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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	FW3S
Cell Model name	ICP362728L1
Nominal voltage	3.8 V
Electric power capacity	1.1 Wh

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UN Test Report

- FW3S(Min.1.1Wh, 3.8V) -

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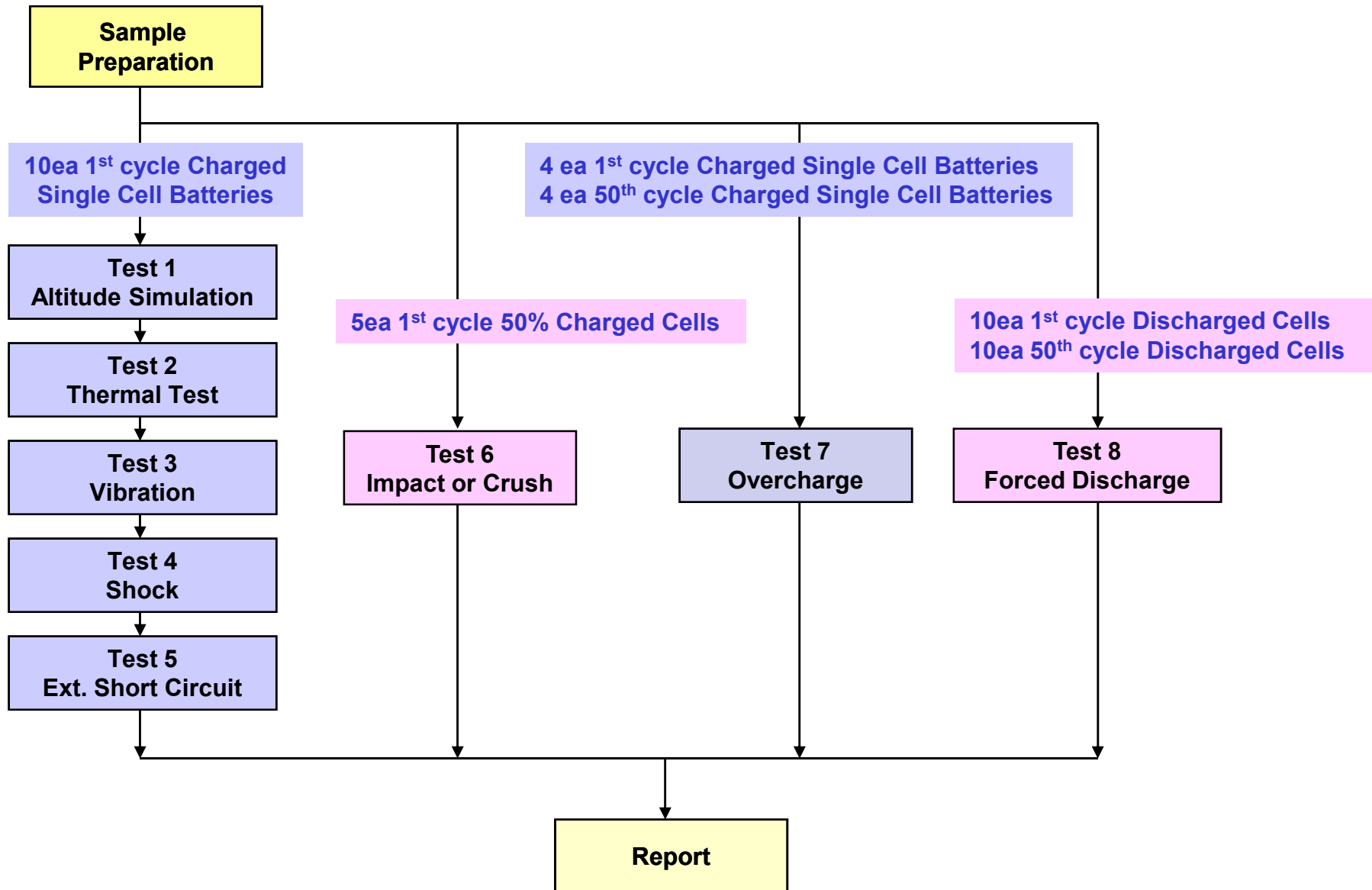
1. UN Transportation Regulation Test

