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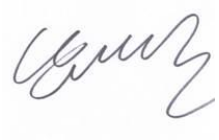
CERTIFICATE OF COMPLIANCE

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	**AP15B8K**
Cell Model name	**ICP30100107L1**
Nominal voltage	**7.6 V**
Electric power capacity	**34.5 Wh**

Conducted By: Dae Ho Nam



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UN Test Report
- AP15B8K(Nom.34.5Wh, 7.6V)-

목 차

2015. 02. 09

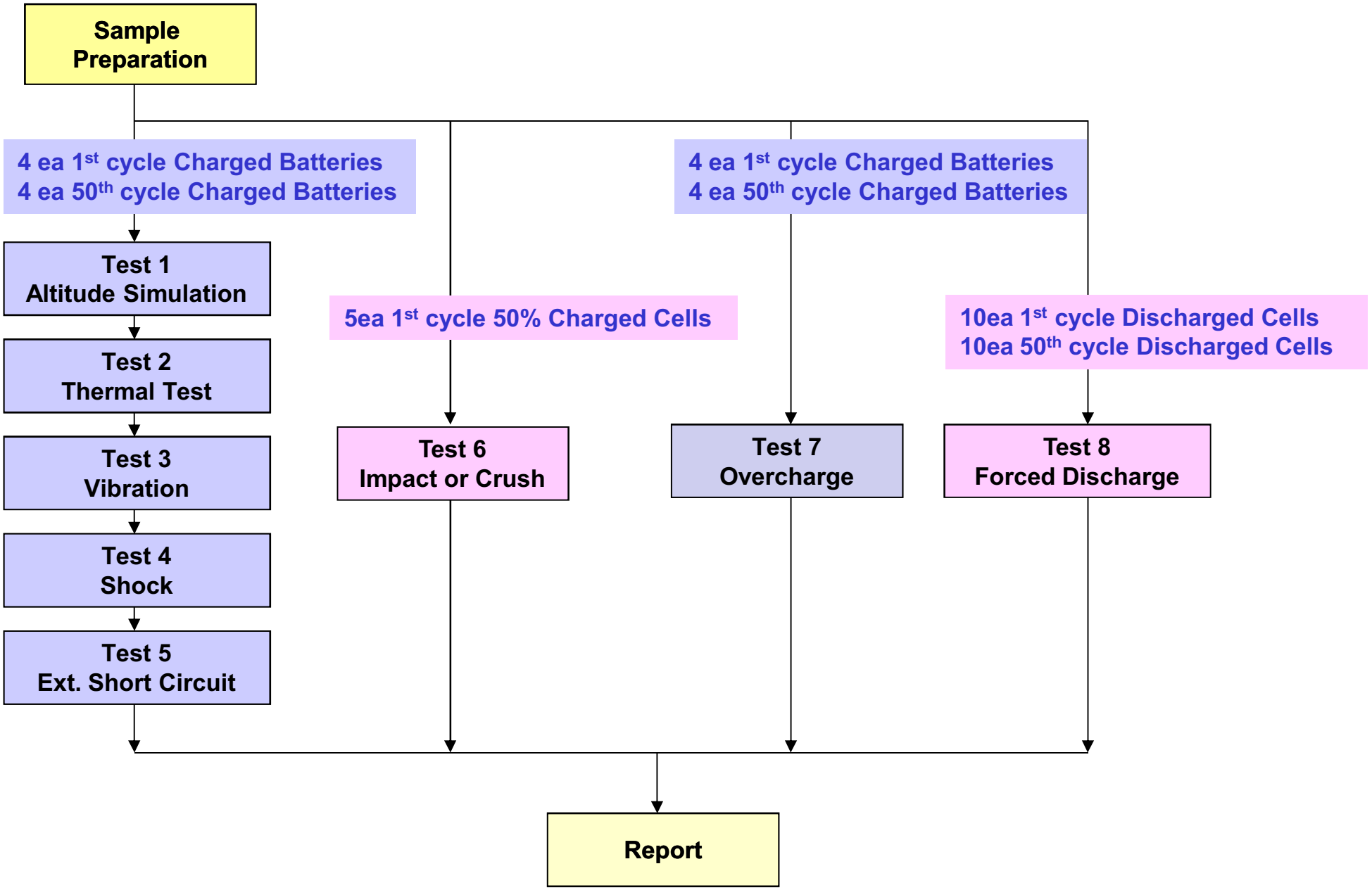
LG Chem

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	100m 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**	8.607	167.97	8.604	167.96	99.97	0.006	**Pass**	8.498	167.95	98.77	0.006	**Pass**	8.496	167.94	99.98	0.006	**Pass**	8.494	167.93	99.98	0.006	**Pass**
	2	8.608	167.19	8.607	167.18	99.99	0.006	**Pass**	8.491	167.17	98.65	0.006	**Pass**	8.491	167.15	100.00	0.012	**Pass**	8.489	167.15	99.98	0.000	**Pass**
	3	8.616	167.29	8.616	167.29	100.00	0.000	**Pass**	8.513	167.28	98.80	0.006	**Pass**	8.512	167.27	99.99	0.006	**Pass**	8.512	167.27	100.00	0.000	**Pass**
	4	8.615	167.57	8.612	167.56	99.97	0.006	**Pass**	8.499	167.54	98.69	0.012	**Pass**	8.496	167.53	99.96	0.006	**Pass**	8.494	167.52	99.98	0.006	**Pass**
	Ave.	8.612	167.51	8.610	167.50	99.98	0.004	**-**	8.500	167.49	98.73	0.007	**-**	8.499	167.47	99.98	0.007	**-**	8.497	167.47	99.98	0.003	**-**
B. 50th cycle fully charged state																							
Charge	**5**	8.602	167.73	8.600	167.73	99.98	0.000	**Pass**	8.483	167.71	98.64	0.012	**Pass**	8.483	167.70	100.00	0.006	**Pass**	8.482	167.69	99.99	0.006	**Pass**
