

# UN38.3 Test Summary


The following product has been evaluated according to the 5th revised edition Amendment 1 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.


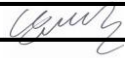

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Description		List of Test Completed	
Test Report Number	QAE-EF02-131114-PKASMPN45N1748	Test 1. Altitude Simulation	Pass
Date of test report	2013.11.14	Test 2. Thermal Test	Pass
Model name	ASM P/N 45N1748	Test 3. Vibration	Pass
Type	Pouch	Test 4. Shock	Pass
Nominal voltage	7.4 V	Test 5. External Short Circuit	Pass
Capacity	34.0 Wh	Test 6. Impact or Crush	Pass
Weight	180.0 g	Test 7. Overcharge	Pass
Dimensions	161.00mm X 105.50mm X 5.80mm	Test 8. Forced Discharge	Pass

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# UN Test Report

## - ASM P/N 45N1748(34Wh, 7.4V) -

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2013. 11. 14

# 1. UN Transportation Regulation Test

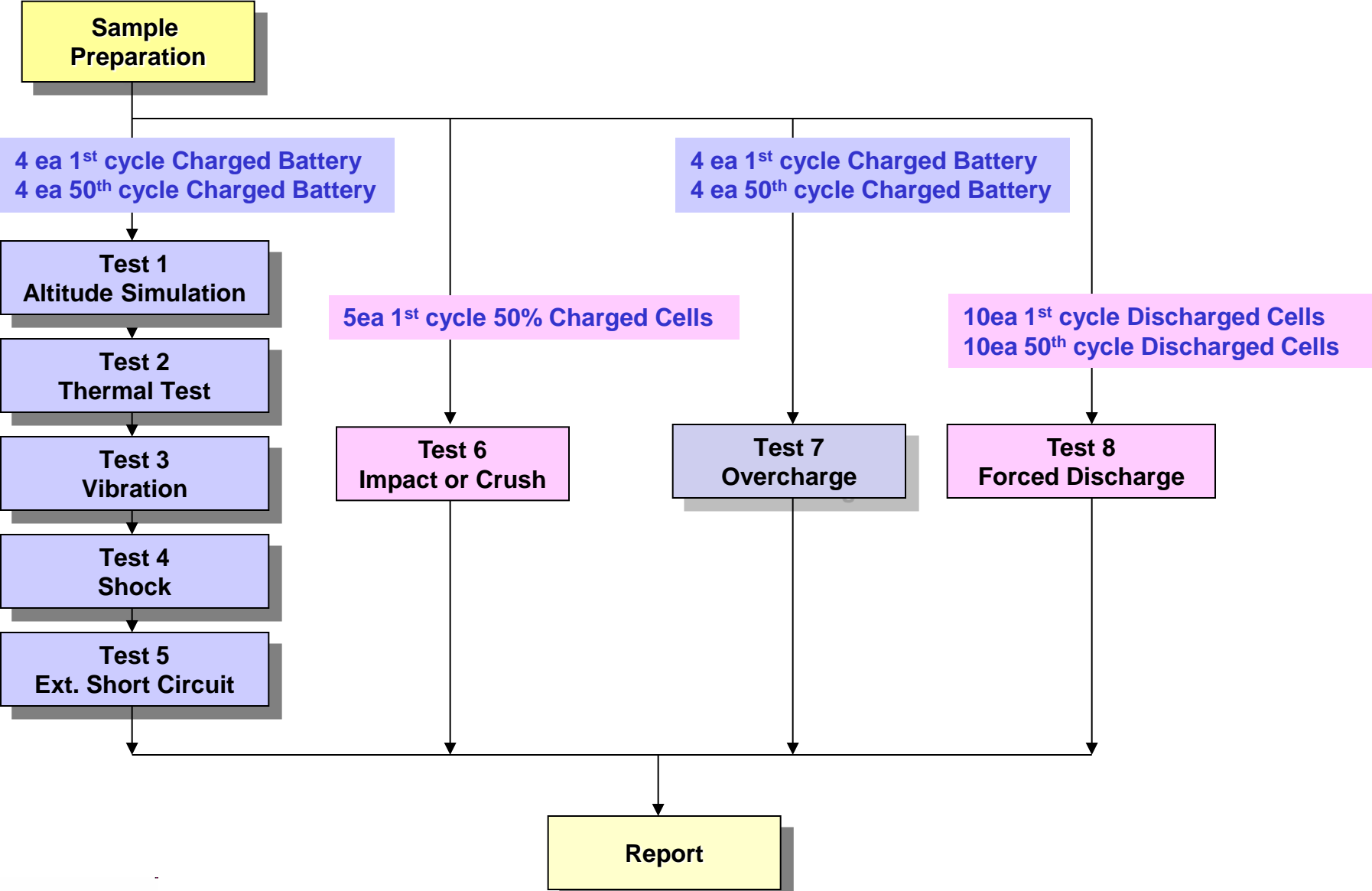
Rev.5 / Amd.1

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	[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℃	
Test 6. Impact for cylindrical cells (> 20mm diameter)	Φ=15.8mm bar, 9.1kg mass, 61±2.5cm height	- No disassembly, no rupture, no fire (after 6 hours) - 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 (after 7 days)
Test 8. Forced Discharge	Discharge at max. discharge current (with 12V DC power supply), Duration time = rated capacity/initial test current	- Appearance picture before/ after test (after 7 days) - Temp. monitoring (max. 170℃)

\* 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	8.348	176.847	8.334	176.842	99.84	0.003	Pass	8.252	176.820	99.01	0.0012	Pass	8.244	176.797	99.90	0.013	Pass	8.233	176.783	99.87	0.008	Pass
	2	8.349	176.745	8.339	176.737	99.88	0.005	Pass	8.260	176.723	99.06	0.008	Pass	8.247	176.701	99.84	0.013	Pass	8.233	176.689	99.83	0.006	Pass
	3	8.342	176.746	8.333	176.731	99.89	0.009	Pass	8.250	176.712	99.00	0.011	Pass	8.238	176.697	99.86	0.008	Pass	8.225	176.692	99.84	0.003	Pass
	4	8.348	176.484	8.336	176.463	99.86	0.012	Pass	8.256	176.461	99.04	0.001	Pass	8.240	176.459	99.80	0.001	Pass	8.227	176.449	99.84	0.006	Pass
