




문서번호	QAE-EF02-140203-PKEY30	
Prepared	김홍일	
	남익현	
Reviewed	남대호	
	우민제	
Approved	김병수	

SolutionPartner

UN Test Report

- EY30(Min.8.2Wh, 3.8V) -

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2014. 02. 03



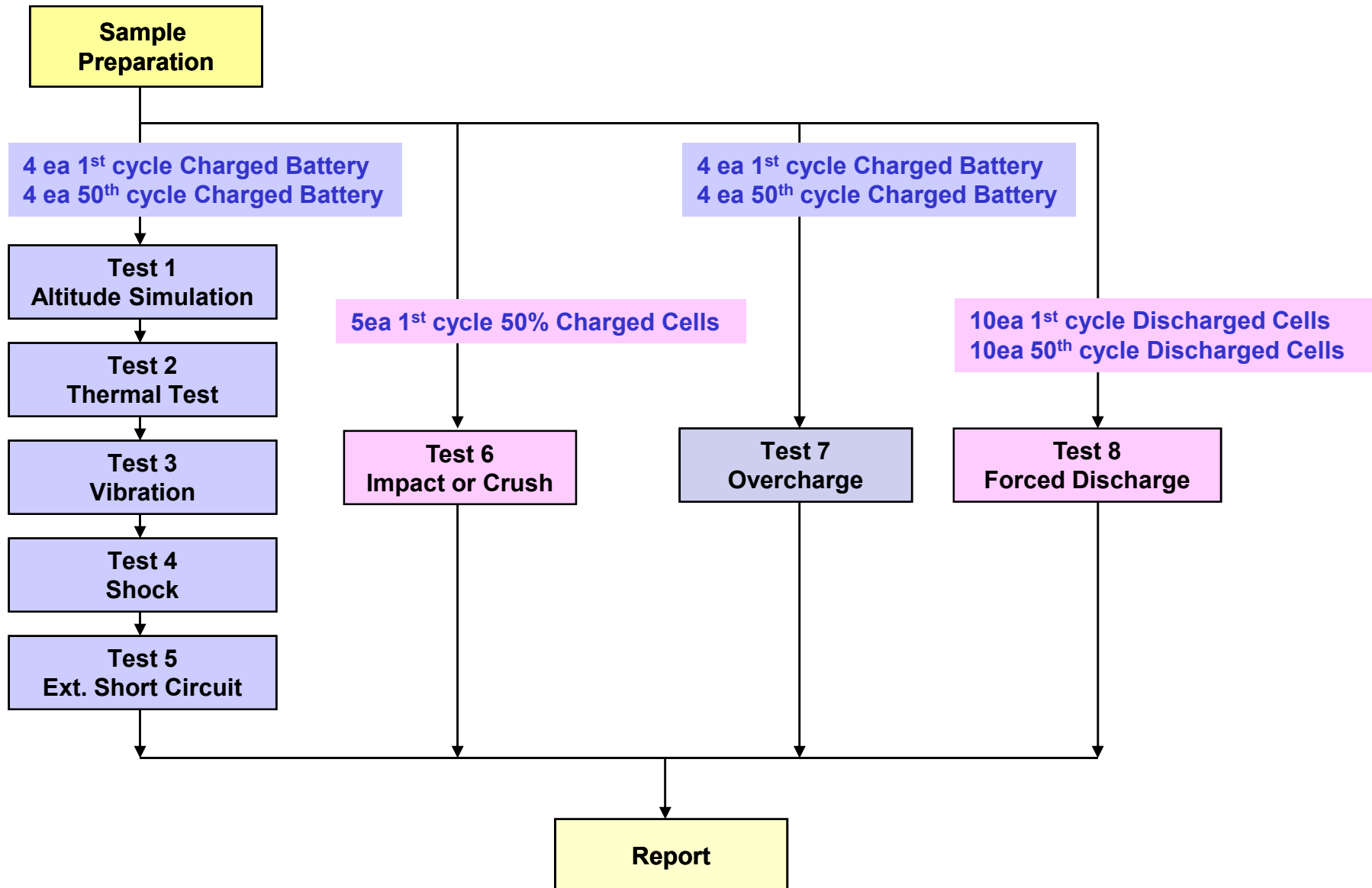
1. UN Transportation Regulation Test

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	
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℃		- No disassembly, no rupture, no fire within 6 hours after the test - Temp. monitoring (max. 170℃)
Test 6. Impact for cylindrical cells (> 20mm diameter)	Φ=15.8mm bar, 9.1kg mass, 61±2.5cm height		- No disassembly, no fire within 6 hours after the test - 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 within 7 days after the test
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 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)					
	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	4.324	34.772	4.323	34.771	99.98	0.003	Pass	4.259	34.771	98.52	0.000	Pass	4.258	34.771	99.98	0.000	Pass	4.256	34.771	99.95	0.000	Pass
	2	4.323	34.718	4.322	34.718	99.98	0.000	Pass	4.258	34.717	98.52	0.003	Pass	4.257	34.716	99.98	0.003	Pass	4.256	34.715	99.98	0.003	Pass
	3	4.323	34.699	4.322	34.699	99.98	0.000	Pass	4.259	34.698	98.54	0.003	Pass	4.258	34.697	99.98	0.003	Pass	4.257	34.696	99.98	0.003	Pass
	4	4.324	34.785	4.323	34.784	99.98	0.003	Pass	4.261	34.783	98.57	0.003	Pass	4.259	34.782	99.95	0.003	Pass	4.257	34.781	99.95	0.003	Pass
	Ave.	4.324	34.744	4.323	34.743	99.98	0.001	-	4.259	34.742	98.54	0.002	-	4.258	34.742	99.97	0.002	-	4.257	34.741	99.96	0.002	-

