

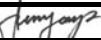


문서번호	QAE-EF02-121128-PKASMPN45N1126I	
Prepared	김홍일	
	남익현	
Reviewed	장승현	
	남대호	
Approved	이재승	
	정준용	

SolutionPartner

UN Test Report

- ASM P/N 45N1126 (23.484Wh, 11.4V) -

목 차

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

2012. 11. 28

 **LG Chem**
Mobile Energy Division

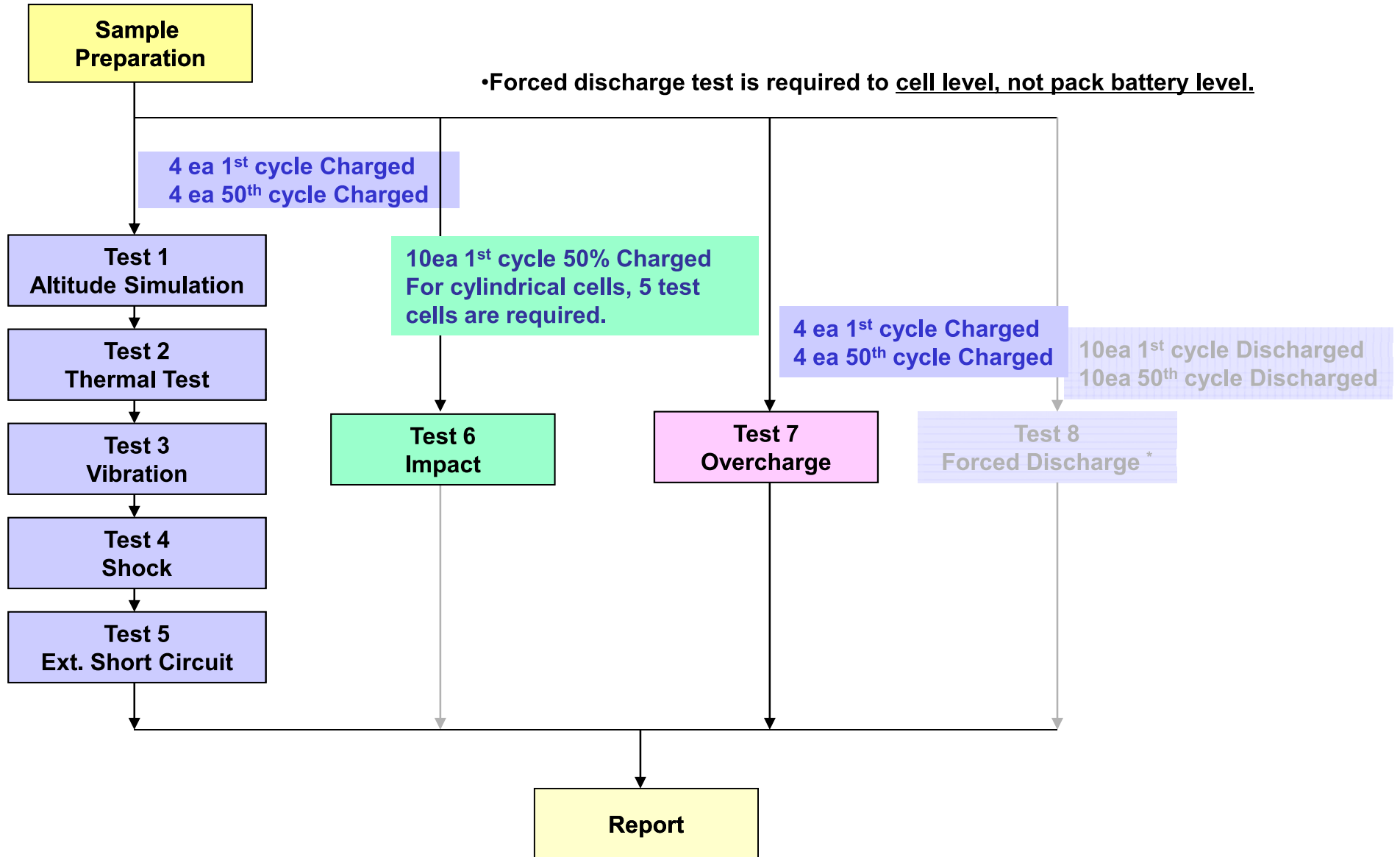
1. UN Transportation Regulation Test

Test	Condition	Requirements
Test 1. Altitude Simulation	Storing at (low pressure) 11.6kPa for 6hr at 20+/-5°C	
Test 2. Thermal Test	[75±2°C, 6hr ↔ -40±2°C, 6hr, interval max. 30min] x 10 cycle Storing at 20±5°C for 24h	<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 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	Φ=15.8mm bar, 9.1kg mass, 61±2.5cm height	<ul style="list-style-type: none"> - No disassembly, no rupture, no fire (after 6 hours) - Temp. monitoring (max. 170°C)
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)	<ul style="list-style-type: none"> - No disassembly, no fire (after 7 days)
Test 8. Forced Discharge	Only for Cell, not battery.	<ul style="list-style-type: none"> - 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	12.842	155.920	12.823	155.905	99.85	0.009	Pass	12.707	155.898	99.10	0.005	Pass	12.693	155.880	99.89	0.012	Pass	12.675	155.879	99.86	0.000	Pass
	2	12.855	156.044	12.835	156.035	99.84	0.006	Pass	12.712	156.010	99.05	0.016	Pass	12.696	156.006	99.87	0.003	Pass	12.681	155.997	99.89	0.006	Pass
	3	12.845	155.102	12.828	155.086	99.87	0.011	Pass	12.709	155.078	99.07	0.005	Pass	12.684	155.069	99.80	0.006	Pass	12.661	155.055	99.82	0.009	Pass
	4	12.849	155.768	12.827	155.747	99.83	0.013	Pass	12.703	155.735	99.03	0.007	Pass	12.678	155.716	99.80	0.012	Pass	12.660	155.702	99.86	0.009	Pass
	Ave.	12.848	155.708	12.828	155.693	99.85	0.010	-	12.708	155.680	99.06	0.008	-	12.687	155.668	99.84	0.008	-	12.669	155.658	99.86	0.006	-

B. 50th cycle fully state

Charge	1	12.823	155.462	12.806	155.446	99.86	0.010	Pass	12.683	155.423	99.04	0.015	Pass	12.670	155.407	99.90	0.010	Pass	12.647	155.394	99.82	0.008	Pass
