LG Chem, Ltd.
128, Yeoui-daero, Yeongdeungpo-gu,
Seoul, Korea

Certification & Evaluation Team
Tel: 82-42-870-6195, Fax: 82-42-863-0182
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CERTIFICATE OF COMPLIANCE

The following product has been evaluated according to the 5th 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.

☐ Lithium-ion cell ☑ Lithium-ion battery ☐ Lithium-ion single cell battery	
Model name	**L15L4A01**
Cell Model name	**ICR18650S3**
Nominal voltage	**14.4 V**
Electric power capacity	**32 Wh**
Lithium Equivalent Content	**2.460 g**

Conducted By: Dae Ho Nam

Manager
Certification & Evaluation
LG Chem, Ltd.
E-mail: kkammy@lgchem.com

Reviewed By: Byung Soo Kim

General Manager
Certification & Evaluation
LG Chem, Ltd.
E-mail: bskim@lgchem.com

문서번호	QAE-EF02-150402-PKL15L4A01	
Prepared	남익현	
	장승현	
Reviewed	남대호	
	박해나	
Approved	김병수	

SolutionPartner

UN Test Report
-L15L4A01(Nom.32Wh, 14.4V)-

목 차

2015. 04. 02

LG Chem

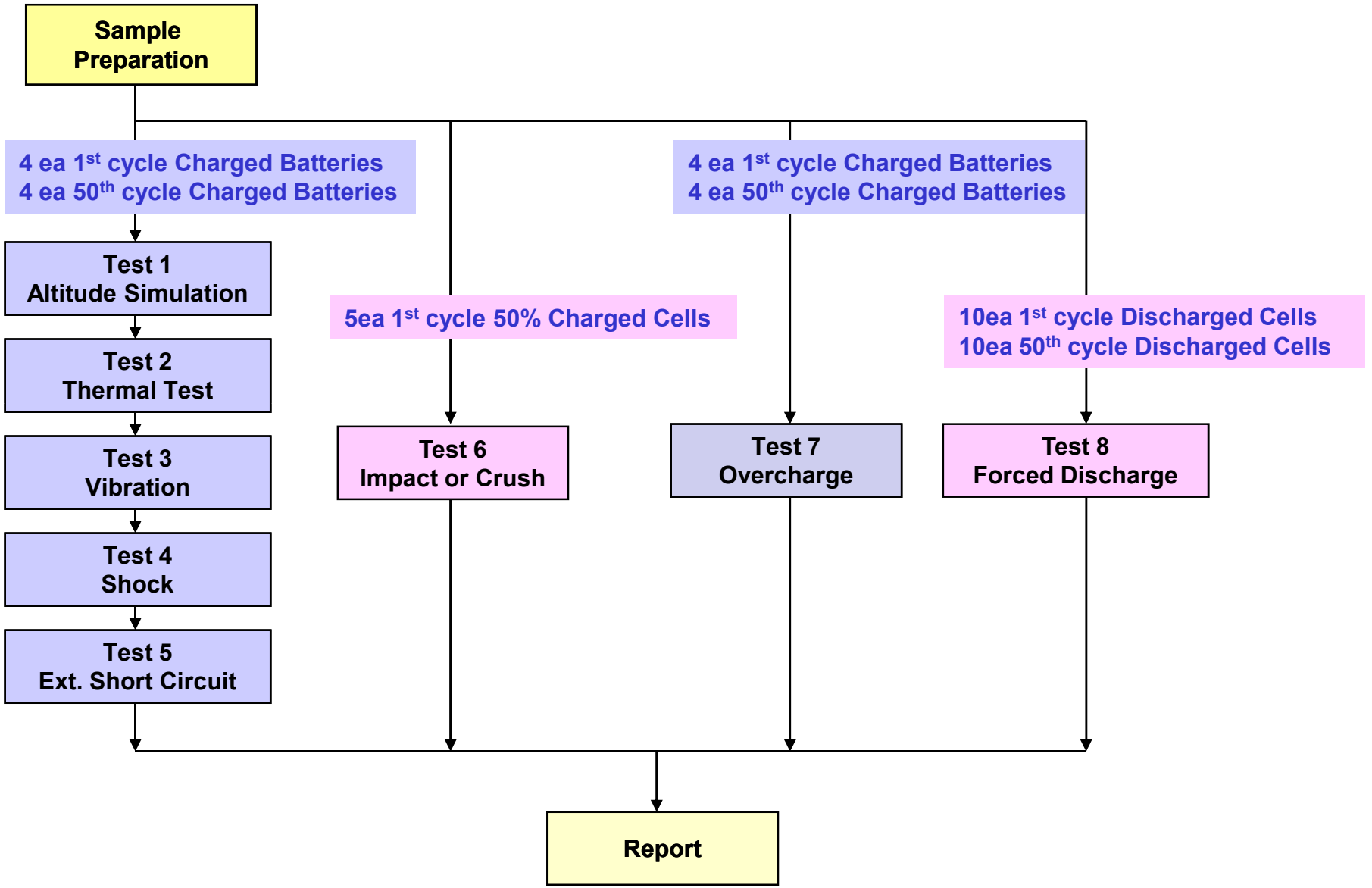
1. UN Transportation Regulation Test

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≤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℃,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℃	- No disassembly, no rupture, 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	- No disassembly, no fire within 6 hours after the test - Temp. monitoring (max. 170℃)
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 charged state																							
Charge	1	16.778	212.77	16.753	212.75	99.85	0.009	Pass	16.509	212.73	98.54	0.009	Pass	16.496	212.71	99.92	0.009	Pass	16.483	212.71	99.92	0.000	Pass
	2	16.733	213.24	16.703	213.21	99.82	0.014	Pass	16.462	213.21	98.56	0.000	Pass	16.449	213.19	99.92	0.009	Pass	16.448	213.18	99.99	0.005	Pass
	3	16.721	212.51	16.693	212.49	99.83	0.009	Pass	16.546	212.48	99.12	0.005	Pass	16.544	212.48	99.99	0.000	Pass	16.538	212.46	99.96	0.009	Pass
	4	16.741	212.75	16.722	212.74	99.89	0.005	Pass	16.477	212.73	98.53	0.005	Pass	16.477	212.73	100.00	0.000	Pass	16.465	212.72	99.93	0.005	Pass
	Ave.	16.743	212.82	16.718	212.80	99.85	0.009	-	16.499	212.79	98.69	0.005	-	16.492	212.78	99.96	0.005	-	16.484	212.77	99.95	0.005	-
B. 50th cycle fully charged state																							
Charge	5	16.767	212.53	16.761	212.51	99.96	0.009	Pass	16.519	212.50	98.56	0.005	Pass	16.510	212.49	99.95	0.005	Pass	16.506	212.47	99.98	0.009	Pass
	6	16.763	213.09	16.754	213.07	99.95	0.009	Pass	16.506	213.07	98.52	0.000	Pass	16.498	213.06	99.95	0.005	Pass	16.491	213.05	99.96	0.005	Pass
	7	16.758	213.40	16.749	213.39	99.95	0.005	Pass	16.503	213.38	98.53	0.005	Pass	16.496	213.36	99.96	0.009	Pass	16.486	213.36	99.94	0.000	Pass
