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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.




<input type="checkbox"/> Lithium-ion cell <input type="checkbox"/> Lithium-ion battery <input checked="" type="checkbox"/> Lithium-ion single cell battery	
Model name	FB55
Cell Model name	ICP5447104L1
Nominal voltage	3.8 V
Electric power capacity	13.5 Wh

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SolutionPartner

UN Test Report

- FB55 (Min.13.5Wh, 3.8V) -

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2015. 03. 06



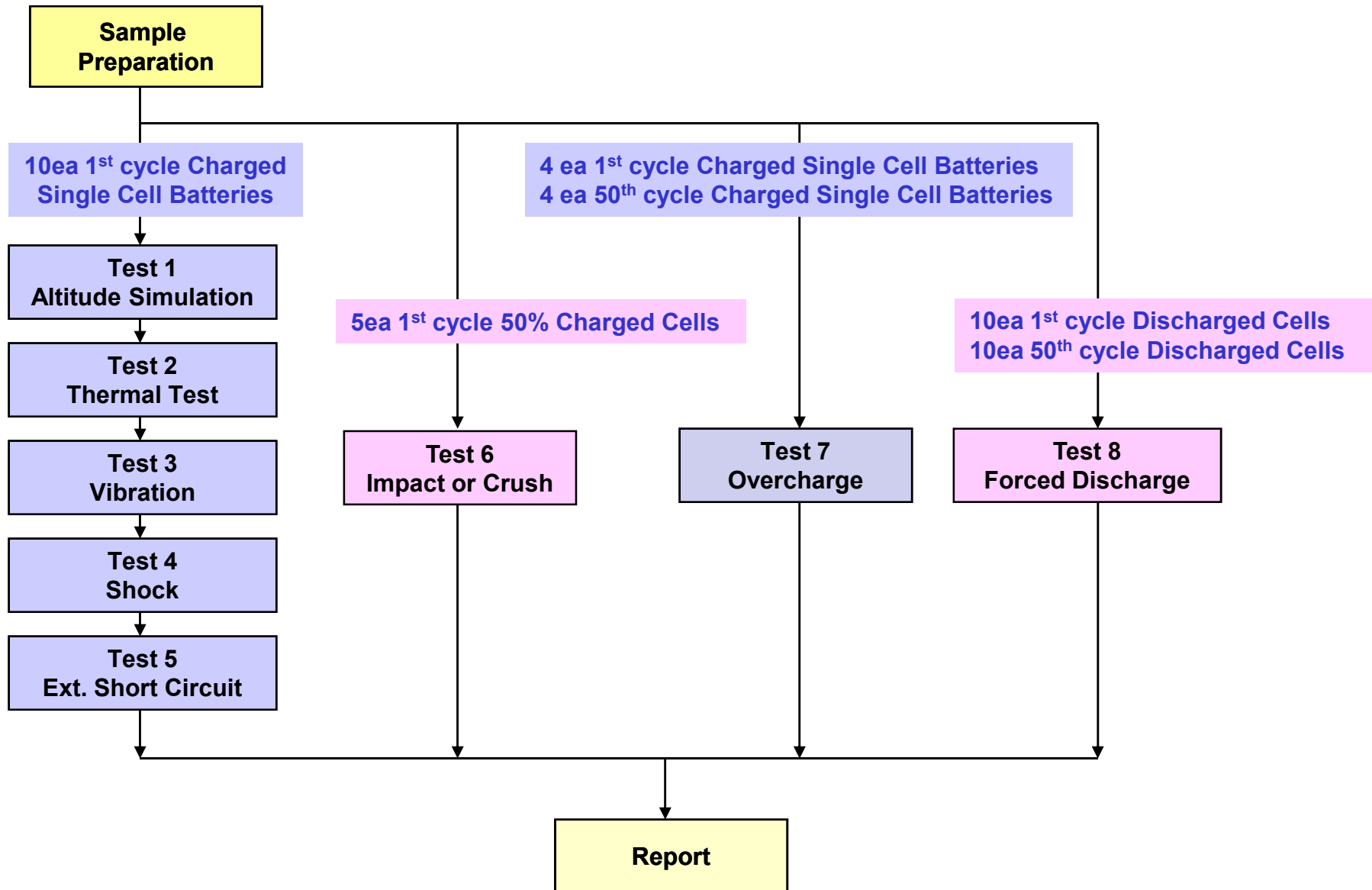
1. UN Transportation Regulation Test

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 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

