

UN38.3 Test Summary

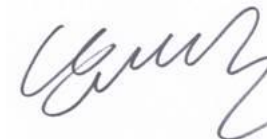
The following product has been evaluated according to the 5th revised edition Amendment2 of the UN Manual of Tests and Criteria.
We, LG Chem, ltd., hereby certify that this battery meets the requirements of the regulation for transportation of lithium-ion cells, batteries and single cell batteries.


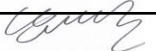

Manufacture's contact information	LG Chem, Ltd. 128 Yeoui-Daero, Yeongdeungpo-gu, SEOUL, 150-721, REPUBLIC OF KOREA Telephone : +86-10-7742-5427 E-mail : kkammy@lgchem.com Website : www.lgchem.com		
Test Laboratory information	LG Chem, Ltd. / RESEARCH PARK 188 Munjiro, Yuseong-gu, Daejeon, 305-738, REPUBLIC OF KOREA Telephone : +82-10-3099-3724 E-mail : juhongpark@lgchem.com Website : www.lgchem.com		
	LG Chem (Nanjing) I&E Materials Co., Ltd NO.17 Hengyi Road, Nanjing Economic & Technological Development Zone, Nanjing, Jiangsu, China Telephone : +86-025-85603000-8288 E-mail : xuyuannj@lgchem.com Website : www.lgchem.com		
Description		List of Test Completed	
Test Report Number	QAE-EF02-140521-PKASM PN SB10F46446	Test 1. Altitude Simulation	Pass
Date of test report	2014.05.21	Test 2. Thermal Test	Pass
Model name	ASM PN SB10F46446	Test 3. Vibration	Pass
Type	Pouch	Test 4. Shock	Pass
Nominal voltage	15.2 V	Test 5. External Short Circuit	Pass
Capacity	672 Wh	Test 6. Impact or Crush	Pass
Weight	310.0 g	Test 7. Overcharge	Pass
Dimensions	233.70mm X 107.80mm X 6.80mm	Test 8. Forced Discharge	Pass

Reviewed By: Joohong Park
 IT & New Application Part Leader
 Global Standard Certification Team
 LG Chem, Ltd.
 E-mail: juhongpark@lgchem.com



Approved By: DaeHo Nam
 Team Leader
 Global Standard Certification Team
 LG Chem, Ltd.
 E-mail: kkammy@lgchem.com



문서번호	QAE-EF02-140521-PKASM PN SB10F46446	
Prepared	남익현	
	장승현	
Reviewed	남대호	
	박해나	
Approved	김병수	

