UN38.3 Test Summary

The following product has been evaluated according to the 5th revised edition 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, batteries and single cell batteries.

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Description		List of Test Completed	
Test Report Number	QAE-EF02-130122-PKASMPN45N1146	Test 1. Altitude Simulation	Pass
Date of test report	2013.01.22	Test 2. Thermal Test	Pass
Model name	ASM P/N 45N1146	Test 3. Vibration	Pass
Type	Cylindrical	Test 4. Shock	Pass
Nominal voltage	10.8 V	Test 5. External Short Circuit	Pass
Capacity	57.0 Wh	Test 6. Impact	Pass
Weight	310.0 g	Test 7. Overcharge	Pass
Dimensions	206.20mm X 51.50mm X 20.10mm	Test 8. Forced Discharge	-

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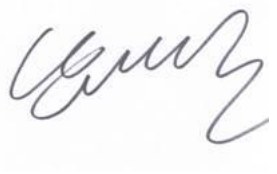

문서번호	QAE-EF02-130122-PKASMPN45N1146	
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SolutionPartner

UN Test Report
- ASM P/N 45N1146 (57Wh, 10.8V)-

목 차

2013. 01. 22

LG Chem
Mobile Energy Division

1. UN Transportation Regulation Test

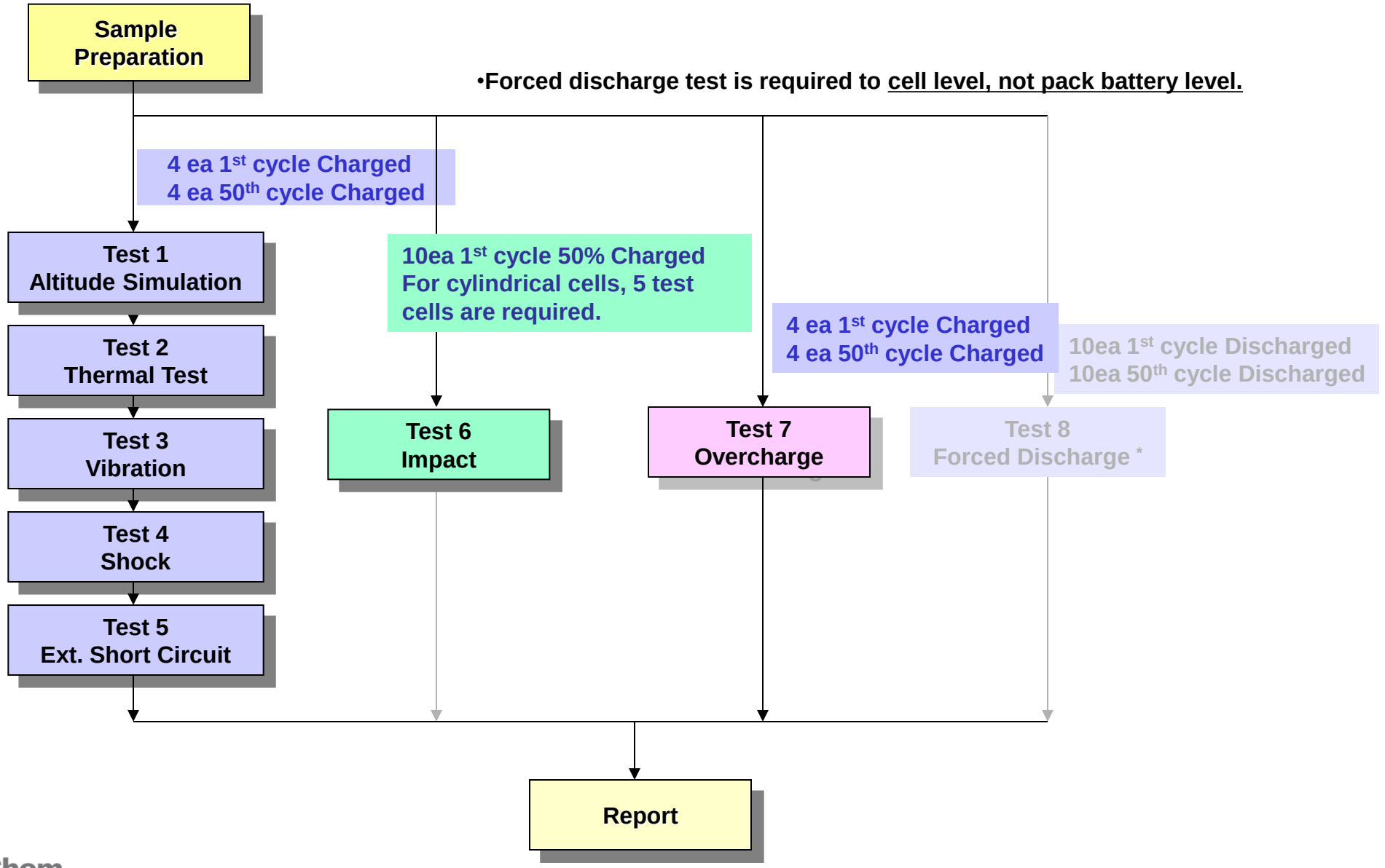
Rev.5

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>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℃	- 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**	12.550	308.357	12.525	308.343	99.80	0.005	**Pass**	12.406	308.341	99.05	0.001	**Pass**	12.390	308.341	99.87	0.000	**Pass**	12.371	308.337	99.85	0.001	**Pass**
	2	12.552	309.065	12.536	309.064	99.87	0.000	**Pass**	12.412	309.046	99.01	0.006	**Pass**	12.395	309.023	99.86	0.007	**Pass**	12.376	309.023	99.85	0.000	**Pass**
	3	12.553	309.176	12.535	309.165	99.86	0.004	**Pass**	12.417	309.150	99.06	0.005	**Pass**	12.396	309.132	99.83	0.006	**Pass**	12.374	309.113	99.82	0.006	**Pass**
	4	12.547	309.301	12.534	309.288	99.90	0.004	**Pass**	12.413	309.275	99.03	0.004	**Pass**	12.388	309.270	99.80	0.002	**Pass**	12.375	309.262	99.90	0.003	**Pass**
	Ave.	12.551	308.975	12.533	308.965	99.86	0.003	-	12.412	308.953	99.04	0.004	-	12.392	308.942	99.84	0.004	-	12.374	308.934	99.85	0.003	-
B. 50th cycle fully state																							
Charge	**1**	12.531	308.742	12.517	308.725	99.89	0.006	**Pass**	12.402	308.714	99.08	0.004	**Pass**	12.379	308.699	99.81	0.005	**Pass**	12.361	308.674	99.85	0.008	**Pass**
