
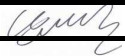



문서번호	QAE-EF02-130308-PKL12L4E55	
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UN Test Report

- L12L4E55(41Wh, 14.8V) -

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 **LG Chem**
Mobile Energy Division

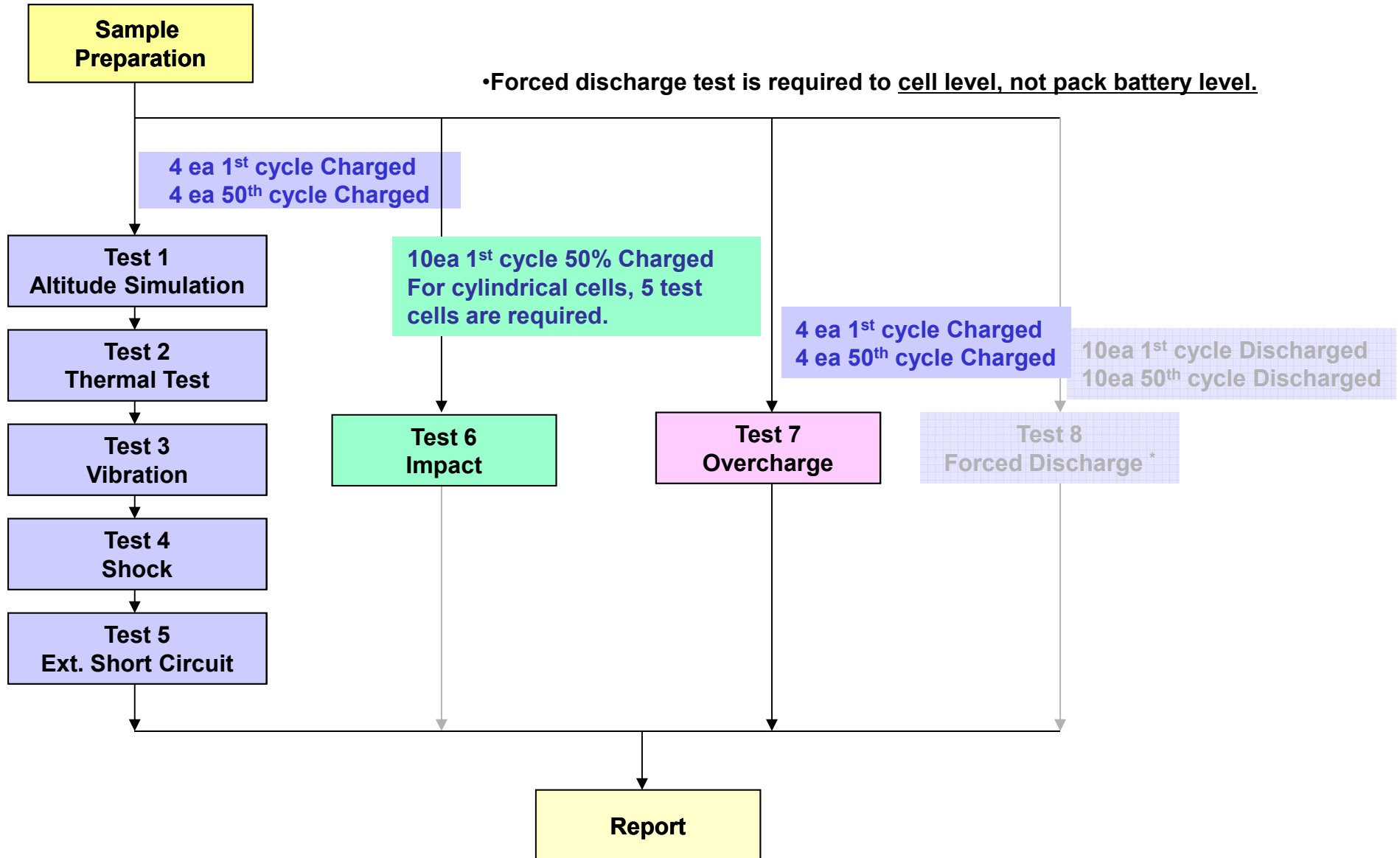
1. UN Transportation Regulation Test

Test	Condition	Requirements
Test 1. Altitude Simulation	Storing at (low pressure) 11.6kPa for 6hr at 20+/-5°C	<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°C, 6hr ↔ -40±2°C, 6hr, interval max. 30min] x 10 cycle Storing at 20±5°C 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°C 1hr continue after returning at 55±2°C	<ul style="list-style-type: none"> - No disassembly, no rupture, no fire (after 6 hours) - Temp. monitoring (max. 170°C)
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)	<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	17.143	220.72	17.126	220.715	99.90	0.003	Pass	16.969	220.71	99.08	0.003	Pass	16.946	220.71	99.87	0.001	Pass	16.913	220.70	99.80	0.001	Pass
	2	17.149	220.39	17.124	220.369	99.85	0.009	Pass	16.956	220.37	99.02	0.002	Pass	16.928	220.36	99.84	0.004	Pass	16.904	220.34	99.86	0.007	Pass
	3	17.144	220.60	17.117	220.589	99.85	0.007	Pass	16.957	220.57	99.06	0.010	Pass	16.935	220.54	99.87	0.011	Pass	16.916	220.54	99.88	0.002	Pass
	4	17.145	220.67	17.112	220.655	99.81	0.009	Pass	16.956	220.64	99.08	0.006	Pass	16.936	220.63	99.89	0.005	Pass	16.918	220.63	99.89	0.001	Pass
	Ave.	17.145	220.597	17.120	220.582	99.85	0.007	-	16.959	220.571	99.06	0.005	-	16.936	220.559	99.87	0.005	-	16.913	220.553	99.86	0.003	-

B. 50th cycle fully state

Charge	9	17.147	220.04	17.115	220.03	99.82	0.004	Pass	16.946	220.01	99.01	0.011	Pass	16.913	219.99	99.81	0.007	Pass	16.889	219.99	99.86	0.001	Pass
	10	17.126	220.40	17.105	220.39	99.88	0.002	Pass	16.944	220.37	99.05	0.010	Pass	16.920	220.35	99.86	0.007	Pass	16.896	220.33	99.86	0.010	Pass