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	4.365	5.234	4.365	5.234	100.00	0.000	Pass	4.312	5.233	98.79	0.019	Pass	4.312	5.233	100.00	0.000	Pass	4.311	5.232	99.98	0.019	Pass
2	4.366	5.232	4.365	5.232	99.98	0.000	Pass	4.313	5.232	98.81	0.000	Pass	4.313	5.232	100.00	0.000	Pass	4.312	5.232	99.98	0.000	Pass
3	4.365	5.233	4.365	5.232	100.00	0.019	Pass	4.312	5.232	98.79	0.000	Pass	4.311	5.232	99.98	0.000	Pass	4.311	5.232	100.00	0.000	Pass
4	4.365	5.235	4.365	5.235	100.00	0.000	Pass	4.312	5.234	98.79	0.019	Pass	4.312	5.233	100.00	0.019	Pass	4.312	5.233	100.00	0.000	Pass
5	4.366	5.234	4.365	5.234	99.98	0.000	Pass	4.312	5.234	98.79	0.000	Pass	4.312	5.234	100.00	0.000	Pass	4.311	5.233	99.98	0.019	Pass
6	4.365	5.234	4.365	5.234	100.00	0.000	Pass	4.313	5.234	98.81	0.000	Pass	4.313	5.234	100.00	0.000	Pass	4.312	5.234	99.98	0.000	Pass
7	4.366	5.232	4.366	5.232	100.00	0.000	Pass	4.312	5.232	98.76	0.000	Pass	4.312	5.232	100.00	0.000	Pass	4.312	5.232	100.00	0.000	Pass
8	4.366	5.235	4.365	5.234	99.98	0.019	Pass	4.313	5.234	98.81	0.000	Pass	4.311	5.234	99.95	0.000	Pass	4.311	5.234	100.00	0.000	Pass
9	4.367	5.233	4.367	5.233	100.00	0.000	Pass	4.312	5.232	98.74	0.019	Pass	4.312	5.232	100.00	0.000	Pass	4.312	5.232	100.00	0.000	Pass
10	4.366	5.234	4.365	5.234	99.98	0.000	Pass	4.312	5.234	98.79	0.000	Pass	4.312	5.233	100.00	0.019	Pass	4.311	5.233	99.98	0.000	Pass
Ave.	4.366	5.234	4.365	5.233	99.99	0.004	-	4.312	5.233	98.79	0.006	-	4.312	5.233	99.99	0.004	-	4.312	5.233	99.99	0.004	-

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	4.311	52.76	Pass
2	4.312	53.45	Pass
3	4.311	55.41	Pass
4	4.312	52.11	Pass
5	4.311	53.87	Pass
6	4.312	53.97	Pass
7	4.312	52.15	Pass
8	4.311	54.24	Pass
9	4.312	52.37	Pass
10	4.311	54.14	Pass
MAX.	4.312	55.41	-

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	4.365	22.15	Pass
	12	4.365	23.48	Pass
	13	4.366	21.36	Pass
	14	4.366	23.77	Pass
	MAX.	4.366	23.77	-

Test Condition
- Max. Charge Current : 290mA - CC/CV 2I _{max} (580mA) 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	24.18	Pass
	16	4.364	25.76	Pass
	17	4.365	24.53	Pass
	18	4.365	22.51	Pass
	MAX.	4.365	25.76	-

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

3-3. T6/T8 Test Result (ICP362728L1)

Crush (T6)				
Direction	NO.	Initial OCV(V)	Max. Temp (°C)	Result
A. 1st cycle 50% charged state				
Flat	C-1	3.895	25.31	Pass
	C-2	3.894	24.22	Pass
	C-3	3.893	25.03	Pass
	C-4	3.892	23.38	Pass
	C-5	3.897	26.33	Pass
MAX.		3.897	26.33	-

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	3.011	48.32	Pass	
C-7	3.012	45.23	Pass	
C-8	3.019	44.32	Pass	
C-9	3.018	45.43	Pass	
C-10	3.012	47.61	Pass	
C-11	3.009	47.23	Pass	
C-12	3.008	48.23	Pass	
C-13	3.013	45.34	Pass	
C-14	3.011	45.34	Pass	
C-15	3.012	45.34	Pass	
MAX.		3.019	48.32	-

B. 50th cycle fully discharged state				
C-16	3.115	45.32	Pass	
C-17	3.111	45.32	Pass	
C-18	3.109	44.33	Pass	
C-19	3.121	45.67	Pass	
C-20	3.108	45.26	Pass	
C-21	3.116	46.32	Pass	
C-22	3.121	47.45	Pass	
C-23	3.124	47.23	Pass	
C-24	3.120	46.11	Pass	
C-25	3.113	44.98	Pass	
MAX.		3.124	47.45	-

Test Condition
- Discharge at max. discharge current (with 12V DC power supply) : 290mA 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	6.173kg		Passed

B. Sample Description

Dimensions	40.5×30.6×16.5 cm	Net Weight of Batteries	3.162kg	Battery Type	Rechargeable Li-ion Battery
Gross weight	6.173kg	Battery number	600Pcs/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