	6	8.603	167.35	8.601	167.35	99.98	0.000	**Pass**	8.490	167.34	98.71	0.006	**Pass**	8.488	167.34	99.98	0.000	**Pass**	8.486	167.33	99.98	0.006	**Pass**
	7	8.609	167.58	8.605	167.57	99.95	0.006	**Pass**	8.489	167.57	98.65	0.000	**Pass**	8.488	167.57	99.99	0.000	**Pass**	8.486	167.57	99.98	0.000	**Pass**
	8	8.610	167.26	8.608	167.25	99.98	0.006	**Pass**	8.498	167.23	98.72	0.012	**Pass**	8.497	167.21	99.99	0.012	**Pass**	8.493	167.20	99.95	0.006	**Pass**
	Ave.	8.606	167.48	8.604	167.48	99.97	0.003	**-**	8.490	167.46	98.68	0.007	**-**	8.489	167.46	99.99	0.004	**-**	8.487	167.45	99.97	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	8.494	59.37	Pass
	2	8.489	58.47	Pass
	3	8.512	59.17	Pass
	4	8.494	58.71	Pass
	MAX.	8.512	59.37	-

EXT.Short Circuit (T5)				
	NO.	Initial OCV(V)	Max. Temp (℃)	Result
B. 50th cycle fully charged state				
Charge	5	8.482	59.46	Pass
	6	8.486	59.20	Pass
	7	8.486	59.76	Pass
	8	8.493	59.70	Pass
	MAX.	8.493	59.76	-

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	8.575	23.96	Pass
	10	8.580	25.23	Pass
	11	8.571	23.71	Pass
	12	8.573	24.98	Pass
	MAX.	8.580	25.23	-

Over Charge (T7)				
	NO.	Initial OCV(V)	Max. Temp (℃)	Result
B. 50th cycle fully charged state				
Charge	13	8.557	25.34	Pass
	14	8.556	24.12	Pass
	15	8.553	23.88	Pass
	16	8.556	24.63	Pass
	MAX.	8.557	25.34	-

Test Condition
- Max. Charge Current : 4420mA - CC/CV 2Imax(8840mA) 17.4V cut-off 24Hr

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

3-3. T6/T8 Test Result (ICP30100107L1)

