




문서번호	QAE-EF02-130102-PKL12L4A02	
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UN Test Report

- L12L4A02(32Wh, 14.4V) -

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 **LG Chem**
Mobile Energy Division

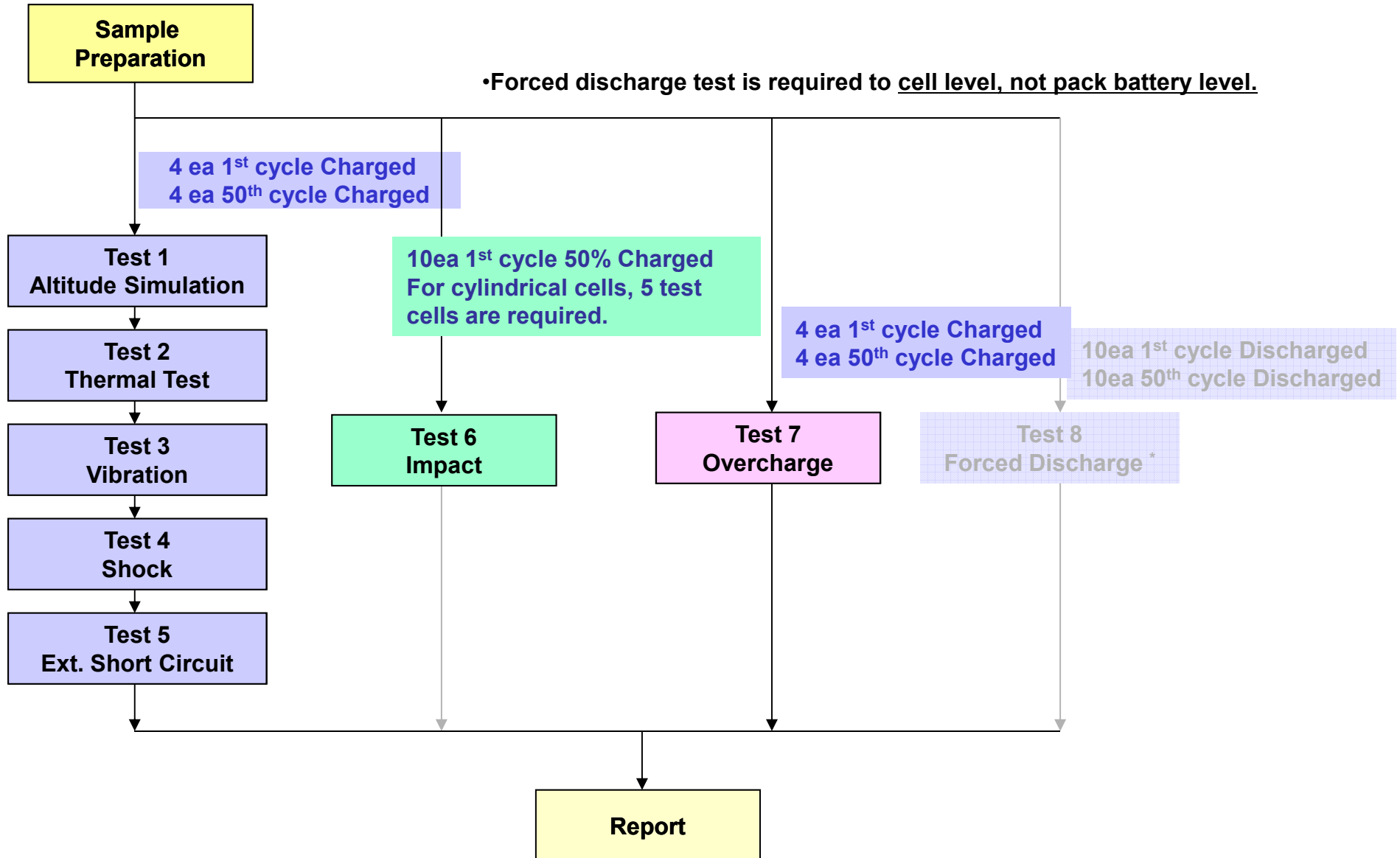
1. UN Transportation Regulation Test

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	16.611	205.344	16.610	205.341	99.99	0.001	Pass	16.430	205.339	98.92	0.001	Pass	16.421	205.335	99.95	0.002	Pass	16.418	205.331	99.98	0.002	Pass
	2	16.612	205.348	16.611	205.342	99.99	0.003	Pass	16.421	205.340	98.86	0.001	Pass	16.421	205.339	100.00	0.000	Pass	16.415	205.335	99.96	0.002	Pass
	3	16.621	205.355	16.619	205.351	99.99	0.002	Pass	16.428	205.342	98.85	0.004	Pass	16.420	205.339	99.95	0.001	Pass	16.413	205.337	99.96	0.001	Pass
	4	16.610	205.352	16.607	205.350	99.98	0.001	Pass	16.412	205.342	98.83	0.004	Pass	16.410	205.339	99.99	0.001	Pass	16.410	205.336	100.00	0.001	Pass
	Ave.	16.614	205.350	16.612	205.346	99.99	0.002	-	16.423	205.341	98.86	0.003	-	16.418	205.338	99.97	0.001	-	16.414	205.335	99.98	0.002	-

B. 50th cycle fully state

Charge	9	16.572	205.112	16.569	205.109	99.98	0.001	Pass	16.380	205.105	98.86	0.002	Pass	16.365	205.092	99.91	0.006	Pass	16.340	205.082	99.85	0.005	Pass
	10	16.570	205.144	16.567	205.139	99.98	0.002	Pass	16.391	205.133	98.94	0.003	Pass	16.385	205.129	99.96	0.002	Pass	16.370	205.125	99.91	0.002	Pass
	11	16.573	205.149	16.571	205.144	99.99	0.002	Pass	16.378	205.142	98.84	0.001	Pass	16.359	205.140	99.88	0.001	Pass	16.353	205.132	99.96	0.004	Pass