	2	12.822	155.261	12.797	155.256	99.80	0.003	Pass	12.679	155.240	99.08	0.010	Pass	12.661	155.239	99.86	0.001	Pass	12.638	155.224	99.82	0.010	Pass
	3	12.829	155.438	12.808	155.417	99.84	0.013	Pass	12.691	155.400	99.09	0.011	Pass	12.663	155.381	99.78	0.012	Pass	12.644	155.365	99.85	0.010	Pass
	4	12.821	155.577	12.801	155.564	99.84	0.008	Pass	12.684	155.553	99.09	0.007	Pass	12.651	155.532	99.74	0.014	Pass	12.637	155.531	99.89	0.001	Pass
	Ave.	12.824	155.434	12.803	155.421	99.84	0.009	-	12.684	155.404	99.07	0.011	-	12.661	155.390	99.82	0.009	-	12.642	155.379	99.84	0.007	-

Requirement	<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%, 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	12.675	57.02	Pass
	2	12.681	56.96	Pass
	3	12.661	57.91	Pass
	4	12.660	56.62	Pass
	MAX.	12.681	57.91	-

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	12.888	27.01	Pass
	10	12.814	27.19	Pass
	11	12.814	25.64	Pass
	12	12.837	26.40	Pass
	MAX.	12.888	27.19	-

Test Condition
- Max. Charge Current : 2600mA - CC/CV 2Imax(5200mA) 22V cut-off 24Hr

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

B. 50th cycle fully state

Charge	1	12.647	56.74	Pass
	2	12.638	56.43	Pass
	3	12.644	58.01	Pass
	4	12.637	57.30	Pass
	MAX.	12.647	58.01	-

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	12.866	25.46	Pass
	14	12.842	25.33	Pass
	15	12.881	26.09	Pass
	16	12.859	26.16	Pass
	MAX.	12.881	26.16	-

Requirement
- No disassembly, no fire within 7 day

3-3. T6 Test Result (ICP653864L1)

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

A. 1st cycle 50% charged state

1	3.817	104.77	Pass
2	3.816	99.06	Pass
3	3.817	101.42	Pass
4	3.817	100.71	Pass
5	3.817	101.62	Pass
6	3.818	117.34	Pass
7	3.816	116.08	Pass
8	3.817	120.94	Pass
9	3.818	109.56	Pass
10	3.817	122.99	Pass
MAX.	3.818	122.99	-

Test Condition
- $\Phi=15.8\text{mm}$ bar, 9.1kg mass, $61\pm 2.5\text{cm}$ height

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

4. Sample Image

