
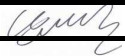



문서번호	QAE-EF02-130122-PKASMPN45N1160	
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UN Test Report

- ASM P/N 45N1160 (48Wh, 10.8V) -

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 **LG Chem**
Mobile Energy Division

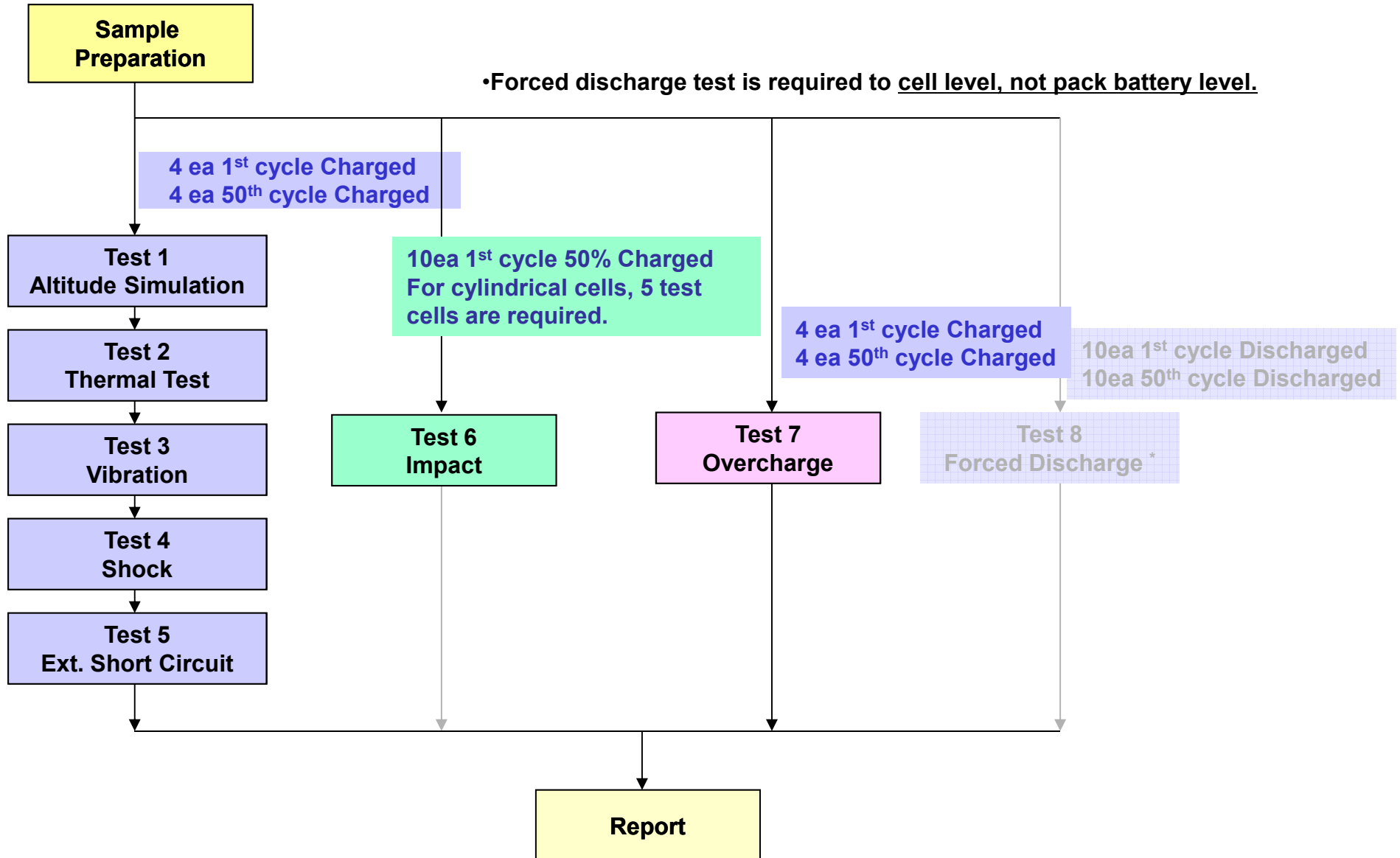
1. UN Transportation Regulation Test

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	12.545	309.532	12.526	309.522	99.85	0.003	Pass	12.401	309.510	99.00	0.004	Pass	12.385	309.499	99.87	0.004	Pass	12.363	309.488	99.82	0.004	Pass
	2	12.557	309.901	12.537	309.882	99.84	0.006	Pass	12.418	309.872	99.05	0.003	Pass	12.403	309.860	99.88	0.004	Pass	12.380	309.854	99.81	0.002	Pass
	3	12.551	309.816	12.529	309.803	99.82	0.004	Pass	12.406	309.799	99.02	0.001	Pass	12.390	309.797	99.87	0.001	Pass	12.373	309.792	99.86	0.002	Pass
	4	12.547	310.030	12.534	310.016	99.90	0.005	Pass	12.416	310.008	99.06	0.003	Pass	12.403	309.991	99.90	0.005	Pass	12.387	309.974	99.87	0.005	Pass
	Ave.	12.550	309.820	12.532	309.806	99.85	0.005	-	12.410	309.797	99.03	0.003	-	12.395	309.787	99.88	0.003	-	12.376	309.777	99.84	0.003	-

B. 50th cycle fully state

Charge	1	12.540	310.312	12.518	310.301	99.82	0.004	Pass	12.397	310.291	99.03	0.003	Pass	12.380	310.289	99.86	0.001	Pass	12.357	310.277	99.81	0.004	Pass
	2	12.535	309.750	12.517	309.748	99.86	0.001	Pass	12.397	309.735	99.04	0.004	Pass	12.374	309.725	99.81	0.003	Pass	12.356	309.715	99.85	0.003	Pass
	3	12.528	310.077	12.506	310.073	99.82	0.001	Pass	12.385	310.050	99.03	0.007	Pass	12.371	310.032	99.89	0.006	Pass	12.351	310.028	99.84	0.001	Pass
	4	12.522	309.783	12.498	309.768	99.81	0.005	Pass	12.382	309.763	99.07	0.002	Pass	12.365	309.740	99.86	0.007	Pass	12.344	309.722	99.83	0.006	Pass
	Ave.	12.531	309.981	12.510	309.973	99.83	0.003	-	12.390	309.960	99.04	0.004	-	12.373	309.947	99.86	0.004	-	12.352	309.936	99.83	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	12.363	55.75	Pass
	2	12.380	54.41	Pass
	3	12.373	54.56	Pass
	4	12.387	55.88	Pass
	MAX.	12.387	55.88	-

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	12.560	25.12	Pass
	10	12.585	25.12	Pass
	11	12.521	25.95	Pass
	12	12.595	25.51	Pass
	MAX.	12.595	25.95	-

Test Condition
- Max. Charge Current : 3000mA - CC/CV 2Imax(6000mA) 22V cut-off 24Hr

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

B. 50th cycle fully state

Charge	1	12.357	54.12	Pass
	2	12.356	54.04	Pass
	3	12.351	55.65	Pass
	4	12.344	55.98	Pass
	MAX.	12.357	55.98	-

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	12.456	25.60	Pass
	14	12.484	24.70	Pass
	15	12.529	24.63	Pass
	16	12.493	24.92	Pass
	MAX.	12.529	25.60	-

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

