
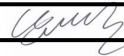



문서번호	QAE-EF02-140117-PKASMPN45N1760	
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UN Test Report

- ASM P/N 45N1760(48 Wh, 10.8V) -

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 **LG Chem**

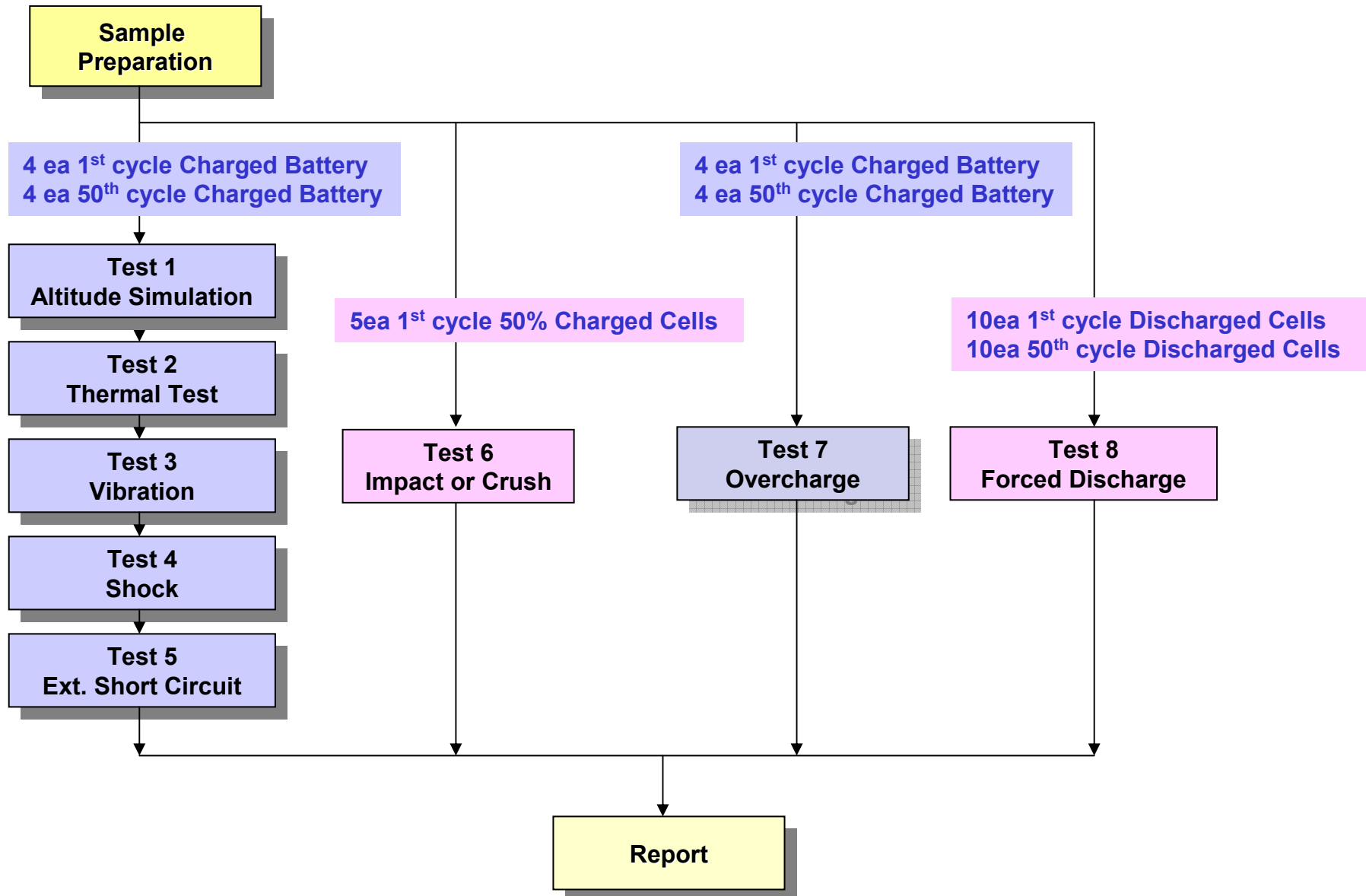
1. UN Transportation Regulation Test

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 $1g \leq M \leq 75g$, 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 (> 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	12.549	305.542	12.529	305.518	99.85	0.008	Pass	12.404	305.506	99.00	0.004	Pass	12.384	305.504	99.84	0.001	Pass	12.370	305.488	99.89	0.005	Pass
	2	12.546	305.373	12.526	305.361	99.84	0.004	Pass	12.409	305.350	99.07	0.003	Pass	12.395	305.332	99.89	0.006	Pass	12.382	305.328	99.90	0.001	Pass
	3	12.550	305.743	12.528	305.730	99.82	0.004	Pass	12.411	305.716	99.07	0.004	Pass	12.390	305.716	99.83	0.000	Pass	12.371	305.694	99.85	0.007	Pass
	4	12.543	305.907	12.518	305.890	99.80	0.006	Pass	12.397	305.880	99.03	0.003	Pass	12.376	305.877	99.83	0.001	Pass	12.360	305.870	99.87	0.002	Pass
	Ave.	12.547	305.641	12.525	305.625	99.83	0.005	-	12.405	305.613	99.04	0.004	-	12.386	305.607	99.85	0.002	-	12.371	305.595	99.88	0.004	-

B. 50th cycle fully state

Charge	5	12.532	305.571	12.514	305.560	99.86	0.004	Pass	12.392	305.549	99.02	0.004	Pass	12.368	305.539	99.81	0.003	Pass	12.351	305.533	99.86	0.002	Pass
	6	12.546	305.617	12.525	305.605	99.83	0.004	Pass	12.405	305.594	99.04	0.003	Pass	12.391	305.570	99.89	0.008	Pass	12.373	305.563	99.86	0.002	Pass
	7	12.539	305.084	12.518	305.065	99.84	0.006	Pass	12.397	305.046	99.03	0.006	Pass	12.384	305.026	99.89	0.006	Pass	12.370	305.007	99.89	0.006	Pass
	8	12.549	305.223	12.526	305.220	99.82	0.001	Pass	12.405	305.212	99.03	0.003	Pass	12.387	305.191	99.86	0.007	Pass	12.370	305.184	99.86	0.002	Pass
	Ave.	12.541	305.374	12.521	305.362	99.84	0.004	-	12.400	305.350	99.03	0.004	-	12.382	305.332	99.86	0.006	-	12.366	305.322	99.87	0.003	-