UN38.3 Test Report

-ASM P/N SB10F46446 (Nom.67Wh, 15.2V)-

목 차

1. UN Transportation Regulation Test
 2. Test Procedure
 3. Test Result
 4. Sample Image
- Appendix. Drop Test Report

2014. 05. 21

1. UN Transportation Regulation Test

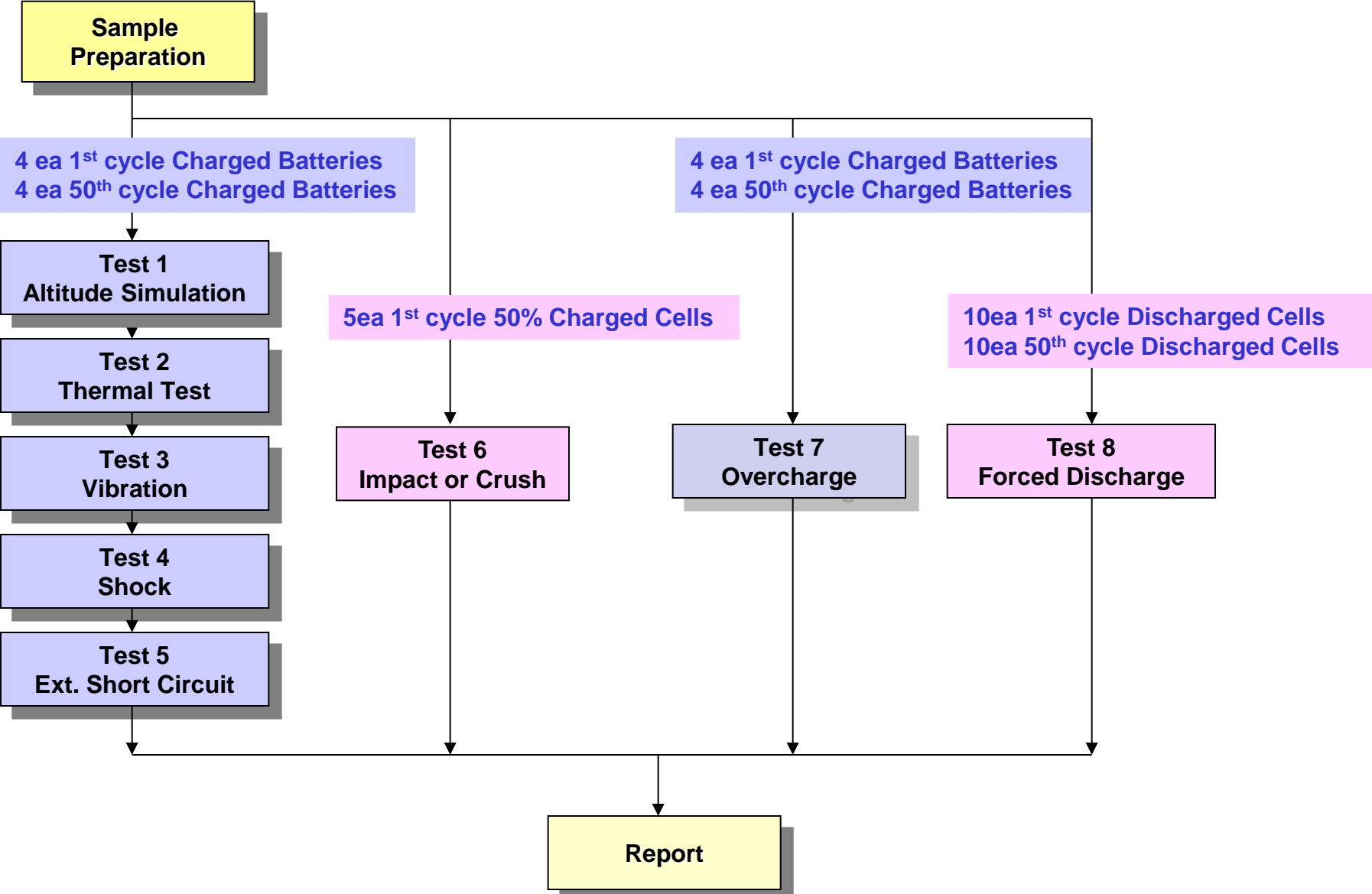
Rev.5 / Amd.2

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 - No disassembly, no rupture, no fire within 6 hours after the test - Temp. monitoring (max. 170℃) - No disassembly, no fire within 6 hours after the test - Temp. monitoring (max. 170℃) - No disassembly, no fire within 7 days after the test
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 (> 18mm diameter)	Φ=15.8mm bar, 9.1kg mass, 61±2.5cm height	
Test 6. Crush for cylindrical cells (≤ 18mm 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)	
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 samples.

* 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.2)

2. Test Procedure



3-1. T1-T4 Test Result

Before			Altitude (T1)					Thermal (T2)					Vibration (T3)					Shock (T4)				
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	17.375	308.938	17.347	308.916	99.84	0.007	Pass	17.097	308.900	98.56	0.005	Pass	17.096	308.884	99.99	0.005	Pass	16.794	308.875	98.23	0.003	Pass
	2	17.350	308.992	17.321	308.992	99.83	0.000	Pass	17.075	308.979	98.58	0.004	Pass	17.073	308.955	99.98	0.008	Pass	16.780	308.945	98.28	0.003	Pass
	3	17.353	308.668	17.319	308.662	99.81	0.002	Pass	17.062	308.643	98.52	0.006	Pass	17.045	308.634	99.90	0.003	Pass	16.740	308.626	98.21	0.002	Pass
	4	17.355	308.017	17.331	308.002	99.86	0.005	Pass	17.088	307.989	98.60	0.004	Pass	17.074	307.986	99.92	0.001	Pass	16.781	307.975	98.28	0.003	Pass
	Ave.	17.358	308.654	17.329	308.643	99.83	0.003	-	17.080	308.628	98.56	0.005	-	17.072	308.615	99.95	0.004	-	16.774	308.605	98.25	0.003	-

