




문서번호	QAE-EF02-150828-PKSB10J78996	
Prepared	남익현	
	장승현	
Reviewed	남대호	
	박해나	
Approved	김병수	

UN38.3 Test Report

-SB10J78996(Nom. 24Wh, 7.5V)-

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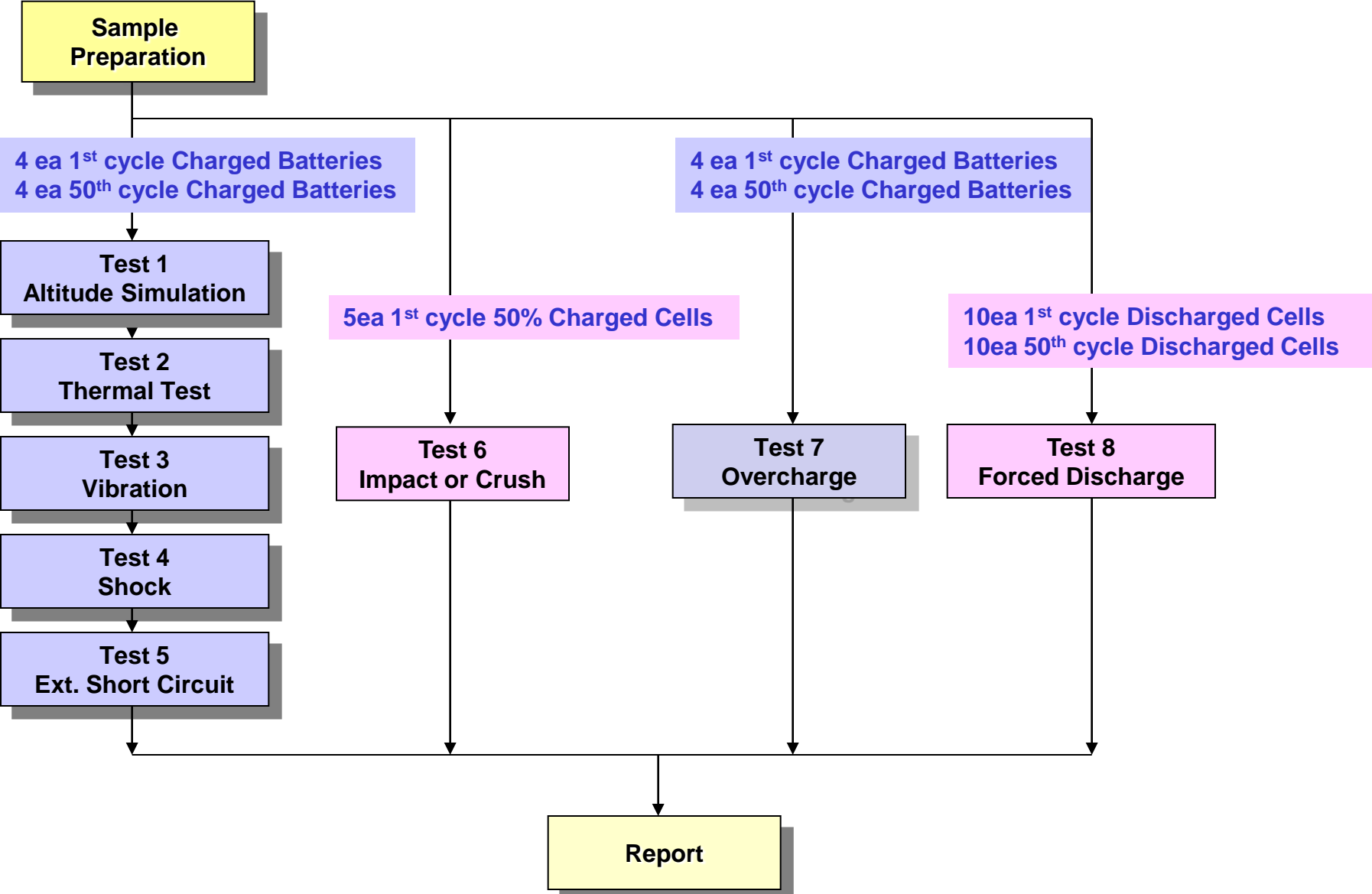
1. UN38.3 Transportation Regulation Test

Test	Condition	Requirements
Test 1. Altitude Simulation	Storing at (low pressure)11.6kPa for 6hr at 20+/-5℃	- Measuring mass before/ after each test (If $M < 1g$, less than 0.5%, If $1g \leq M \leq 75g$, less than 0.2%, If $M > 75g$, 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	[72±2℃,6hr ↔ -40±2℃,6hr,interval max. 30min] x 10cycle Storing at 20±5℃ 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℃ 1hr continue after returning at 55±2℃	
Test 6. Impact for cylindrical cells (> 18mm diameter)	Φ=15.8mm bar, 9.1kg mass, 61±2.5cm height	- No disassembly, no fire within 6 hours after the test - Temp. monitoring (max. 170℃)
Test 6. Crush for cylindrical cells (≤ 18mm diameter) for prismatic, pouch, coin/button cells	Crushing rate :1.5cm/s, until 13kN±0.78kN or 100mV drop or 50% deformation	
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)	- No disassembly, no fire within 7 days after the test
Test 8. Forced Discharge	Discharge at max. discharge current (with 12V DC power supply), Duration time = rated capacity/initial test current	

* Tests through T1-T5 shall be conducted in sequence with the same samples.