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)				
	Pack NO.	Initial OCV(V)	Max. Temp (°C)	Result

A. 1st cycle fully state

Charge	1	12.370	55.48	Pass
	2	12.382	55.22	Pass
	3	12.371	55.16	Pass
	4	12.360	55.65	Pass
	MAX.	12.371	55.65	-

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

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

A. 1st cycle fully state

Charge	9	12.525	25.98	Pass
	10	12.509	25.96	Pass
	11	12.568	25.69	Pass
	12	12.598	25.47	Pass
	MAX.	12.598	25.98	-

Test Condition
- Max. Charge Current : 2800 mA - CC/CV 2Imax(5600mA) 22 V cut-off 24Hr

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

B. 50th cycle fully state

Charge	5	12.351	54.26	Pass
	6	12.373	54.41	Pass
	7	12.370	54.94	Pass
	8	12.370	55.00	Pass
	MAX.	12.366	55.00	-

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

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

B. 50th cycle fully state

Charge	13	12.576	25.43	Pass
	14	12.484	25.06	Pass
	15	12.523	25.95	Pass
	16	12.524	25.23	Pass
	MAX.	12.576	25.95	-

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

3-3. T6 Test Result (ICR18650S3)

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

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

Flat	1	3.647	17.86	Pass
	2	3.647	18.66	Pass
	3	3.647	19.22	Pass
	4	3.647	19.82	Pass
	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)			
Pack NO.	Initial OCV(V)	Max. Temp (°C)	Result

A. 1st cycle fully Discharged state

1	3.435	95.86	Pass
2	3.435	91.43	Pass
3	3.436	104.99	Pass
4	3.436	98.50	Pass
5	3.436	93.10	Pass
6	3.437	99.91	Pass
7	3.437	97.06	Pass
8	3.435	97.02	Pass
9	3.436	103.25	Pass
10	3.435	99.42	Pass
MAX.	3.437	104.99	-

B. 50th cycle fully discharged state

1	3.435	94.44	Pass
2	3.436	93.95	Pass
3	3.436	98.90	Pass
4	3.435	102.69	Pass
5	3.436	95.74	Pass
6	3.436	95.66	Pass
7	3.436	93.42	Pass
8	3.437	98.34	Pass
9	3.437	96.99	Pass
10	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 (30.7min)

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