B. 50th cycle fully state

Charge	5	4.315	34.768	4.314	34.767	99.98	0.003	Pass	4.252	34.766	98.56	0.003	Pass	4.251	34.765	99.98	0.003	Pass	4.249	34.765	99.95	0.000	Pass
	6	4.313	34.687	4.311	34.686	99.95	0.003	Pass	4.249	34.686	98.56	0.000	Pass	4.248	34.685	99.98	0.003	Pass	4.247	34.684	99.98	0.003	Pass
	7	4.314	34.724	4.312	34.723	99.95	0.003	Pass	4.248	34.722	98.52	0.003	Pass	4.246	34.721	99.95	0.003	Pass	4.245	34.721	99.98	0.000	Pass
	8	4.314	34.718	4.313	34.718	99.98	0.000	Pass	4.249	34.717	98.52	0.003	Pass	4.248	34.715	99.98	0.006	Pass	4.246	34.714	99.95	0.003	Pass
	Ave.	4.314	34.724	4.313	34.724	99.97	0.002	-	4.250	34.723	98.54	0.002	-	4.248	34.722	99.97	0.004	-	4.247	34.721	99.97	0.002	-

Requirement	<ul style="list-style-type: none"> - Measuring mass before/after each test (If $M > 75g$, less than 0.1%, $1g \leq M \leq 75$, 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
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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	4.256	55.77	Pass
	2	4.256	55.34	Pass
	3	4.257	54.86	Pass
	4	4.257	54.42	Pass
	MAX.	4.257	55.77	-

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	4.324	22.34	Pass
	10	4.323	21.78	Pass
	11	4.323	21.89	Pass
	12	4.321	22.65	Pass
	MAX.	4.324	22.65	-

Test Condition
- Max. Charge Current : 2230mA - CC/CV 2Imax(4460mA) 8.7V cut-off 24Hr

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

B. 50th cycle fully state

Charge	5	4.249	56.51	Pass
	6	4.247	55.55	Pass
	7	4.245	55.81	Pass
	8	4.246	56.03	Pass
	MAX.	4.247	56.51	-