1	4.367	54.604	4.366	54.603	99.98	0.002	Pass	4.313	54.603	98.79	0.000	Pass	4.312	54.603	99.98	0.000	Pass	4.310	54.602	99.95	0.002	Pass
2	4.366	54.601	4.365	54.601	99.98	0.000	Pass	4.316	54.601	98.88	0.000	Pass	4.314	54.600	99.95	0.002	Pass	4.311	54.600	99.93	0.000	Pass
3	4.367	54.606	4.365	54.605	99.95	0.002	Pass	4.312	54.605	98.79	0.000	Pass	4.311	54.604	99.98	0.002	Pass	4.310	54.603	99.98	0.002	Pass
4	4.365	54.603	4.364	54.603	99.98	0.000	Pass	4.313	54.603	98.83	0.000	Pass	4.311	54.603	99.95	0.000	Pass	4.310	54.603	99.98	0.000	Pass
5	4.366	54.603	4.364	54.603	99.95	0.000	Pass	4.311	54.603	98.79	0.000	Pass	4.310	54.603	99.98	0.000	Pass	4.308	54.602	99.95	0.002	Pass
6	4.366	54.604	4.365	54.604	99.98	0.000	Pass	4.313	54.604	98.81	0.000	Pass	4.311	54.603	99.95	0.002	Pass	4.309	54.603	99.95	0.000	Pass
7	4.367	54.602	4.366	54.602	99.98	0.000	Pass	4.312	54.602	98.76	0.000	Pass	4.310	54.602	99.95	0.000	Pass	4.308	54.601	99.95	0.002	Pass
8	4.366	54.603	4.365	54.602	99.98	0.002	Pass	4.312	54.602	98.79	0.000	Pass	4.311	54.602	99.98	0.000	Pass	4.309	54.601	99.95	0.002	Pass
9	4.367	54.604	4.365	54.604	99.95	0.000	Pass	4.311	54.604	98.76	0.000	Pass	4.310	54.603	99.98	0.002	Pass	4.309	54.603	99.98	0.000	Pass
10	4.366	54.603	4.365	54.603	99.98	0.000	Pass	4.312	54.603	98.79	0.000	Pass	4.311	54.602	99.98	0.002	Pass	4.308	54.601	99.93	0.002	Pass
Ave.	4.366	54.603	4.365	54.603	99.97	0.001	-	4.313	54.603	98.80	0.000	-	4.311	54.603	99.97	0.001	-	4.309	54.602	99.96	0.001	-

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
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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	4.310	53.14	Pass
2	4.311	52.17	Pass
3	4.310	54.87	Pass
4	4.310	53.66	Pass
5	4.308	52.71	Pass
6	4.309	52.37	Pass
7	4.308	52.36	Pass
8	4.309	53.69	Pass
9	4.309	54.18	Pass
10	4.308	55.23	Pass
MAX.	4.311	55.23	-

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	23.12	Pass
	12	4.365	24.25	Pass
	13	4.365	23.60	Pass
	14	4.366	23.22	Pass
	MAX.	4.366	24.25	-

Test Condition
- Max. Charge Current : 3660mA - CC/CV 2Imax(7320mA) 8.8V cut-off 24Hr

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

B. 50th cycle fully charged state

Charge	15	4.364	23.65	Pass
	16	4.365	24.66	Pass
	17	4.365	21.45	Pass
	18	4.364	22.21	Pass
	MAX.	4.365	24.66	-

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

3-3. T6/T8 Test Result (ICP5447104L1)

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

A. 1st cycle 50% charged state

Flat	C-1	3.882	23.13	Pass
	C-2	3.881	22.57	Pass
	C-3	3.880	23.57	Pass
	C-4	3.881	23.55	Pass
	C-5	3.880	24.09	Pass
MAX.		3.882	24.09	-

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	3.018	46.99	Pass
C-7	3.013	46.74	Pass
C-8	3.012	45.21	Pass
C-9	3.016	48.26	Pass
C-10	3.008	48.20	Pass
C-11	3.017	48.56	Pass
C-12	3.017	49.63	Pass
C-13	3.015	47.21	Pass
C-14	3.012	46.50	Pass
C-15	3.010	47.30	Pass
MAX.	3.018	49.63	-

B. 50th cycle fully discharged state

C-16	3.129	45.94	Pass
C-17	3.117	47.63	Pass
C-18	3.119	48.21	Pass
C-19	3.125	47.86	Pass
C-20	3.119	48.16	Pass
C-21	3.126	48.22	Pass
C-22	3.122	47.39	Pass
C-23	3.122	49.25	Pass
C-24	3.127	45.22	Pass
C-25	3.120	44.89	Pass
MAX.	3.125	49.25	-

Test Condition
- Discharge at max. discharge current : 3660mA (with 12V DC power supply), 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 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	5.729 kg		Passed

B. Sample Description

Dimensions	400×300×87mm	Net Weight of Batteries	4.300 kg	Battery Type	Rechargeable Li-ion Battery
Gross weight	5.729 kg	Battery number	80Pcs/Carton	** Description	Covered by Styrofoam

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

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