

# 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.


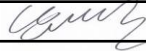

Manufacture's contact information	LG Chem, Ltd. 128 Yeoui-Daero, Yeongdeungpo-gu, SEOUL, 150-721, REPUBLIC OF KOREA Telephone : +86-10-7742-5427      E-mail : kkammy@lgchem.com      Website : <a href="http://www.lgchem.com">www.lgchem.com</a>		
Test Laboratory information	LG Chem, Ltd. / RESEARCH PARK 188 Munjiro, Yuseong-gu, Daejeon, 305-738, REPUBLIC OF KOREA Telephone : +82-10-3099-3724      E-mail : juhongpark@lgchem.com      Website : <a href="http://www.lgchem.com">www.lgchem.com</a>		
	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 : <a href="http://www.lgchem.com">www.lgchem.com</a>		
Description		List of Test Completed	
Test Report Number	QAE-EF02-150313-PKL14L4P24	Test 1. Altitude Simulation	Pass
Date of test report	2015.03.13	Test 2. Thermal Test	Pass
Model name	L14L4P24	Test 3. Vibration	Pass
Type	Pouch	Test 4. Shock	Pass
Nominal voltage	7.6 V	Test 5. External Short Circuit	Pass
Capacity	66.0 Wh	Test 6. Impact or Crush	Pass
Weight	290.0 g	Test 7. Overcharge	Pass
Dimensions	254.00mm X 112.00mm X 5.10mm	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



문서번호	QAE-EF02-150313-PKL14L4P24	
Prepared	남익현	
	장승현	
Reviewed	남대호	
	정규채	
Approved	김병수	