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	4.316	23.95	Pass
	14	4.314	22.05	Pass
	15	4.315	21.87	Pass
	16	4.315	21.95	Pass
	MAX.	4.316	23.95	-

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

3-3. T6 Test Result (ICP286291L1)

Crush (T6)				
Direction	NO.	Initial OCV(V)	Max. Temp (°C)	Result

A. 1st cycle 50% charged state

Flat	1	3.647	23.50	Pass
	2	3.647	23.45	Pass
	3	3.648	24.10	Pass
	4	3.647	24.08	Pass
	5	3.648	24.10	Pass
MAX.		3.648	24.10	-

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

1	3.316	83.11	Pass
2	3.321	82.92	Pass
3	3.319	79.88	Pass
4	3.317	80.27	Pass
5	3.324	79.33	Pass
6	3.319	83.05	Pass
7	3.318	81.22	Pass
8	3.321	78.65	Pass
9	3.317	78.25	Pass
10	3.315	79.14	Pass
MAX.	3.324	83.11	-

B. 50th cycle fully discharged state

1	3.453	85.97	Pass
2	3.451	87.99	Pass
3	3.461	88.61	Pass
4	3.448	89.91	Pass
5	3.453	85.31	Pass
6	3.453	90.03	Pass
7	3.450	86.59	Pass
8	3.499	87.86	Pass
9	3.487	88.56	Pass
10	3.455	89.53	Pass
MAX.	3.499	90.03	-

Test Condition
- Discharge at max. discharge current (with 12V DC power supply) : 2230mA Duration time: rated capacity (60min)

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

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 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(16 th) special provisions 188	464.8g		Passed




B. Sample Description

Dimensions	26.0×16.5×4.4cm	Net Weight of Batteries	278.4g	Battery Type	Rechargeable Li-ion Battery
Gross weight	464.8g	Battery number	8Pcs/Carton	** Description	Covered by Styrofoam

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

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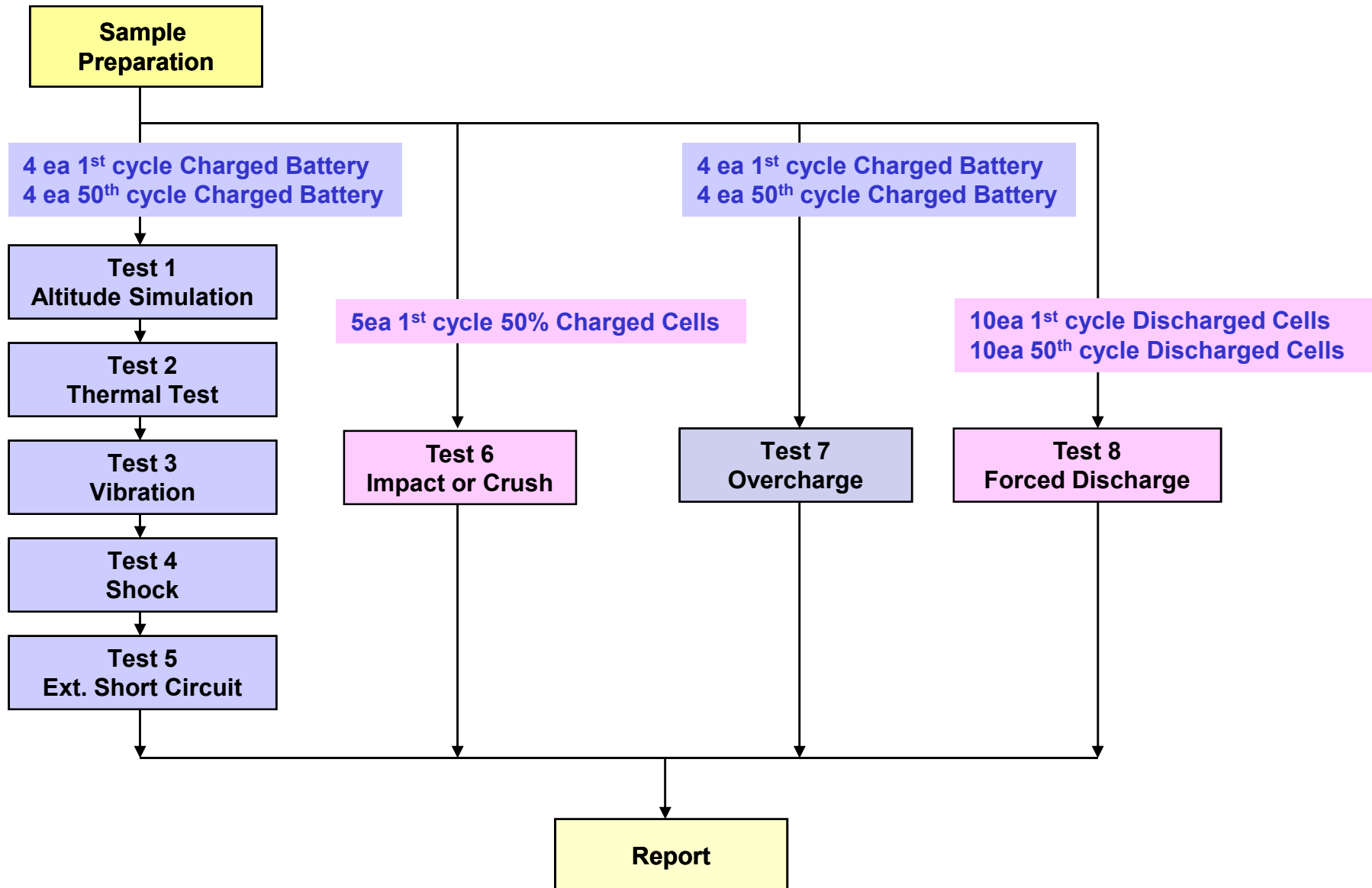
1. UN Transportation Regulation Test

