



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

Certification & Evaluation Team
Tel: 82-42-870-6195, Fax: 82-42-863-0182
If any of pages is not legible or has not been received,
please notify our office for re-transmission

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.




<input type="checkbox"/> Lithium-ion cell <input type="checkbox"/> Lithium-ion battery <input checked="" type="checkbox"/> Lithium-ion single cell battery	
Model name	FW3L
Cell Model name	ICP363132L1
Nominal voltage	3.8 V
Electric power capacity	1.4 Wh

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-EF02-150127-PKFW3L	
Prepared	남익현	
	장승현	
Reviewed	남대호	
	박해나	
Approved	김병수	

SolutionPartner

UN Test Report

- FW3L (Min. 1.4Wh, 3.8V) -

목 차

1. UN Transportation Regulation Test
 2. Test Procedure
 3. Test Result
 4. Sample Image
- Appendix. 1.2m Drop Test Report

2015. 01. 27

 **LG Chem**

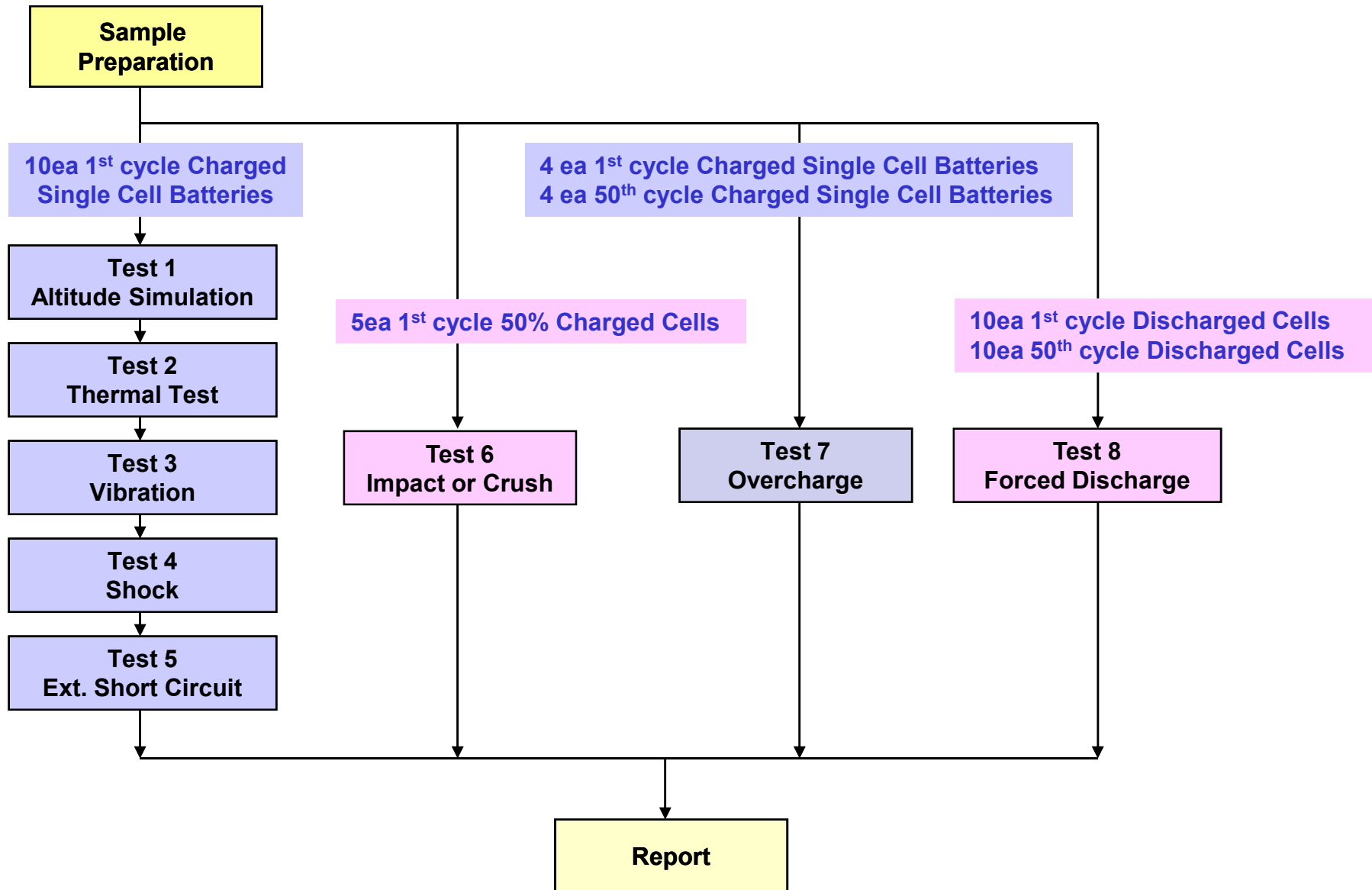
1. UN Transportation Regulation Test

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 $1g \leq M \leq 75g$, 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 10 cycle 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	- 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