B. 50th cycle fully state

Charge	5	17.364	308.782	17.335	308.780	99.83	0.000	Pass	17.079	308.759	98.52	0.007	Pass	17.062	308.757	99.90	0.001	Pass	16.765	308.753	98.26	0.001	Pass
	6	17.364	308.473	17.342	308.466	99.87	0.002	Pass	17.098	308.451	98.59	0.005	Pass	17.083	308.442	99.92	0.003	Pass	16.777	308.422	98.21	0.006	Pass
	7	17.363	308.218	17.335	308.197	99.84	0.007	Pass	17.081	308.195	98.53	0.001	Pass	17.072	308.188	99.95	0.002	Pass	16.780	308.187	98.29	0.000	Pass
	8	17.366	308.454	17.340	308.445	99.85	0.003	Pass	17.091	308.442	98.56	0.001	Pass	17.086	308.437	99.97	0.001	Pass	16.788	308.434	98.26	0.001	Pass
	Ave.	17.364	308.482	17.338	308.472	99.85	0.003	-	17.087	308.462	98.55	0.003	-	17.076	308.456	99.93	0.002	-	16.778	308.449	98.25	0.002	-

Requirement	<ul style="list-style-type: none"> - Measuring mass before/after each test (If M>75g, less than 0.1%, 1g≤M≤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)

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

A. 1st cycle fully state

Charge	1	16.794	56.46	Pass
	2	16.780	56.04	Pass
	3	16.740	56.18	Pass
	4	16.781	55.05	Pass
	MAX.	16.794	56.46	-

Test Condition

- 100mΩ ext. short-circuit at 55±2°C

Over Charge (T7)

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

A. 1st cycle fully state

Charge	9	17.350	25.12	Pass
	10	17.340	23.89	Pass
	11	17.341	23.49	Pass
	12	17.342	24.57	Pass
	MAX.	17.350	25.12	-

Test Condition

- Max. Charge Current : 3800mA
 - CC/CV 2I_{max}(7600mA) 22V cut-off 24Hr

EXT.Short Circuit (T5)

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

B. 50th cycle fully state

Charge	5	16.765	55.79	Pass
	6	16.777	55.19	Pass
	7	16.780	56.04	Pass
	8	16.788	55.59	Pass
	MAX.	16.788	56.04	-

Requirement

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

Over Charge (T7)

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

B. 50th cycle fully state

Charge	13	17.324	25.17	Pass
	14	17.327	23.77	Pass
	15	17.321	24.34	Pass
	16	17.329	24.10	Pass
	MAX.	17.329	25.17	-

Requirement

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

3-3. T6/T8 Test Result (ICP575792L1)

Crush (T6)

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

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

Flat	C-1	3.819	23.91	Pass
	C-2	3.821	24.54	Pass
	C-3	3.809	24.56	Pass
	C-4	3.813	24.71	Pass
	C-5	3.811	24.59	Pass
MAX.		3.821	24.71	-

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)

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

A. 1st cycle fully Discharged state

C-6	3.000	38.80	Pass
C-7	3.009	41.30	Pass
C-8	2.979	39.58	Pass
C-9	2.989	42.69	Pass
C-10	2.987	41.06	Pass
C-11	2.991	41.01	Pass
C-12	3.001	41.03	Pass
C-13	2.980	41.09	Pass
C-14	3.012	41.89	Pass
C-15	2.989	42.59	Pass
MAX.	3.012	42.69	-

B. 50th cycle fully discharged state

C-16	3.044	41.19	Pass
C-17	3.100	40.07	Pass
C-18	3.071	39.99	Pass
C-19	3.012	40.10	Pass
C-20	3.091	41.07	Pass
C-21	3.004	42.05	Pass
C-22	3.007	42.00	Pass
C-23	3.047	41.17	Pass
C-24	3.013	42.05	Pass
C-25	3.101	42.31	Pass
MAX.	3.100	42.31	-

Test Condition

- Discharge at max. discharge current
(with 12V DC power supply) : 4300mA
Duration time: rated capacity (60.0min)

Requirement

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

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(18 th) 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(18 th) special provisions 188	692,3 g		Passed

B. Sample Description

Dimensions	31.5 cm x 14.0cm x 3.5cm	Net Weight of Batteries	616.9 g	Battery Type	Rechargeable Li-ion Battery
Gross weight	692,3 g	Battery number	2Pcs/Carton	** Description	Partition (Made of Flute)

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(18 th) 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(18 th) special provisions 188	8.83 kg		Passed

B. Sample Description

Dimensions	36.5cm x 20.5cm x 17.5cm	Net Weight of Batteries	7.72 kg	Battery Type	Rechargeable Li-polymer Battery
Gross weight	8.83 kg	Battery number	25Pcs / Carton	** Description	Partition (Made of Flute)

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