# UN Test Report

## - L14L4P24(Nom.66Wh, 7.6V)-

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2015. 03. 13

# 1. UN Transportation Regulation Test

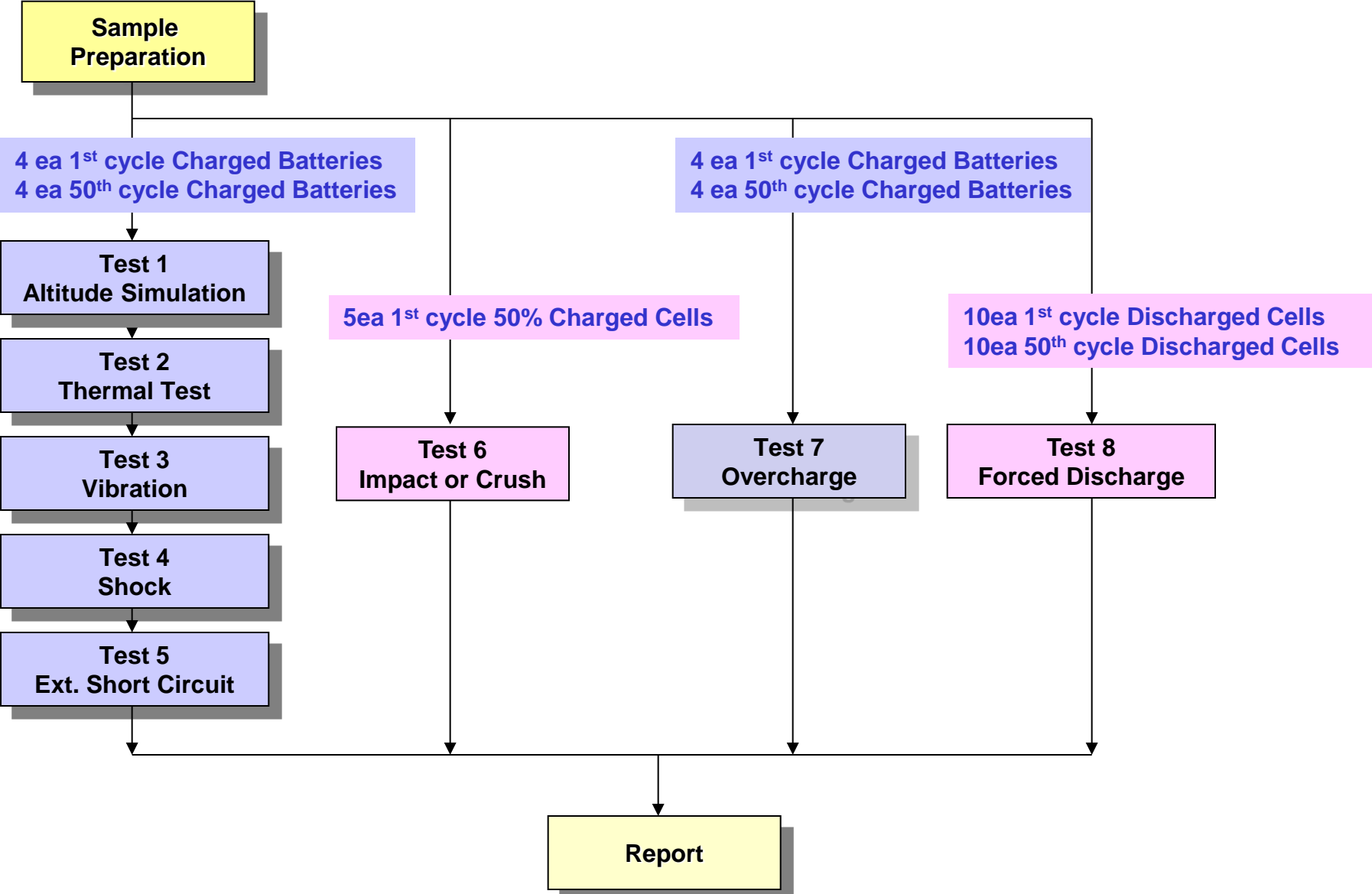
Rev.5 / Amd.2

Test	Condition	Requirements
Test 1. Altitude Simulation	Storing at (low pressure)11.6kPa for 6hr at 20+/-5℃	- Measuring mass before/ after each test (If $M < 1g$ , less than 0.5%, If $1g \leq M \leq 75g$ , 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℃,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	- No disassembly, no rupture, no fire within 6 hours after the test - Temp. monitoring (max. 170℃)
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℃	- No disassembly, no fire within 6 hours after the test - Temp. monitoring (max. 170℃)
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	- No disassembly, no fire within 7 days after the test
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	8.672	289.70	8.671	289.69	99.99	0.003	Pass	8.571	289.66	98.85	0.010	Pass	8.568	289.65	99.96	0.003	Pass	8.566	289.63	99.98	0.007	Pass
	2	8.652	289.04	8.651	289.03	99.99	0.003	Pass	8.537	289.01	98.68	0.007	Pass	8.533	289.00	99.95	0.003	Pass	8.531	289.00	99.98	0.000	Pass
	3	8.657	289.32	8.651	289.30	99.93	0.007	Pass	8.542	289.28	98.74	0.007	Pass	8.541	289.27	99.99	0.003	Pass	8.538	289.25	99.96	0.007	Pass
	4	8.659	289.95	8.650	289.92	99.90	0.010	Pass	8.530	289.90	98.61	0.007	Pass	8.528	289.88	99.98	0.007	Pass	8.527	289.87	99.99	0.003	Pass
	Ave.	8.660	289.50	8.656	289.49	99.95	0.006	-	8.545	289.46	98.72	0.008	-	8.543	289.45	99.97	0.004	-	8.541	289.44	99.98	0.004	-

## B. 50th cycle fully charged state

Charge	5	8.653	289.15	8.652	289.15	99.99	0.000	Pass	8.512	289.14	98.38	0.003	Pass	8.507	289.12	99.94	0.007	Pass	8.500	289.11	99.92	0.003	Pass
	6	8.669	289.56	8.666	289.55	99.97	0.003	Pass	8.569	289.55	98.88	0.000	Pass	8.560	289.54	99.89	0.003	Pass	8.558	289.52	99.98	0.007	Pass
	7	8.651	289.13	8.650	289.13	99.99	0.000	Pass	8.510	289.12	98.38	0.003	Pass	8.509	289.10	99.99	0.007	Pass	8.490	289.10	99.78	0.000	Pass
	8	8.667	289.02	8.662	289.02	99.94	0.000	Pass	8.520	289.00	98.36	0.007	Pass	8.512	288.99	99.91	0.003	Pass	8.502	288.98	99.88	0.003	Pass
	Ave.	8.660	289.22	8.658	289.21	99.97	0.001	-	8.528	289.20	98.50	0.003	-	8.522	289.19	99.93	0.005	-	8.513	289.18	99.89	0.003	-

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

Charge	1	8.566	56.32	Pass
	2	8.531	55.09	Pass
	3	8.538	55.57	Pass
	4	8.527	55.32	Pass
	MAX.	8.566	56.32	-

## 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	8.646	24.30	Pass
	10	8.640	24.11	Pass
	11	8.649	24.06	Pass
	12	8.649	25.12	Pass
	MAX.	8.649	25.12	-

## Test Condition

- Max. Charge Current : 4400mA  
 - CC/CV 2Imax(8800mA) 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	8.500	56.29	Pass
	6	8.558	54.74	Pass
	7	8.490	55.45	Pass
	8	8.502	56.27	Pass
	MAX.	8.558	56.29	-

## 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	8.624	24.42	Pass
	14	8.620	24.85	Pass
	15	8.621	23.48	Pass
	16	8.622	23.80	Pass
	MAX.	8.624	24.85	-

## Requirement

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

# 3-3. T6/T8 Test Result (ICP4554116L1)

## Crush (T6)

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

Flat	C-1	3.859	23.25	Pass
	C-2	3.856	23.36	Pass
	C-3	3.858	23.15	Pass
	C-4	3.853	23.29	Pass
	C-5	3.855	23.18	Pass
<b>MAX.</b>		3.859	23.36	-

## 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	3.015	48.22	Pass
C-7	3.011	48.23	Pass
C-8	3.010	47.56	Pass
C-9	3.014	47.13	Pass
C-10	3.011	48.52	Pass
C-11	3.011	47.25	Pass
C-12	3.009	47.89	Pass
C-13	3.011	47.44	Pass
C-14	3.010	48.09	Pass
C-15	3.015	47.96	Pass
<b>MAX.</b>	3.015	48.52	-

### B. 50th cycle fully discharged state

C-16	3.117	45.95	Pass
C-17	3.124	46.69	Pass
C-18	3.124	46.21	Pass
C-19	3.120	45.98	Pass
C-20	3.117	45.11	Pass
C-21	3.120	45.52	Pass
C-22	3.119	46.03	Pass
C-23	3.120	46.59	Pass
C-24	3.120	44.52	Pass
C-25	3.118	44.67	Pass
<b>MAX.</b>	3.120	46.69	-

## Test Condition

- Discharge at max. discharge current  
(with 12V DC power supply) : 4310mA  
Duration time: rated capacity (60min)

## 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	656 g		Passed

## B. Sample Description

Dimensions	315*138*36mm	Net Weight of Batteries	578 g	Battery Type	Rechargeable Li-Polymer Battery
Gross weight	656 g	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	7.99 Kg		Passed

## B. Sample Description

Dimensions	306*256*155mm	Net Weight of Batteries	7.23 Kg	Battery Type	Rechargeable Li-Polymer Battery
Gross weight	7.99 Kg	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