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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 checked="" type="checkbox"/> Lithium-ion battery <input type="checkbox"/> Lithium-ion single cell battery	
Model name	L14L4A01
Cell Model name	ICR18650S3
Nominal voltage	14.4 V
Electric power capacity	32 Wh

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SolutionPartner

UN Test Report

- L14L4A01 (Nom.32Wh, 14.4V) -

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2014. 11. 20



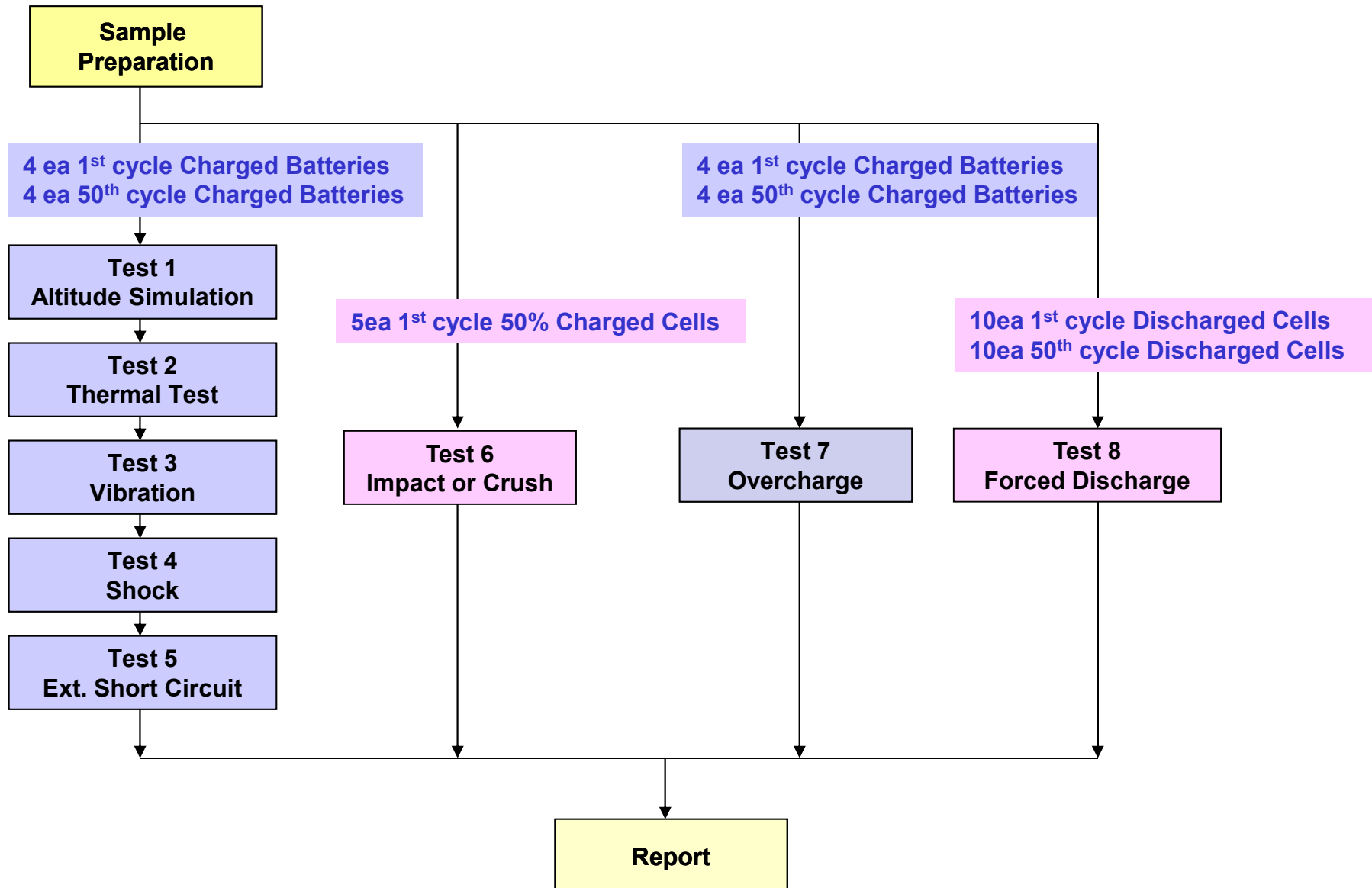
1. UN Transportation Regulation Test

Test	Condition	Requirements
Test 1. Altitude Simulation	Storing at (low pressure) 11.6kPa for 6hr at 20+/-5 °C	- 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 °C, 6hr ↔ -40 ± 2 °C, 6hr, interval max. 30min] x 10 cycle Storing at 20±5 °C 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 °C 1hr continue after returning at 55±2 °C	
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 °C)
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 state

