




문서번호	QAE-EF02-120611-PKASMPN45N1106	
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UN Test Report

- ASM P/N 45N1106 (48Wh, 10.8V) -

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 **LG Chem**
Mobile Energy Division

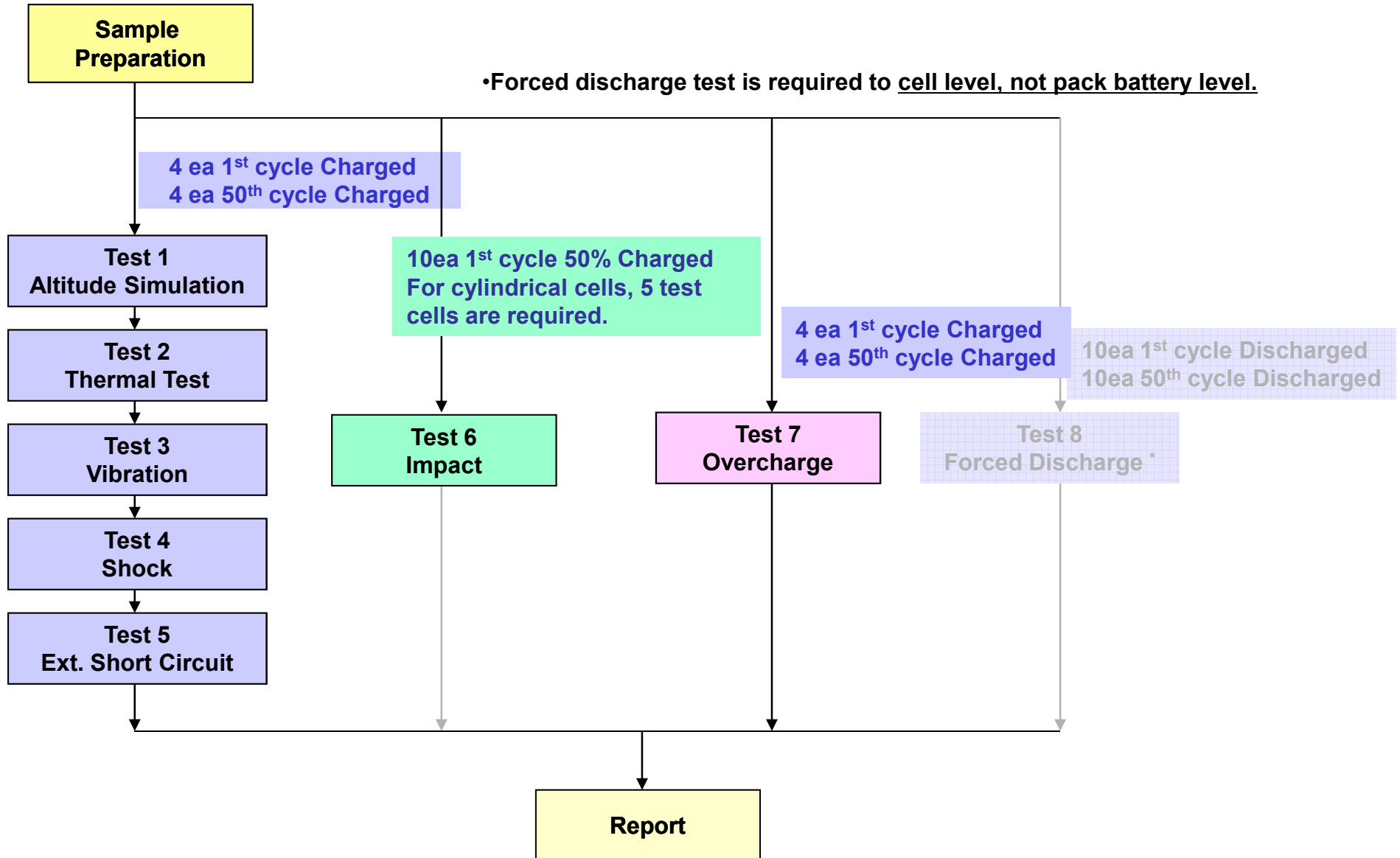
1. UN Transportation Regulation Test

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	12.562	295.123	12.560	295.122	99.98	0.000	Pass	12.444	295.121	99.08	0.000	Pass	12.434	295.119	99.92	0.001	Pass	12.428	295.117	99.95	0.001	Pass
	2	12.563	295.221	12.561	295.221	99.98	0.000	Pass	12.441	295.218	99.04	0.001	Pass	12.431	295.216	99.92	0.001	Pass	12.425	295.213	99.95	0.001	Pass
	3	12.560	295.221	12.557	295.220	99.98	0.000	Pass	12.439	295.218	99.06	0.001	Pass	12.429	295.215	99.92	0.001	Pass	12.425	295.212	99.97	0.001	Pass
	4	12.564	295.211	12.561	295.211	99.98	0.000	Pass	12.435	295.210	99.00	0.000	Pass	12.425	295.207	99.92	0.001	Pass	12.421	295.205	99.97	0.001	Pass
	Ave.	12.562	295.194	12.560	295.194	99.98	0.000	-	12.440	295.192	99.04	0.001	-	12.430	295.189	99.92	0.001	-	12.425	295.187	99.96	0.001	-

B. 50th cycle fully state

Charge	9	12.443	295.217	12.44	295.215	99.98	0.001	Pass	12.31	295.213	98.95	0.001	Pass	12.298	295.213	99.90	0.000	Pass	12.292	295.211	99.95	0.001	Pass
	10	12.501	295.216	12.478	295.213	99.82	0.001	Pass	12.312	295.211	98.67	0.001	Pass	12.3	295.21	99.90	0.000	Pass	12.293	295.208	99.94	0.001	Pass
