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UN Test Report

- AC13F8L (20Wh, 3.75V) -

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2013. 03. 20

 **LG Chem**
Mobile Energy Division

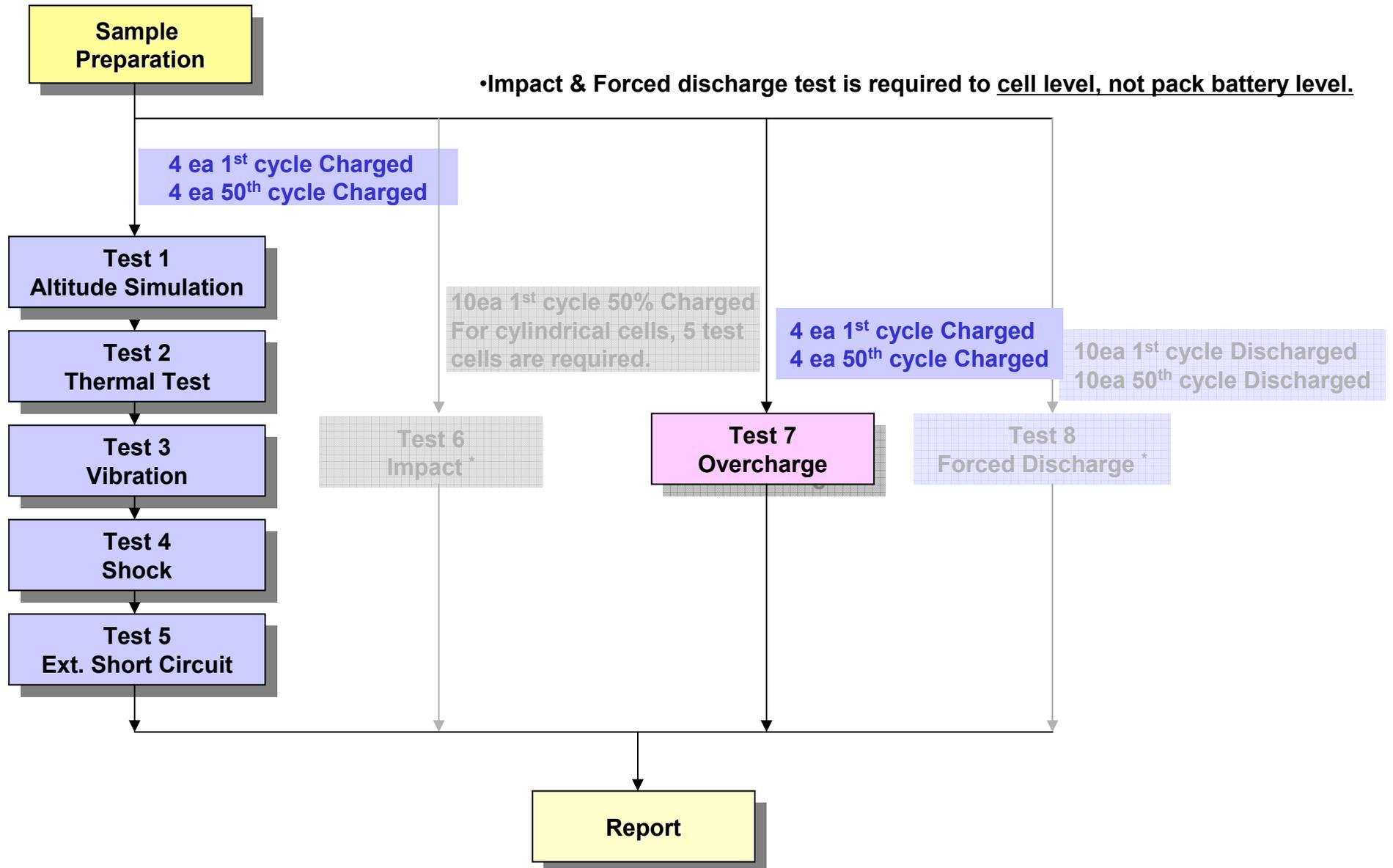
1. UN Transportation Regulation Test

Test	Condition	Requirements
Test 1. Altitude Simulation	Storing at (low pressure) 11.6kPa for 6hr at 20+/-5℃	<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 2. Thermal Test	[75±2℃, 6hr ↔ -40±2℃, 6hr, interval max. 30min] x 10 cycle 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℃	<ul style="list-style-type: none"> - No disassembly, no rupture, no fire (after 6 hours) - Temp. monitoring (max. 170℃)
Test 6. Impact	Only for Cell, not battery.	
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	4.255	100.869	4.249	100.853	99.85	0.017	Pass	4.207	100.846	99.03	0.006	Pass	4.203	100.831	99.89	0.015	Pass	4.197	100.824	99.87	0.007	Pass
	2	4.250	100.682	4.245	100.663	99.86	0.019	Pass	4.206	100.657	99.10	0.006	Pass	4.200	100.657	99.84	0.000	Pass	4.193	100.646	99.84	0.012	Pass
	3	4.257	100.978	4.249	100.965	99.82	0.013	Pass	4.210	100.953	99.08	0.012	Pass	4.202	100.953	99.82	0.000	Pass	4.195	100.932	99.83	0.020	Pass
	4	4.251	100.817	4.246	100.815	99.86	0.002	Pass	4.203	100.801	99.01	0.015	Pass	4.197	100.784	99.85	0.016	Pass	4.190	100.774	99.83	0.010	Pass
	Ave.	4.253	100.837	4.247	100.824	99.85	0.013	-	4.207	100.814	99.05	0.010	-	4.200	100.806	99.85	0.008	-	4.194	100.794	99.84	0.012	-

B. 50th cycle fully state

Charge	9	4.226	100.791	4.221	100.769	99.89	0.022	Pass	4.182	100.762	99.08	0.007	Pass	4.176	100.753	99.86	0.009	Pass	4.169	100.735	99.83	0.019	Pass
	10	4.231	100.736	4.227	100.726	99.89	0.010	Pass	4.185	100.716	99.02	0.011	Pass	4.179	100.702	99.84	0.014	Pass	4.174	100.688	99.88	0.014	Pass
	11	4.235	100.708	4.230	100.692	99.89	0.016	Pass	4.192	100.679	99.10	0.013	Pass	4.184	100.654	99.80	0.025	Pass	4.176	100.644	99.82	0.010	Pass
