
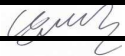



문서번호	QAE-EF02-130122-PKASMPN45N1146	
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UN Test Report

- ASM P/N 45N1146 (57Wh, 10.8V) -

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 **LG Chem**
Mobile Energy Division

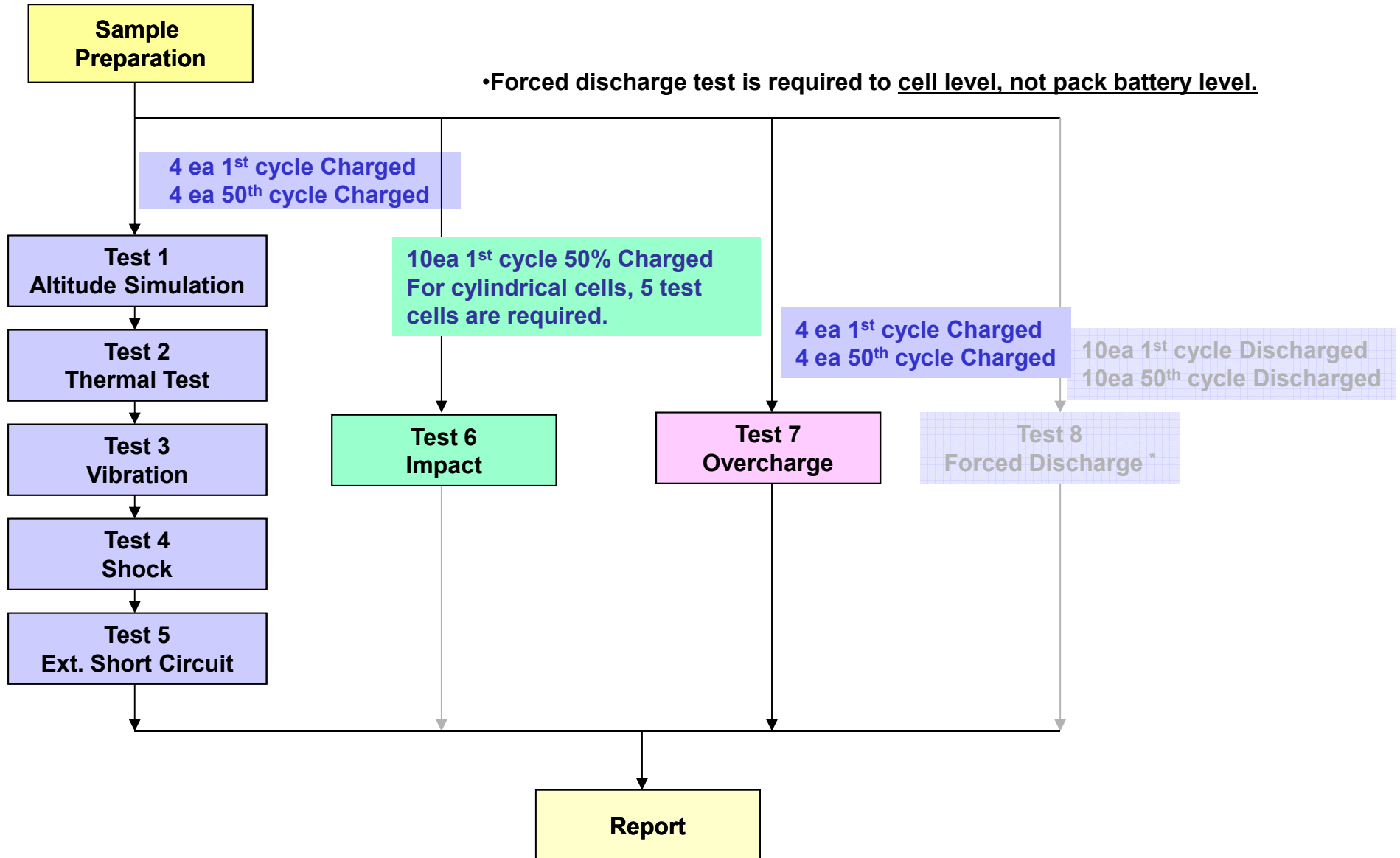
1. UN Transportation Regulation Test

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	12.550	308.357	12.525	308.343	99.80	0.005	Pass	12.406	308.341	99.05	0.001	Pass	12.390	308.341	99.87	0.000	Pass	12.371	308.337	99.85	0.001	Pass
	2	12.552	309.065	12.536	309.064	99.87	0.000	Pass	12.412	309.046	99.01	0.006	Pass	12.395	309.023	99.86	0.007	Pass	12.376	309.023	99.85	0.000	Pass
	3	12.553	309.176	12.535	309.165	99.86	0.004	Pass	12.417	309.150	99.06	0.005	Pass	12.396	309.132	99.83	0.006	Pass	12.374	309.113	99.82	0.006	Pass
	4	12.547	309.301	12.534	309.288	99.90	0.004	Pass	12.413	309.275	99.03	0.004	Pass	12.388	309.270	99.80	0.002	Pass	12.375	309.262	99.90	0.003	Pass
	Ave.	12.551	308.975	12.533	308.965	99.86	0.003	-	12.412	308.953	99.04	0.004	-	12.392	308.942	99.84	0.004	-	12.374	308.934	99.85	0.003	-

B. 50th cycle fully state

Charge	1	12.531	308.742	12.517	308.725	99.89	0.006	Pass	12.402	308.714	99.08	0.004	Pass	12.379	308.699	99.81	0.005	Pass	12.361	308.674	99.85	0.008	Pass
	2	12.540	309.192	12.524	309.177	99.87	0.005	Pass	12.407	309.157	99.07	0.006	Pass	12.390	309.150	99.86	0.002	Pass	12.373	309.150	99.86	0.000	Pass
	3	12.538	308.811	12.520	308.800	99.86	0.004	Pass	12.400	308.795	99.04	0.002	Pass	12.385	308.782	99.88	0.004	Pass	12.363	308.761	99.82	0.007	Pass