Crush (T6)				
Direction	NO.	Initial OCV(V)	Max. Temp (℃)	Result
A. 1st cycle 50% charged state				
Flat	C-1	3.824	24.21	Pass
	C-2	3.822	24.65	Pass
	C-3	3.821	24.31	Pass
	C-4	3.821	24.33	Pass
	C-5	3.821	24.32	Pass
MAX.		3.824	24.65	-

Test Condition
- Crushing rate :1.5cm/s, until 13kN±0.78kN or 100mV drop or 50% deformation

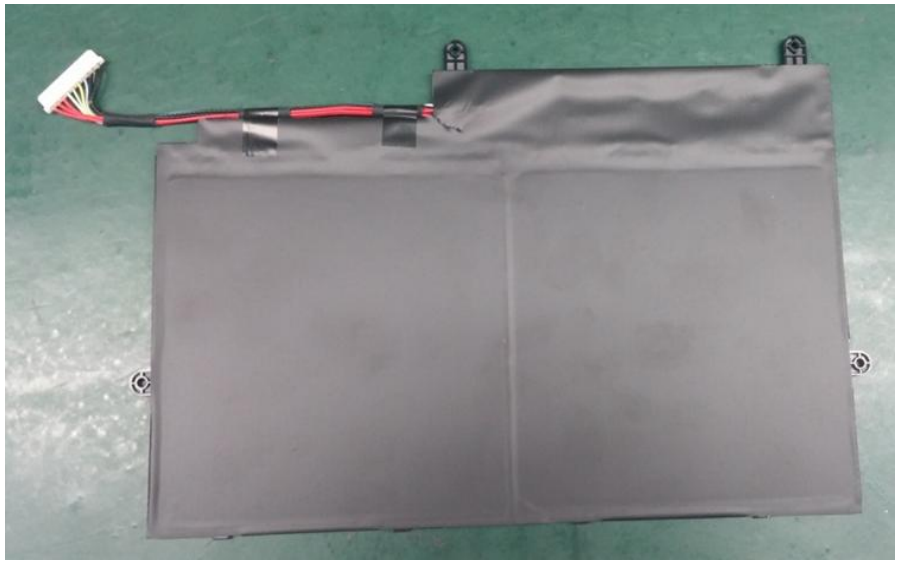
Requirement
- Temperature ≤ 170 (℃)
- No disassembly, no fire within 6 hours after the test

Forced Discharge (T8)			
NO.	Initial OCV(V)	Max. Temp (℃)	Result
A. 1st cycle fully discharged state			
C-6	3.050	59.21	Pass
C-7	3.042	59.22	Pass
C-8	3.032	63.74	Pass
C-9	3.045	59.83	Pass
C-10	3.052	61.78	Pass
C-11	3.045	67.35	Pass
C-12	3.036	61.85	Pass
C-13	3.043	72.79	Pass
C-14	3.046	71.73	Pass
C-15	3.025	64.46	Pass
MAX.	3.052	72.79	-
B. 50th cycle fully discharged state			
C-16	3.088	67.26	Pass
C-17	3.090	63.27	Pass
C-18	3.094	69.00	Pass
C-19	3.068	60.28	Pass
C-20	3.113	68.10	Pass
C-21	3.097	60.31	Pass
C-22	3.111	57.80	Pass
C-23	3.100	64.22	Pass
C-24	3.101	66.74	Pass
C-25	3.068	61.84	Pass
MAX.	3.113	69.00	-

Test Condition
- Discharge at max. discharge current (with 12V DC power supply) : 4420mA 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(18th) 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(18th) special provisions 188	410 g		Passed

B. Sample Description

Dimensions	24.6X 16.0X 3.6cm	**Net Weight of Batteries**	335 g	**Battery Type**	Rechargeable Li-ion Battery
Gross weight	410 g	**Battery number**	2Pcs/Carton	**** Description**	Covered by air bag

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

Appendix 2. 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(18th) 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(18th) special provisions 188	9.10 kg		Passed

B. Sample Description

Dimensions	33.5X 28.5 X 15.8cm	**Net Weight of Batteries**	8.75 kg	**Battery Type**	Rechargeable Li-ion Battery
Gross weight	9.10 kg	**Battery number**	50Pcs/Carton	**** Description**	Covered by air bag

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