1	4.366	6.835	4.365	6.834	99.98	0.015	Pass	4.311	6.834	98.76	0.000	Pass	4.311	6.834	100.00	0.000	Pass	4.311	6.833	100.00	0.015	Pass
2	4.366	6.834	4.365	6.834	99.98	0.000	Pass	4.312	6.834	98.79	0.000	Pass	4.312	6.833	100.00	0.015	Pass	4.311	6.833	99.98	0.000	Pass
3	4.366	6.835	4.366	6.835	100.00	0.000	Pass	4.312	6.834	98.76	0.015	Pass	4.311	6.834	99.98	0.000	Pass	4.311	6.834	100.00	0.000	Pass
4	4.365	6.833	4.365	6.833	100.00	0.000	Pass	4.312	6.833	98.79	0.000	Pass	4.312	6.833	100.00	0.000	Pass	4.312	6.833	100.00	0.000	Pass
5	4.365	6.835	4.365	6.834	100.00	0.015	Pass	4.311	6.833	98.76	0.015	Pass	4.311	6.833	100.00	0.000	Pass	4.310	6.833	99.98	0.000	Pass
6	4.365	6.834	4.365	6.834	100.00	0.000	Pass	4.313	6.834	98.81	0.000	Pass	4.313	6.834	100.00	0.000	Pass	4.312	6.833	99.98	0.015	Pass
7	4.366	6.834	4.365	6.834	99.98	0.000	Pass	4.313	6.834	98.81	0.000	Pass	4.312	6.834	99.98	0.000	Pass	4.312	6.834	100.00	0.000	Pass
8	4.365	6.835	4.365	6.835	100.00	0.000	Pass	4.313	6.835	98.81	0.000	Pass	4.313	6.835	100.00	0.000	Pass	4.311	6.835	99.95	0.000	Pass
9	4.366	6.836	4.366	6.836	100.00	0.000	Pass	4.311	6.835	98.74	0.015	Pass	4.311	6.834	100.00	0.015	Pass	4.311	6.834	100.00	0.000	Pass
10	4.366	6.835	4.366	6.835	100.00	0.000	Pass	4.312	6.835	98.76	0.000	Pass	4.312	6.835	100.00	0.000	Pass	4.311	6.835	99.98	0.000	Pass
Ave.	4.366	6.835	4.365	6.834	99.99	0.003	-	4.312	6.834	98.78	0.004	-	4.312	6.834	100.00	0.003	-	4.311	6.834	99.99	0.003	-

Requirement	<ul style="list-style-type: none"> - 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 charged state

1	4.311	53.46	Pass
2	4.311	52.17	Pass
3	4.311	54.78	Pass
4	4.312	51.29	Pass
5	4.310	52.44	Pass
6	4.312	53.62	Pass
7	4.312	52.15	Pass
8	4.311	53.78	Pass
9	4.311	52.31	Pass
10	4.311	52.89	Pass
MAX.	4.312	54.78	-

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

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

A. 1st cycle fully charged state

Charge	11	4.366	23.15	Pass
	12	4.365	23.66	Pass
	13	4.364	22.18	Pass
	14	4.365	24.01	Pass
	MAX.	4.366	24.01	-

Test Condition
- Max. Charge Current : 390mA - CC/CV 2Imax(780mA) 8.8V cut-off 24Hr

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

B. 50th cycle fully charged state

Charge	15	4.365	23.18	Pass
	16	4.364	22.44	Pass
	17	4.364	23.51	Pass
	18	4.365	23.33	Pass
	MAX.	4.365	23.51	-

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

3-3. T6/T8 Test Result (ICP363132L1)

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

A. 1st cycle 50% charged state

Flat	C-1	3.795	23.33	Pass
	C-2	3.792	22.57	Pass
	C-3	3.790	23.04	Pass
	C-4	3.787	22.69	Pass
	C-5	3.792	23.17	Pass
MAX.		3.795	23.33	-

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	3.015	46.10	Pass
C-7	3.013	46.52	Pass
C-8	3.016	45.28	Pass
C-9	3.016	44.65	Pass
C-10	3.015	47.58	Pass
C-11	3.014	46.33	Pass
C-12	3.016	47.04	Pass
C-13	3.014	48.67	Pass
C-14	3.013	47.95	Pass
C-15	3.017	48.99	Pass
MAX.	3.017	48.99	-

B. 50th cycle fully discharged state

C-16	3.124	48.51	Pass
C-17	3.115	47.54	Pass
C-18	3.124	47.69	Pass
C-19	3.114	48.02	Pass
C-20	3.122	47.36	Pass
C-21	3.127	48.97	Pass
C-22	3.119	47.63	Pass
C-23	3.122	48.01	Pass
C-24	3.123	48.97	Pass
C-25	3.116	48.69	Pass
MAX.	3.127	48.97	-

Test Condition
- Discharge at max. discharge current (with 12V DC power supply) : 390mA Duration time: rated capacity (58min)

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 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(18 th) special provisions 188	6.689 kg		Passed

B. Sample Description

Dimensions	29.0×22.0×10.0 cm	Net Weight of Batteries	3.808 kg	Battery Type	Rechargeable Li-ion Battery
Gross weight	6.689 kg	Battery number	560Pcs/Carton	** Description	In-tray

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