	11	17.145	220.39	17.120	220.37	99.86	0.007	Pass	16.952	220.36	99.02	0.009	Pass	16.922	220.34	99.82	0.009	Pass	16.896	220.31	99.85	0.010	Pass
	12	17.147	220.32	17.119	220.30	99.84	0.009	Pass	16.951	220.28	99.02	0.009	Pass	16.919	220.27	99.81	0.008	Pass	16.891	220.26	99.83	0.004	Pass
	Ave.	17.141	220.288	17.115	220.275	99.85	0.006	-	16.948	220.254	99.02	0.010	-	16.919	310.633	99.83	0.008	-	16.893	220.223	99.85	0.006	-

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	16.913	55.69	Pass
	2	16.904	55.57	Pass
	3	16.916	55.61	Pass
	4	16.918	55.26	Pass
	MAX.	16.918	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	17.197	25.84	Pass
	10	17.106	25.08	Pass
	11	17.126	25.56	Pass
	12	17.137	25.62	Pass
	MAX.	17.197	25.84	-

Test Condition
- Max. Charge Current : 2600 mA - CC/CV 2Imax(5200mA) 22V cut-off 24Hr

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

B. 50th cycle fully state

Charge	5	16.889	54.99	Pass
	6	16.896	54.55	Pass
	7	16.896	54.23	Pass
	8	16.891	54.46	Pass
	MAX.	16.896	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	17.131	25.48	Pass
	14	17.163	25.34	Pass
	15	17.083	25.31	Pass
	16	17.115	25.73	Pass
	MAX.	17.163	25.73	-

Requirement
- No disassembly, no fire within 7 day

3-3. T6 Test Result (ICR18650C2)

Impact (T6)			
Pack NO.	Initial OCV(V)	Max. Temp (°C)	Result
A. 1st cycle 50% charge state			
C-1	3.807	25.43	Pass
C-2	3.807	108.50	Pass
C-3	3.806	24.36	Pass
C-4	3.806	24.79	Pass
C-5	3.806	114.39	Pass
MAX.	3.807	114.39	-
B. 50th cycle fully discharge state			
C-6	3.351	24.83	Pass
C-7	3.362	46.43	Pass
C-8	3.387	49.26	Pass
C-9	3.369	49.90	Pass
C-10	3.353	47.55	Pass
MAX.	3.387	49.90	-
Test Condition			
- $\Phi=15.8\text{mm}$ bar, 9.1kg mass, $61 \pm 2.5\text{cm}$ height			
Requirement			
- Temperature < 170 (°C) - No disassembly, no rupture, no fire within 6 hours			

4. Sample Image