Charge	1	16.777	203.189	16.747	203.169	99.82	0.010	Pass	16.512	203.166	98.60	0.001	Pass	16.321	203.158	98.84	0.004	Pass	16.030	203.152	98.22	0.003	Pass
	2	16.748	203.805	16.722	203.803	99.84	0.001	Pass	16.473	203.800	98.51	0.001	Pass	16.287	203.783	98.87	0.008	Pass	16.006	203.775	98.27	0.004	Pass
	3	16.747	203.241	16.718	203.222	99.83	0.009	Pass	16.470	203.207	98.52	0.007	Pass	16.278	203.206	98.83	0.000	Pass	15.999	203.199	98.29	0.003	Pass
	4	16.737	203.488	16.709	203.484	99.83	0.002	Pass	16.466	203.482	98.55	0.001	Pass	16.271	203.458	98.82	0.012	Pass	15.994	203.441	98.30	0.008	Pass
	Ave.	16.752	203.431	16.724	203.420	99.83	0.006	-	16.480	203.414	98.54	0.003	-	16.289	203.401	98.84	0.006	-	16.007	203.392	98.27	0.005	-

B. 50th cycle fully state

Charge	5	16.767	203.268	16.748	203.266	99.89	0.001	Pass	16.510	203.253	98.58	0.006	Pass	16.325	203.246	98.88	0.003	Pass	16.039	203.232	98.25	0.007	Pass
	6	16.750	203.550	16.729	203.542	99.87	0.004	Pass	16.491	203.528	98.58	0.007	Pass	16.309	203.519	98.90	0.004	Pass	16.025	203.510	98.26	0.004	Pass
	7	16.767	203.425	16.744	203.403	99.86	0.011	Pass	16.507	203.392	98.58	0.005	Pass	16.309	203.383	98.80	0.004	Pass	16.030	203.372	98.29	0.005	Pass
	8	16.758	203.240	16.726	203.229	99.81	0.005	Pass	16.479	203.226	98.52	0.001	Pass	16.287	203.213	98.83	0.006	Pass	16.008	203.194	98.29	0.009	Pass
	Ave.	16.761	203.371	16.737	203.360	99.86	0.005	-	16.497	203.350	98.57	0.005	-	16.308	203.340	98.85	0.005	-	16.026	203.327	98.27	0.007	-

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

A. 1st cycle fully state

Charge	1	16.030	56.34	Pass
	2	16.006	55.51	Pass
	3	15.999	56.62	Pass
	4	15.994	55.06	Pass
	MAX.	16.030	56.62	-

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

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

A. 1st cycle fully state

Charge	9	16.746	24.23	Pass
	10	16.745	24.95	Pass
	11	16.748	24.88	Pass
	12	16.749	23.51	Pass
	MAX.	16.749	24.95	-

Test Condition
- Max. Charge Current : 1075mA - CC/CV 2Imax(2150mA) 22V cut-off 24Hr

EXT.Short Circuit (T5)				
	NO.	Initial OCV(V)	Max. Temp (°C)	Result

B. 50th cycle fully state

Charge	5	16.039	55.72	Pass
	6	16.025	55.96	Pass
	7	16.030	56.11	Pass
	8	16.008	55.06	Pass
	MAX.	16.039	56.11	-

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

B. 50th cycle fully state

Charge	13	16.723	24.12	Pass
	14	16.721	23.67	Pass
	15	16.722	23.53	Pass
	16	16.728	24.62	Pass
	MAX.	16.728	24.62	-

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

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

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

A. 1st cycle 50% charged state (Direction : Flat)

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
- 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	3.435	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

