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UN Test Report
- ASM P/N 45N1754(47 Wh, 11.4V) -

목 차

2014. 01. 17

LG Chem

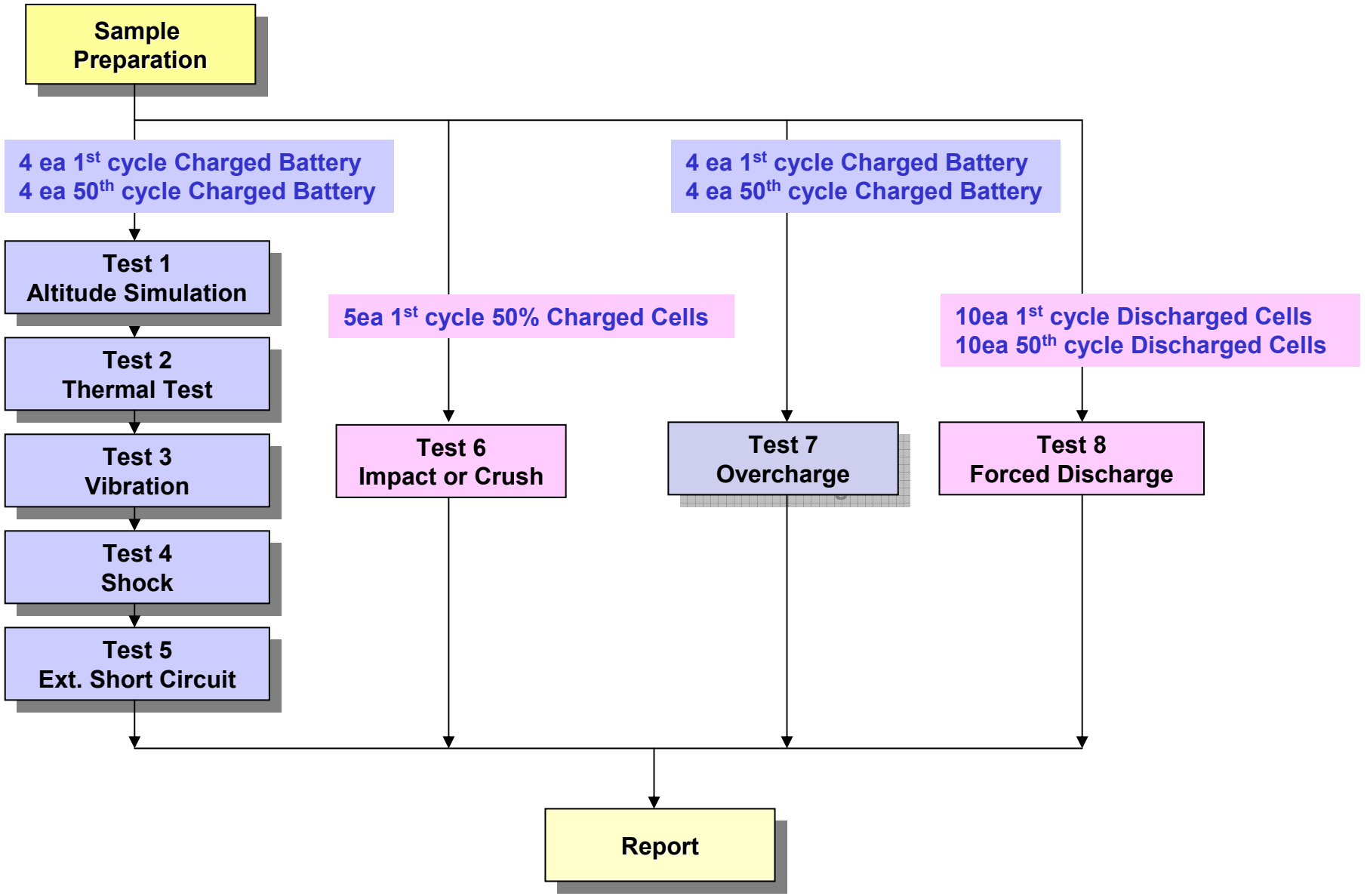
1. UN Transportation Regulation Test

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	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 (> 20mm 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 (≤ 20mm 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 battery.

* 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.1)