	11	12.468	295.211	12.425	295.209	99.66	0.001	Pass	12.309	295.208	99.07	0.000	Pass	12.295	295.205	99.89	0.001	Pass	12.289	295.203	99.95	0.001	Pass
	12	12.471	295.213	12.448	295.212	99.82	0.000	Pass	12.308	295.21	98.88	0.001	Pass	12.297	295.208	99.91	0.001	Pass	12.29	295.206	99.94	0.001	Pass
	Ave.	12.471	295.214	12.448	295.212	99.82	0.001	-	12.310	295.211	98.89	0.001	-	12.298	295.209	99.90	0.001	-	12.291	295.207	99.95	0.001	-

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	12.428	55.83	Pass
	2	12.425	55.40	Pass
	3	12.425	54.18	Pass
	4	12.421	55.77	Pass
	MAX.	12.428	55.83	-

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	12.555	25.21	Pass
	18	12.549	25.09	Pass
	19	12.552	25.03	Pass
	20	12.551	25.93	Pass
	MAX.	12.555	25.93	-

Test Condition
- Max. Charge Current : 3900 mA - CC/CV 2Imax(7800mA) 22V cut-off 24Hr

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

B. 50th cycle fully state

Charge	9	12.292	55.75	Pass
	10	12.293	54.17	Pass
	11	12.289	55.19	Pass
	12	12.29	54.98	Pass
	MAX.	12.293	55.75	-

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	12.448	25.26	Pass
	22	12.450	25.39	Pass
	23	12.455	25.63	Pass
	24	12.451	25.11	Pass
	MAX.	12.455	25.63	-

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			
21	3.677	25.53	Pass
22	3.676	25.51	Pass
23	3.678	24.71	Pass
24	3.675	25.28	Pass
25	3.679	24.61	Pass
MAX.	3.679	25.53	-
B. 50th cycle fully discharge state			
26	3.458	25.24	Pass
27	3.459	25.57	Pass
28	3.458	24.95	Pass
29	3.459	25.13	Pass
30	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