	Ave.	8.347	176.706	8.336	176.693	99.87	0.007	-	8.255	176.679	99.03	0.008	-	8.242	176.664	99.85	0.009	-	8.230	176.653	99.85	0.006	-

## B. 50th cycle fully state

Charge	5	8.329	176.283	8.318	176.263	99.86	0.012	Pass	8.235	176.244	99.00	0.011	Pass	8.221	176.221	99.83	0.013	Pass	8.212	176.201	99.90	0.011	Pass
	6	8.341	176.260	8.331	176.236	99.88	0.014	Pass	8.251	176.230	99.04	0.003	Pass	8.237	176.224	99.82	0.003	Pass	8.226	176.207	99.87	0.009	Pass
	7	8.328	176.657	8.311	176.655	99.80	0.001	Pass	8.235	176.655	99.08	0.000	Pass	8.223	176.635	99.87	0.011	Pass	8.209	176.618	99.83	0.010	Pass
	8	8.347	176.957	8.331	176.944	99.81	0.008	Pass	8.254	176.921	99.07	0.013	Pass	8.245	176.90	99.89	0.012	Pass	8.232	176.876	99.85	0.013	Pass
	Ave.	8.336	176.539	8.323	176.524	99.84	0.009	-	8.244	176.512	99.05	0.007	-	8.231	176.495	99.85	0.010	-	8.220	176.476	99.86	0.011	-

### 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	8.233	55.69	Pass
	2	8.233	55.57	Pass
	3	8.225	55.61	Pass
	4	8.227	55.26	Pass
	MAX.	8.233	55.69	-

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	8.399	25.99	Pass
	10	8.348	25.34	Pass
	11	8.313	25.86	Pass
	12	8.312	25.25	Pass
	MAX.	8.399	25.99	-

Test Condition
- Max. Charge Current : 3800 mA - CC/CV 2Imax(7600mA) 16.8 V cut-off 24Hr

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

## B. 50th cycle fully state

Charge	5	8.212	54.99	Pass
	6	8.226	54.55	Pass
	7	8.209	54.23	Pass
	8	8.232	54.46	Pass
	MAX.	8.232	54.99	-

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	8.379	25.57	Pass
	14	8.289	25.90	Pass
	15	8.371	25.47	Pass
	16	8.292	25.03	Pass
	MAX.	8.379	25.90	-

Requirement
- No disassembly, no fire within 7 day

# 3-3. T6 Test Result (ICP505070L1)

## Crush (T6)

Pack NO.	Initial OCV(V)	Max. Temp (°C)	Result
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### A. 1st cycle 50% charged state

#### Direction

Direction	1	Initial OCV(V)	Max. Temp (°C)	Result
Flat	1	4.167	26.45	Pass
	2	4.168	27.27	Pass
	3	4.169	28.51	Pass
	4	4.169	26.74	Pass
	5	4.166	28.67	Pass
<b>MAX.</b>	4.169	28.67	-	

