

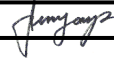


문서번호	QAE-EF02-111013-PKASMP/N45N1024	
Prepared	김홍일	
	남익현	
	이문규	
Reviewed	남대호	
	최운기	
Approved	정준용	

SolutionPartner

UN Test Report

- ASM P/N 45N1024 (Nom. 63Wh, 11.1V)-

목 차

1. UN Transportation Regulation Test
2. Test Procedure
3. Test Result
4. Sample Image

2011. 10. 13

 **LG Chem**
Mobile Energy Division

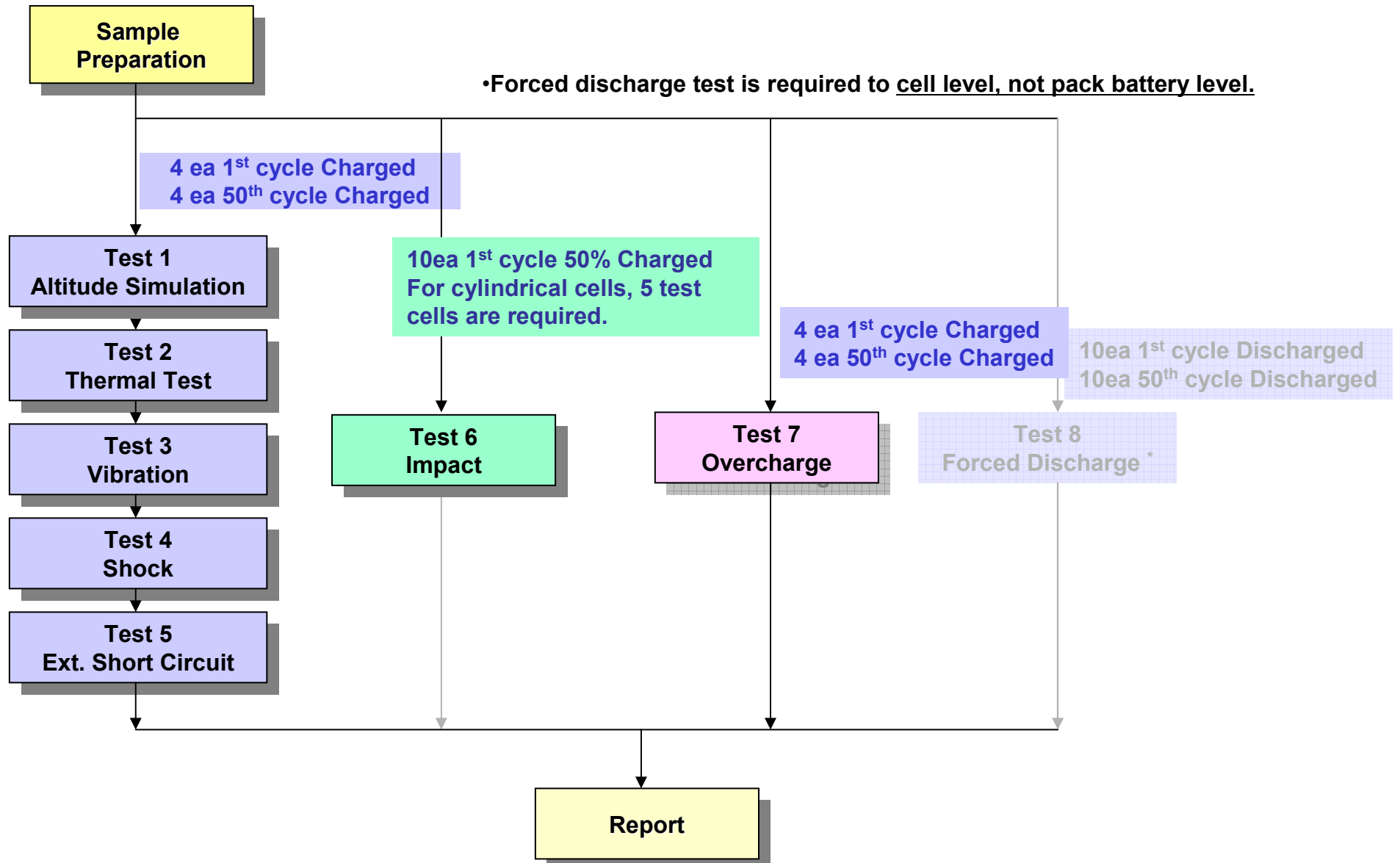
1. UN Transportation Regulation Test

Test	Condition	Requirements
Test 1. Altitude Simulation	Storing at (low pressure)11.6kPa for 6hr at 20+/-5℃	<ul style="list-style-type: none"> - Measuring mass before/ after each test (If M>5g, 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	[75±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℃	<ul style="list-style-type: none"> - No disassembly, no rupture, no fire (after 6 hours) - Temp. monitoring (max. 170℃)
Test 6. Impact	Φ=15.8mm bar, 9.1kg mass, 61±2.5cm height	
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 (after 7 days)
Test 8. Forced Discharge	Only for Cell, not battery.	- No disassembly, no fire (after 7 days)