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	
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℃		- No disassembly, no rupture, no fire within 6 hours after the test - Temp. monitoring (max. 170℃)
Test 6. Impact for cylindrical cells (> 20mm diameter)	Φ=15.8mm bar, 9.1kg mass, 61±2.5cm height		- No disassembly, no fire within 6 hours after the test - 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 within 7 days after the test
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 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)					
	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	4.324	34.772	4.323	34.771	99.98	0.003	Pass	4.259	34.771	98.52	0.000	Pass	4.258	34.771	99.98	0.000	Pass	4.256	34.771	99.95	0.000	Pass
	2	4.323	34.718	4.322	34.718	99.98	0.000	Pass	4.258	34.717	98.52	0.003	Pass	4.257	34.716	99.98	0.003	Pass	4.256	34.715	99.98	0.003	Pass
	3	4.323	34.699	4.322	34.699	99.98	0.000	Pass	4.259	34.698	98.54	0.003	Pass	4.258	34.697	99.98	0.003	Pass	4.257	34.696	99.98	0.003	Pass
	4	4.324	34.785	4.323	34.784	99.98	0.003	Pass	4.261	34.783	98.57	0.003	Pass	4.259	34.782	99.95	0.003	Pass	4.257	34.781	99.95	0.003	Pass
	Ave.	4.324	34.744	4.323	34.743	99.98	0.001	-	4.259	34.742	98.54	0.002	-	4.258	34.742	99.97	0.002	-	4.257	34.741	99.96	0.002	-

