycle fully discharged state

C-6	3.012	46.32	Pass
C-7	3.010	45.74	Pass
C-8	3.009	44.21	Pass
C-9	3.015	47.13	Pass
C-10	3.009	48.21	Pass
C-11	3.014	47.56	Pass
C-12	3.008	47.46	Pass
C-13	3.014	47.20	Pass
C-14	3.010	46.49	Pass
C-15	3.014	47.32	Pass
<b>MAX.</b>	3.015	48.21	-

### B. 50th cycle fully discharged state

C-16	3.121	44.84	Pass
C-17	3.122	44.26	Pass
C-18	3.118	43.21	Pass
C-19	3.120	44.56	Pass
C-20	3.117	45.26	Pass
C-21	3.123	45.52	Pass
C-22	3.119	46.79	Pass
C-23	3.120	44.52	Pass
C-24	3.122	44.62	Pass
C-25	3.116	42.69	Pass
<b>MAX.</b>	3.123	46.79	-

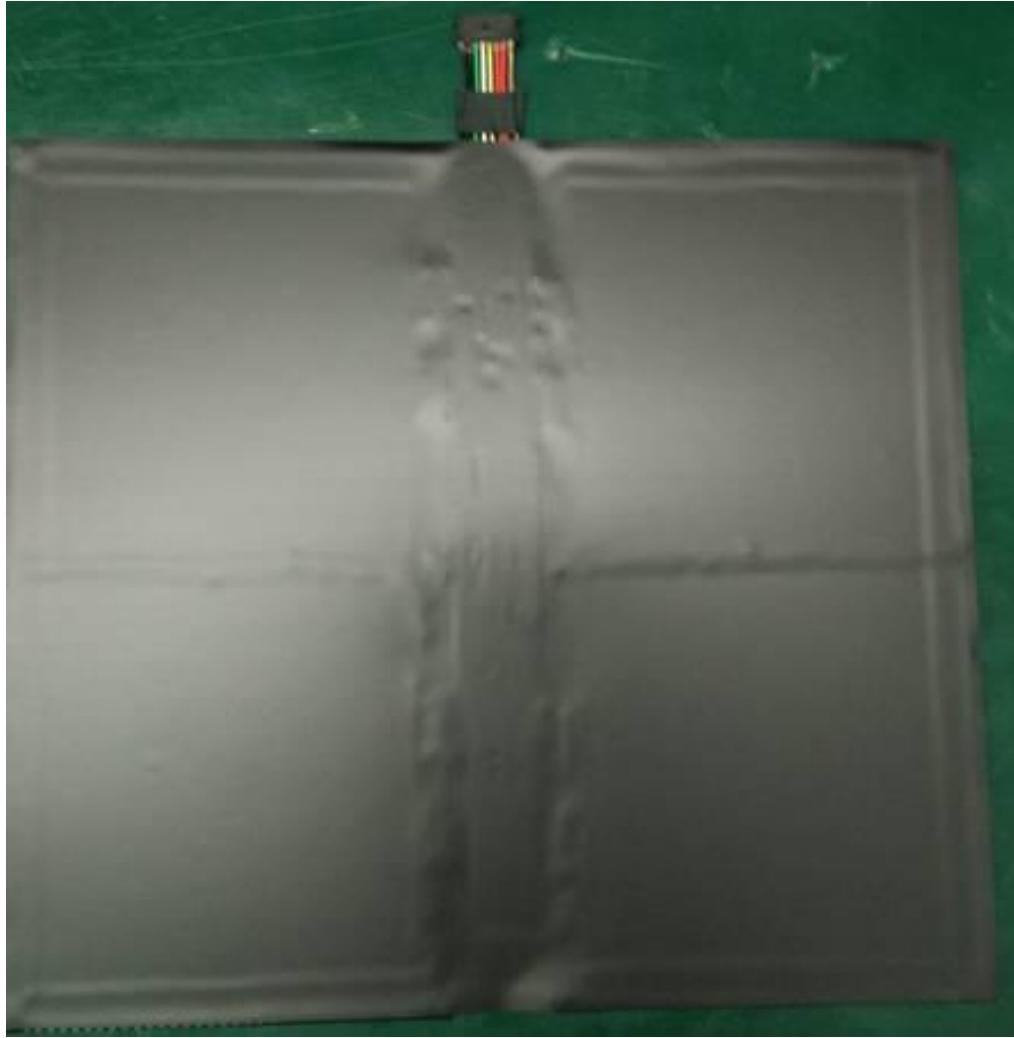
## Test Condition

- Discharge at max. discharge current  
(with 12V DC power supply) : 1335mA  
Duration time: rated capacity (120min)

## 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(18 <sup>th</sup> ) 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(18 <sup>th</sup> ) special provisions 188	505g		Passed

## B. Sample Description

Dimensions	30.4 x 20.2 x 3.2 cm	Net Weight of Batteries	350g	Battery Type	Rechargeable Li-ion Battery
Gross weight	505g	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(18 <sup>th</sup> ) 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(18 <sup>th</sup> ) special provisions 188	7.85kg		Passed

## B. Sample Description

Dimensions	40.5 x 30.5 x 22.5 cm	Net Weight of Batteries	6.95kg	Battery Type	Rechargeable Li-ion Battery
Gross weight	7.85kg	Battery number	40Pcs/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