## Test Condition

- Crushing rate :1.5cm/s, until 13kN±0.78kN or 100mV drop or 50% deformation

## Requirement

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

## Forced Discharge (T8)

Pack NO.	Initial OCV(V)	Max. Temp (°C)	Result
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### A. 1st cycle fully Discharged state

1	3.289	69.88	Pass
2	3.290	81.34	Pass
3	3.287	75.28	Pass
4	3.295	90.48	Pass
5	3.287	74.75	Pass
6	3.293	80.86	Pass
7	3.300	83.18	Pass
8	3.293	83.59	Pass
9	3.312	78.80	Pass
10	3.293	85.01	Pass
<b>MAX.</b>	3.312	90.48	-

### B. 50th cycle fully discharged state

1	3.653	73.22	Pass
2	3.684	101.00	Pass
3	3.645	90.28	Pass
4	3.671	97.70	Pass
5	3.660	92.67	Pass
6	3.654	77.80	Pass
7	3.651	86.00	Pass
8	3.659	97.04	Pass
9	3.692	93.52	Pass
10	3.693	93.21	Pass
<b>MAX.</b>	3.693	101.00	-

## Test Condition

- Discharge at max. discharge current (with 12V DC power supply), Duration time: rated capacity

## Requirement

- No disassembly, no fire within 7 days

# 4. Sample Image





# Appendix 1. 1.2m Drop Test Report

**A. Test Result**

No	Name of Test Items	Standard requirement or The Clause Number of Standard	Test Result		Conclusion
1	1.2m Drop Test	* UNITED NATIONS "Recommendations on the TRANSPORT OF DANGEROUS GOODS" Model Regulations(16 <sup>th</sup> ) special provisions 188	Face	The package is not cracked, the contents are not damaged and not shifted.	Passed
			Edge	The package is not cracked, the contents are not damaged and not shifted.	
			Angle	The package is not cracked, the contents are not damaged and not shifted.	
2	Gross Weight Measure	* UNITED NATIONS "Recommendations on the TRANSPORT OF DANGEROUS GOODS" Model Regulations(16 <sup>th</sup> ) special provisions 188	415.20g		Passed

**B. Sample Description**

<b>Dimensions</b>	24.5x14X3.6cm	<b>Net Weight of Batteries</b>	349.70g	<b>Battery Type</b>	Rechargeable Li-ion Battery
<b>Gross weight</b>	415.20g	<b>Battery number</b>	2PCS / 1Carton	<b>** Description</b>	Covered by air bag

**C. Image After Test**



\* Recommendations on the transport of dangerous goods as below  
 Each package of cells or batteries, or the completed package must be capable of withstanding a 1.2 m drop test in any orientation without:  
 1) damage to cells or batteries contained therein  
 2) shifting of the contents so as to allow battery to battery (or cell to cell) contact  
 3) release of contents.

\*\* Description: Description about the protection of short-circuit

# Appendix 2. 1.2m Drop Test Report

**A. Test Result**

No	Name of Test Items	Standard requirement or The Clause Number of Standard	Test Result		Conclusion
1	1.2m Drop Test	* UNITED NATIONS "Recommendations on the TRANSPORT OF DANGEROUS GOODS" Model Regulations(16 <sup>th</sup> ) special provisions 188	Face	The package is not cracked, the contents are not damaged and not shifted.	Passed
			Edge	The package is not cracked, the contents are not damaged and not shifted.	
			Angle	The package is not cracked, the contents are not damaged and not shifted.	
2	Gross Weight Measure	* UNITED NATIONS "Recommendations on the TRANSPORT OF DANGEROUS GOODS" Model Regulations(16 <sup>th</sup> ) special provisions 188	6.80kg		Passed

**B. Sample Description**

<b>Dimensions</b>	27 x 29.5 x 32.5cm	<b>Net Weight of Batteries</b>	5.7kg	<b>Battery Type</b>	Rechargeable Li-ion Battery
<b>Gross weight</b>	6.8kg	<b>Battery number</b>	32PCS / 1Carton	<b>** Description</b>	Covered by air bag

**C. Image After Test**



\* Recommendations on the transport of dangerous goods as below  
 Each package of cells or batteries, or the completed package must be capable of withstanding a 1.2 m drop test in any orientation without:

- 1) damage to cells or batteries contained therein
- 2) shifting of the contents so as to allow battery to battery (or cell to cell) contact
- 3) release of contents.

\*\* Description: Description about the protection of short-circuit