	2	12.540	309.192	12.524	309.177	99.87	0.005	**Pass**	12.407	309.157	99.07	0.006	**Pass**	12.390	309.150	99.86	0.002	**Pass**	12.373	309.150	99.86	0.000	**Pass**
	3	12.538	308.811	12.520	308.800	99.86	0.004	**Pass**	12.400	308.795	99.04	0.002	**Pass**	12.385	308.782	99.88	0.004	**Pass**	12.363	308.761	99.82	0.007	**Pass**
	4	12.524	309.174	12.501	309.161	99.82	0.004	**Pass**	12.386	309.136	99.08	0.008	**Pass**	12.370	309.131	99.87	0.002	**Pass**	12.352	309.123	99.85	0.003	**Pass**
	Ave.	12.533	308.980	12.516	308.966	99.86	0.005	-	12.399	308.951	99.07	0.005	-	12.381	308.941	99.86	0.003	-	12.362	308.927	99.85	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 (℃)	Result
A. 1st cycle fully state				
Charge	1	12.371	54.20	Pass
	2	12.376	54.44	Pass
	3	12.374	54.81	Pass
	4	12.375	54.50	Pass
	MAX.	12.376	54.81	-

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	1	12.361	55.28	Pass
	2	12.373	55.77	Pass
	3	12.363	55.61	Pass
	4	12.352	55.37	Pass
	MAX.	12.373	55.77	-

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

Over Charge (T7)				
	Pack NO.	Initial OCV(V)	Max. Temp (℃)	Result
A. 1st cycle fully state				
Charge	9	12.506	24.29	Pass
	10	12.545	24.88	Pass
	11	12.518	25.53	Pass
	12	12.543	24.31	Pass
	MAX.	12.545	25.53	-

Test Condition
- Max. Charge Current : 3500mA - CC/CV 2Imax(7000mA) 22V cut-off 24Hr

Over Charge (T7)				
	Pack NO.	Initial OCV(V)	Max. Temp (℃)	Result
B. 50th cycle fully state				
Charge	13	12.561	25.76	Pass
	14	12.548	25.20	Pass
	15	12.589	25.30	Pass
	16	12.508	24.70	Pass
	MAX.	12.589	25.76	-

Requirement
- No disassembly, no fire within 7 day

3-3. T6 Test Result (ICR18650B4)

Impact (T6)			
Pack NO.	Initial OCV(V)	Max. Temp (℃)	Result
A. 1st cycle 50% charge state			
C-1	3.623	24.22	**Pass**
C-2	3.623	24.59	**Pass**
C-3	3.623	24.57	**Pass**
C-4	3.597	24.81	**Pass**
C-5	3.622	24.61	**Pass**
MAX.	3.623	24.81	-
B. 50th cycle fully discharge state			
C-6	3.442	29.25	**Pass**
C-7	3.443	27.43	**Pass**
C-8	3.445	60.84	**Pass**
C-9	3.442	23.43	**Pass**
C-10	3.443	22.54	**Pass**
MAX.	3.445	60.84	-

Test Condition
- Φ=15.8mm bar, 9.1kg mass, 61±2.5cm height

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

4. Sample Image