	12	4.233	100.620	4.227	100.608	99.87	0.012	Pass	4.188	100.590	99.07	0.018	Pass	4.182	100.574	99.86	0.016	Pass	4.176	100.557	99.86	0.016	Pass
	Ave.	4.231	100.714	4.226	100.699	99.88	0.015	-	4.187	100.687	99.07	0.012	-	4.180	310.633	99.84	0.016	-	4.174	100.656	99.85	0.015	-

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
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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	4.197	55.89	Pass
	2	4.193	54.60	Pass
	3	4.195	54.08	Pass
	4	4.190	54.45	Pass
	MAX.	4.197	55.89	-

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	4.267	24.52	Pass
	10	4.261	24.35	Pass
	11	4.260	24.09	Pass
	12	4.265	24.31	Pass
	MAX.	4.267	24.52	-

Test Condition
- Max. Charge Current : 2585mA - CC/CV 2Imax(5170mA) 8.6V cut-off 24Hr

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

B. 50th cycle fully state

Charge	5	4.169	54.97	Pass
	6	4.174	54.66	Pass
	7	4.176	55.15	Pass
	8	4.176	54.20	Pass
	MAX.	4.176	55.15	-

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	4.258	24.95	Pass
	14	4.245	24.73	Pass
	15	4.246	24.04	Pass
	16	4.253	24.83	Pass
	MAX.	4.258	24.95	-

Requirement
- No disassembly, no fire within 7 day

3-3. T6 Test Result (ICP426080L1)

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

A. 1st cycle 50% charged state

Direction

Flat	1	3.871	92.43	Pass
	2	3.872	87.85	Pass
	3	3.869	84.32	Pass
	4	3.871	95.34	Pass
	5	3.870	103.26	Pass
Vertical	6	3.871	84.31	Pass
	7	3.872	98.17	Pass
	8	3.870	100.20	Pass
	9	3.871	84.65	Pass
	10	3.872	96.17	Pass
MAX.		3.872	103.26	-

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

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

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 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	0.24KG		Passed

B. Sample Description

Dimensions	24.6*13.8*3.6cm	Net Weight of Batteries	0.19Kg	Battery Type	Rechargeable Li-ion Polymer Battery
Gross weight	0.24KG	Battery number	2Pcs/Carton	** Description	Use 'Air PE 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