	12	16.572	205.145	16.570	205.141	99.99	0.002	Pass	16.375	205.132	98.82	0.004	Pass	16.358	205.129	99.90	0.001	Pass	16.352	205.121	99.96	0.004	Pass
	Ave.	16.572	205.138	16.569	205.133	99.98	0.002	-	16.381	205.128	98.86	0.003	-	16.367	310.633	99.91	0.003	-	16.354	205.115	99.92	0.004	-

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	16.418	55.21	Pass
	2	16.415	55.39	Pass
	3	16.413	55.82	Pass
	4	16.410	55.79	Pass
	MAX.	16.418	55.82	-

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	17	16.609	25.32	Pass
	18	16.611	24.99	Pass
	19	16.613	25.32	Pass
	20	16.632	25.12	Pass
	MAX.	16.632	25.32	-

Test Condition
- Max. Charge Current : 2080 mA - CC/CV 2Imax(4160mA) 22V cut-off 24Hr

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

B. 50th cycle fully state

Charge	9	16.340	54.68	Pass
	10	16.370	57.32	Pass
	11	16.353	54.63	Pass
	12	16.352	55.32	Pass
	MAX.	16.370	57.32	-

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	21	16.572	25.89	Pass
	22	16.570	25.99	Pass
	23	16.610	26.53	Pass
	24	16.590	26.03	Pass
	MAX.	16.610	26.53	-

Requirement
- No disassembly, no fire within 7 day

3-3. T6 Test Result (ICR18650S3)

Impact (T6)			
Pack NO.	Initial OCV(V)	Max. Temp (°C)	Result
A. 1st cycle 50% charge state			
C-1	3.677	25.53	Pass
C-2	3.676	25.51	Pass
C-3	3.678	24.71	Pass
C-4	3.675	25.28	Pass
C-5	3.679	24.61	Pass
MAX.	3.679	25.53	-
B. 50th cycle fully discharge state			
C-6	3.458	25.24	Pass
C-7	3.459	25.57	Pass
C-8	3.458	24.95	Pass
C-9	3.459	25.13	Pass
C-10	3.461	24.72	Pass
MAX.	3.461	25.57	-
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