	8	16.753	213.19	16.737	213.18	99.90	0.005	Pass	16.499	213.17	98.58	0.005	Pass	16.497	213.16	99.99	0.005	Pass	16.486	213.16	99.93	0.000	Pass
	Ave.	16.760	213.05	16.750	213.04	99.94	0.007	-	16.507	213.03	98.55	0.004	-	16.500	213.02	99.96	0.006	-	16.492	213.01	99.95	0.004	-

Requirement	- Measuring mass before/after each test (If M>75g, less than 0.1%, 1g≤M≤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 (℃)	Result
A. 1st cycle fully charged state				
Charge	1	16.483	55.93	Pass
	2	16.448	55.27	Pass
	3	16.538	54.98	Pass
	4	16.465	54.95	Pass
	MAX.	16.538	55.93	-

EXT.Short Circuit (T5)				
	NO.	Initial OCV(V)	Max. Temp (℃)	Result
B. 50th cycle fully charged state				
Charge	5	16.506	56.31	Pass
	6	16.491	55.96	Pass
	7	16.486	55.75	Pass
	8	16.486	55.54	Pass
	MAX.	16.506	56.31	-

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

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

Over Charge (T7)				
	NO.	Initial OCV(V)	Max. Temp (℃)	Result
A. 1st cycle fully charged state				
Charge	9	16.741	24.27	Pass
	10	16.743	25.04	Pass
	11	16.740	24.62	Pass
	12	16.747	24.59	Pass
	MAX.	16.747	25.04	-

Over Charge (T7)				
	NO.	Initial OCV(V)	Max. Temp (℃)	Result
B. 50th cycle fully charged state				
Charge	13	16.722	23.51	Pass
	14	16.724	24.33	Pass
	15	16.729	23.48	Pass
	16	16.727	25.23	Pass
	MAX.	16.729	25.23	-

Test Condition
- Max. Charge Current : 1075mA - CC/CV 2Imax(2150mA) 22.0V cut-off 24Hr

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

3-3. T6/T8 Test Result (ICR18650S3)

Impact (T6)				
Direction	NO.	Initial OCV(V)	Max. Temp (℃)	Result
A. 1st cycle 50% charged state				
Flat	C-1	3.647	17.86	Pass
	C-2	3.647	18.66	Pass
	C-3	3.647	19.22	Pass
	C-4	3.647	19.82	Pass
	C-5	3.647	19.49	Pass
MAX.		3.647	19.49	-

Test Condition
- - Φ=15.8mm bar, 9.1kg mass, 61±2.5cm height

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

Forced Discharge (T8)			
NO.	Initial OCV(V)	Max. Temp (℃)	Result
A. 1st cycle fully discharged state			
C-6	3.435	95.86	Pass
C-7	3.435	91.43	Pass
C-8	3.436	104.99	Pass
C-9	3.436	98.50	Pass
C-10	3.436	93.10	Pass
C-11	3.437	99.91	Pass
C-12	3.437	97.06	Pass
C-13	3.435	97.02	Pass
C-14	3.436	103.25	Pass
C-15	3.435	99.42	Pass
MAX.	3.437	104.99	-
B. 50th cycle fully discharged state			
C-16	3.435	94.44	Pass
C-17	3.436	93.95	Pass
C-18	3.436	98.90	Pass
C-19	3.435	102.69	Pass
C-20	3.436	95.74	Pass
C-21	3.436	95.66	Pass
C-22	3.436	93.42	Pass
C-23	3.437	98.34	Pass
C-24	3.437	96.99	Pass
C-25	3.436	100.33	Pass
MAX.	3.437	102.69	-

Test Condition
- Discharge at max. discharge current (with 12V DC power supply) : 4300mA Duration time: rated capacity (31min)

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

4. Sample Image