2. Test Procedure



3-1. T1-T4 Test Result

Before				Altitude (T1)					Thermal (T2)					Vibration (T3)					Shock (T4)				
	Pack 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**	12.847	241.652	12.828	241.632	99.86	0.008	**Pass**	12.708	241.609	99.06	0.010	**Pass**	12.690	241.601	99.86	0.003	**Pass**	12.674	241.588	99.87	0.005	**Pass**
	2	12.845	241.235	12.831	241.211	99.89	0.010	**Pass**	12.707	241.200	99.04	0.005	**Pass**	12.693	241.186	99.89	0.006	**Pass**	12.674	241.164	99.85	0.009	**Pass**
	3	12.847	241.627	12.834	241.611	99.90	0.007	**Pass**	12.716	241.586	99.08	0.010	**Pass**	12.702	241.579	99.89	0.003	**Pass**	12.678	241.578	99.81	0.001	**Pass**
	4	12.846	241.099	12.824	241.081	99.83	0.007	**Pass**	12.707	241.064	99.08	0.007	**Pass**	12.694	241.045	99.89	0.008	**Pass**	12.678	241.037	99.88	0.003	**Pass**
	Ave.	12.846	241.403	12.829	241.384	99.87	0.008	-	12.710	241.365	99.07	0.008	-	12.695	241.353	99.88	0.005	-	12.676	241.342	99.85	0.005	-
B. 50th cycle fully state																							
Charge	**5**	12.836	241.060	12.812	241.060	99.82	0.000	**Pass**	12.687	241.058	99.02	0.001	**Pass**	12.673	241.055	99.89	0.001	**Pass**	12.661	241.034	99.90	0.009	**Pass**
	6	12.848	241.842	12.834	241.819	99.89	0.010	**Pass**	12.707	241.811	99.01	0.003	**Pass**	12.686	241.799	99.83	0.005	**Pass**	12.665	241.775	99.83	0.010	**Pass**
	7	12.845	241.897	12.830	241.882	99.89	0.006	**Pass**	12.705	241.873	99.02	0.004	**Pass**	12.690	241.867	99.88	0.002	**Pass**	12.676	241.842	99.89	0.010	**Pass**
	8	12.839	241.244	12.814	241.225	99.81	0.008	**Pass**	12.694	241.225	99.07	0.000	**Pass**	12.681	241.202	99.89	0.010	**Pass**	12.666	241.194	99.88	0.003	**Pass**
	Ave.	12.842	241.511	12.823	241.497	99.85	0.006	-	12.699	241.492	99.03	0.002	-	12.683	241.481	99.87	0.005	-	12.667	241.461	99.88	0.008	-

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)				
	Pack NO.	Initial OCV(V)	Max. Temp (℃)	Result
A. 1st cycle fully state				
Charge	1	12.674	55.44	Pass
	2	12.674	55.38	Pass
	3	12.678	55.09	Pass
	4	12.678	55.63	Pass
	MAX.	12.678	55.63	-

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

EXT.Short Circuit (T5)				
	Pack NO.	Initial OCV(V)	Max. Temp (℃)	Result
B. 50th cycle fully state				
Charge	5	12.661	54.57	Pass
	6	12.665	54.50	Pass
	7	12.676	54.72	Pass
	8	12.666	54.75	Pass
	MAX.	12.676	54.75	-

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

Over Charge (T7)				
	Pack NO.	Initial OCV(V)	Max. Temp (℃)	Result
A. 1st cycle fully state				
Charge	9	12.867	25.37	Pass
	10	12.838	25.37	Pass
	11	12.810	25.53	Pass
	12	12.893	25.99	Pass
	MAX.	12.893	25.99	-

Test Condition
- Max. Charge Current : 4300 mA - CC/CV 2Imax(8600mA) 22 V cut-off 24Hr

Over Charge (T7)				
	Pack NO.	Initial OCV(V)	Max. Temp (℃)	Result
B. 50th cycle fully state				
Charge	13	12.885	25.13	Pass
	14	12.852	25.05	Pass
	15	12.834	25.22	Pass
	16	12.802	25.34	Pass
	MAX.	12.885	25.34	-

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

3-3. T6 Test Result (ICP653864L1)

Crush (T6)				
	Pack NO.	Initial OCV(V)	Max. Temp (℃)	Result
A. 1st cycle 50% charged state (Direction :Flat)				
Flat	1	3.845	26.41	Pass
	2	3.845	23.44	Pass
	3	3.845	23.35	Pass
	4	3.856	24.19	Pass
	5	3.858	22.56	Pass
MAX.		3.858	24.19	-

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)			
Pack NO.	Initial OCV(V)	Max. Temp (℃)	Result
A. 1st cycle fully Discharged state			
1	3.201	76.51	Pass
2	3.202	77.92	Pass
3	3.198	85.21	Pass
4	3.206	77.21	Pass
5	3.197	78.32	Pass
6	3.197	80.26	Pass
7	3.201	82.35	Pass
8	3.202	78.79	Pass
9	3.195	77.69	Pass
10	3.208	79.94	Pass
MAX.	3.210	85.21	-
B. 50th cycle fully discharged state			
1	3.345	80.12	Pass
2	3.348	81.24	Pass
3	3.351	79.14	Pass
4	3.340	76.66	Pass
5	3.337	81.24	Pass
6	3.350	82.06	Pass
7	3.347	80.44	Pass
8	3.360	81.09	Pass
9	3.357	78.94	Pass
10	3.355	81.35	Pass
MAX.	3.360	82.06	-

Test Condition
- Discharge at max. discharge current (with 12V DC power supply) : 3015mA Duration time: rated capacity 40.0min

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

4. Sample Image