B. 50th cycle fully state

Charge	5	4.315	34.768	4.314	34.767	99.98	0.003	Pass	4.252	34.766	98.56	0.003	Pass	4.251	34.765	99.98	0.003	Pass	4.249	34.765	99.95	0.000	Pass
	6	4.313	34.687	4.311	34.686	99.95	0.003	Pass	4.249	34.686	98.56	0.000	Pass	4.248	34.685	99.98	0.003	Pass	4.247	34.684	99.98	0.003	Pass
	7	4.314	34.724	4.312	34.723	99.95	0.003	Pass	4.248	34.722	98.52	0.003	Pass	4.246	34.721	99.95	0.003	Pass	4.245	34.721	99.98	0.000	Pass
	8	4.314	34.718	4.313	34.718	99.98	0.000	Pass	4.249	34.717	98.52	0.003	Pass	4.248	34.715	99.98	0.006	Pass	4.246	34.714	99.95	0.003	Pass
	Ave.	4.314	34.724	4.313	34.724	99.97	0.002	-	4.250	34.723	98.54	0.002	-	4.248	34.722	99.97	0.004	-	4.247	34.721	99.97	0.002	-

Requirement	<ul style="list-style-type: none"> - Measuring mass before/after each test (If $M > 75g$, less than 0.1%, $1g \leq M \leq 75$, 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
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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	4.256	55.77	Pass
	2	4.256	55.34	Pass
	3	4.257	54.86	Pass
	4	4.257	54.42	Pass
	MAX.	4.257	55.77	-

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	4.324	22.34	Pass
	10	4.323	21.78	Pass
	11	4.323	21.89	Pass
	12	4.321	22.65	Pass
	MAX.	4.324	22.65	-

Test Condition
- Max. Charge Current : 2230mA - CC/CV 2Imax(4460mA) 8.7V cut-off 24Hr

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

B. 50th cycle fully state

Charge	5	4.249	56.51	Pass
	6	4.247	55.55	Pass
	7	4.245	55.81	Pass
	8	4.246	56.03	Pass
	MAX.	4.247	56.51	-

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	4.316	23.95	Pass
	14	4.314	22.05	Pass
	15	4.315	21.87	Pass
	16	4.315	21.95	Pass
	MAX.	4.316	23.95	-

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

3-3. T6 Test Result (ICP286291L1)

Crush (T6)				
Direction	NO.	Initial OCV(V)	Max. Temp (°C)	Result

A. 1st cycle 50% charged state

Flat	1	3.647	23.50	Pass
	2	3.647	23.45	Pass
	3	3.648	24.10	Pass
	4	3.647	24.08	Pass
	5	3.648	24.10	Pass
MAX.		3.648	24.10	-

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

1	3.316	83.11	Pass
2	3.321	82.92	Pass
3	3.319	79.88	Pass
4	3.317	80.27	Pass
5	3.324	79.33	Pass
6	3.319	83.05	Pass
7	3.318	81.22	Pass
8	3.321	78.65	Pass
9	3.317	78.25	Pass
10	3.315	79.14	Pass
MAX.	3.324	83.11	-

B. 50th cycle fully discharged state

1	3.453	85.97	Pass
2	3.451	87.99	Pass
3	3.461	88.61	Pass
4	3.448	89.91	Pass
5	3.453	85.31	Pass
6	3.453	90.03	Pass
7	3.450	86.59	Pass
8	3.499	87.86	Pass
9	3.487	88.56	Pass
10	3.455	89.53	Pass
MAX.	3.499	90.03	-

Test Condition
- Discharge at max. discharge current (with 12V DC power supply) : 2230mA Duration time: rated capacity (60min)

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

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 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(16 th) special provisions 188	464.8g		Passed

B. Sample Description

Dimensions	26.0×16.5×4.4cm	Net Weight of Batteries	278.4g	Battery Type	Rechargeable Li-ion Battery
Gross weight	464.8g	Battery number	8Pcs/Carton	** Description	Covered by Styrofoam

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

Manufacturer:

LG Chemical, Ltd.

Address: Twin Tower, Youido-Dong, Youngdeungpo-gu, Seoul, Korea

Telephone: 82-80-005-4000

Website: www.lgchem.com

Email: kimhwans@lgchem.com

Test Laboratory:

LG Chem, Ltd.

Address: 128, Yeoui-daero, Yeongdeungpo-gu, Seoul, Korea

Telephone: 82-42-870-6195

Website: www.lgchem.com

Email: kkammy@lgchem.com