	4	12.524	309.174	12.501	309.161	99.82	0.004	Pass	12.386	309.136	99.08	0.008	Pass	12.370	309.131	99.87	0.002	Pass	12.352	309.123	99.85	0.003	Pass
	Ave.	12.533	308.980	12.516	308.966	99.86	0.005	-	12.399	308.951	99.07	0.005	-	12.381	308.941	99.86	0.003	-	12.362	308.927	99.85	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	12.371	54.20	Pass
	2	12.376	54.44	Pass
	3	12.374	54.81	Pass
	4	12.375	54.50	Pass
	MAX.	12.376	54.81	-

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	12.506	24.29	Pass
	10	12.545	24.88	Pass
	11	12.518	25.53	Pass
	12	12.543	24.31	Pass
	MAX.	12.545	25.53	-

Test Condition
- Max. Charge Current : 3500mA - CC/CV 2Imax(7000mA) 22V cut-off 24Hr

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

B. 50th cycle fully state

Charge	1	12.361	55.28	Pass
	2	12.373	55.77	Pass
	3	12.363	55.61	Pass
	4	12.352	55.37	Pass
	MAX.	12.373	55.77	-

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	12.561	25.76	Pass
	14	12.548	25.20	Pass
	15	12.589	25.30	Pass
	16	12.508	24.70	Pass
	MAX.	12.589	25.76	-

Requirement
- No disassembly, no fire within 7 day

3-3. T6 Test Result (ICR18650B4)

Impact (T6)			
Pack NO.	Initial OCV(V)	Max. Temp (°C)	Result
A. 1st cycle 50% charge state			
C-1	3.623	24.22	Pass
C-2	3.623	24.59	Pass
C-3	3.623	24.57	Pass
C-4	3.597	24.81	Pass
C-5	3.622	24.61	Pass
MAX.	3.623	24.81	-
B. 50th cycle fully discharge state			
C-6	3.442	29.25	Pass
C-7	3.443	27.43	Pass
C-8	3.445	60.84	Pass
C-9	3.442	23.43	Pass
C-10	3.443	22.54	Pass
MAX.	3.445	60.84	-
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