* 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)

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	12.411	327.874	12.402	327.869	99.93	0.002	Pass	12.397	327.863	99.96	0.002	Pass	12.395	327.855	99.98	0.002	Pass	12.389	327.853	99.95	0.001	Pass
	2	12.492	327.855	12.485	327.844	99.94	0.003	Pass	12.378	327.838	99.14	0.002	Pass	12.365	327.835	99.90	0.001	Pass	12.361	327.831	99.97	0.001	Pass
	3	12.405	327.891	12.401	327.885	99.97	0.002	Pass	12.394	327.881	99.94	0.001	Pass	12.393	327.875	99.99	0.002	Pass	12.387	327.873	99.95	0.001	Pass
	4	12.487	327.735	12.483	327.731	99.97	0.001	Pass	12.376	327.719	99.14	0.004	Pass	12.369	327.711	99.94	0.002	Pass	12.365	327.704	99.97	0.002	Pass
	Ave.	12.449	327.839	12.443	327.832	99.95	0.002	-	12.386	327.825	99.55	0.002	-	12.381	327.819	99.95	0.002	-	12.376	327.815	99.96	0.001	-

B. 50th cycle fully state

Charge	5	12.356	327.386	12.351	327.382	99.96	0.001	Pass	12.345	327.376	99.95	0.002	Pass	12.338	327.368	99.94	0.002	Pass	12.331	327.363	99.94	0.002	Pass
	6	12.345	327.457	12.279	327.448	99.47	0.003	Pass	12.273	327.435	99.95	0.004	Pass	12.266	327.431	99.94	0.001	Pass	12.256	327.416	99.92	0.005	Pass
	7	12.362	327.441	12.358	327.437	99.97	0.001	Pass	12.352	327.426	99.95	0.003	Pass	12.345	327.411	99.94	0.005	Pass	12.336	327.391	99.93	0.006	Pass
	8	12.375	327.355	12.367	327.319	99.94	0.011	Pass	12.355	327.315	99.90	0.001	Pass	12.348	327.304	99.94	0.003	Pass	12.335	327.289	99.89	0.005	Pass
	Ave.	12.360	327.410	12.339	327.397	99.83	0.004	-	12.331	327.388	99.94	0.003	-	12.324	327.379	99.94	0.003	-	12.315	327.365	99.92	0.004	-

Requirement

- Measuring mass before/after each test (If M>5g, less than 0.1%)
- 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	12.389	55.29	Pass
	2	12.361	55.11	Pass
	3	12.387	55.19	Pass
	4	12.365	54.98	Pass
	MAX.	12.389	55.29	-

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	12.323	25.50	Pass
	10	12.399	25.39	Pass
	11	12.333	25.11	Pass
	12	12.381	25.33	Pass
	MAX.	12.399	25.50	-

Test Condition				
- Max. Charge Current : 4000 mA - CC/CV 2Imax(8000mA) 22V cut-off 24Hr				

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

B. 50th cycle fully state

Charge	5	12.331	55.10	Pass
	6	12.256	54.97	Pass
	7	12.336	55.29	Pass
	8	12.335	55.89	Pass
	MAX.	12.336	55.89	-

Requirement				
- Temperature < 170 (°C) - No disassembly, no rupture, no fire within 6 hours				

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

B. 50th cycle fully state

Charge	13	12.399	24.51	Pass
	14	12.383	25.00	Pass
	15	12.322	25.03	Pass
	16	12.312	25.09	Pass
	MAX.	12.399	25.09	-

Requirement				
- No disassembly, no fire within 7 day				

3-3. T6 Test Result (ICR18650C2)

Impact (T6)			
Pack NO.	Initial OCV(V)	Max. Temp (°C)	Result
A. 1st cycle 50% charge state			
21	3.807	25.43	Pass
22	3.807	108.50	Pass
23	3.806	24.36	Pass
24	3.806	24.79	Pass
25	3.806	114.39	Pass
MAX.	3.807	114.39	-
B. 50th cycle fully discharge state			
26	3.351	24.83	Pass
27	3.362	46.43	Pass
28	3.387	49.26	Pass
29	3.369	49.90	Pass
30	3.353	47.55	Pass
MAX.	3.387	49.90	-
Test Condition			
- Φ =15.8mm bar, 9.1kg mass, 61±2.5cm height			
Requirement			
- Temperature < 170 (°C) - No disassembly, no rupture, no fire within 6 hours			

4. Sample Image