* We declare that the above-mentioned test is the result of being checked according to UN38.3 Test
(Manual of Test and Criteria ST/SG/AC.10/11/Rev.5/Amd.2)

2. Test Procedure



3-1. T1-T4 Test Result

Before			Altitude (T1)					Thermal (T2)					Vibration (T3)					Shock (T4)				
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 charged state

Charge	1	8.686	112.05	8.681	112.04	99.94	0.009	Pass	8.571	112.03	98.73	0.009	Pass	8.567	112.03	99.95	0.000	Pass	8.566	112.03	99.99	0.000	Pass
	2	8.656	112.07	8.651	112.06	99.94	0.009	Pass	8.537	112.06	98.68	0.000	Pass	8.532	112.06	99.94	0.000	Pass	8.531	112.05	99.99	0.009	Pass
	3	8.654	112.15	8.651	112.14	99.97	0.009	Pass	8.542	112.13	98.74	0.009	Pass	8.540	112.13	99.98	0.000	Pass	8.538	112.13	99.98	0.000	Pass
	4	8.653	112.17	8.650	112.17	99.97	0.000	Pass	8.530	112.17	98.61	0.000	Pass	8.527	112.16	99.96	0.009	Pass	8.526	112.16	99.99	0.000	Pass
	Ave.	8.662	112.11	8.658	112.10	99.95	0.007	-	8.545	112.10	98.69	0.004	-	8.542	112.10	99.96	0.002	-	8.540	112.09	99.99	0.002	-

B. 50th cycle fully charged state

Charge	5	8.658	112.54	8.652	112.53	99.93	0.009	Pass	8.512	112.53	98.38	0.000	Pass	8.507	112.53	99.94	0.000	Pass	8.500	112.52	99.92	0.009	Pass
	6	8.670	112.39	8.666	112.39	99.95	0.000	Pass	8.569	112.39	98.88	0.000	Pass	8.560	112.38	99.89	0.009	Pass	8.558	112.38	99.98	0.000	Pass
	7	8.662	112.58	8.660	112.57	99.98	0.009	Pass	8.510	112.57	98.27	0.000	Pass	8.509	112.57	99.99	0.000	Pass	8.501	112.57	99.91	0.000	Pass
	8	8.662	112.19	8.662	112.18	100.00	0.009	Pass	8.520	112.17	98.36	0.009	Pass	8.512	112.17	99.91	0.000	Pass	8.508	112.17	99.95	0.000	Pass
	Ave.	8.663	112.43	8.660	112.42	99.97	0.007	-	8.528	112.42	98.47	0.002	-	8.522	112.41	99.93	0.002	-	8.517	112.41	99.94	0.002	-

Requirement	<ul style="list-style-type: none"> - Measuring mass before/after each test (If M>75g, less than 0.1%, 1g≤M≤75, less than 0.2%, M<1g, less than 0.5%) - 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)

	NO.	Initial OCV(V)	Max. Temp (°C)	Result
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A. 1st cycle fully charged state

Charge	1	8.566	56.32	Pass
	2	8.531	55.09	Pass
	3	8.538	55.57	Pass
	4	8.526	55.32	Pass
	MAX.	8.566	56.32	-

Test Condition

- 100mΩ ext. short-circuit at 55±2°C

Over Charge (T7)

	NO.	Initial OCV(V)	Max. Temp (°C)	Result
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A. 1st cycle fully charged state

Charge	9	8.646	24.30	Pass
	10	8.640	24.11	Pass
	11	8.649	24.06	Pass
	12	8.649	25.12	Pass
	MAX.	8.649	25.12	-

Test Condition

- Max. Charge Current : 1546mA
 - CC/CV 2I_{max}(3092mA) 17.4V cut-off 24Hr

EXT.Short Circuit (T5)

	NO.	Initial OCV(V)	Max. Temp (°C)	Result
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B. 50th cycle fully charged state

Charge	5	8.500	56.29	Pass
	6	8.558	54.74	Pass
	7	8.501	55.45	Pass
	8	8.508	56.27	Pass
	MAX.	8.558	56.29	-

Requirement

- Temperature ≤ 170 (°C)
 - No disassembly, no rupture, no fire within 6 hours after the test

Over Charge (T7)

	NO.	Initial OCV(V)	Max. Temp (°C)	Result
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B. 50th cycle fully charged state

Charge	13	8.624	24.42	Pass
	14	8.620	24.85	Pass
	15	8.621	23.48	Pass
	16	8.622	23.80	Pass
	MAX.	8.624	24.85	-

Requirement

- No disassembly, no fire within 7 day after the test

3-3. T6/T8 Test Result (ICR18650E1)

Impact (T6)

Direction	NO.	Initial OCV(V)	Max. Temp (°C)	Result
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A. 1st cycle 50% charged state

Flat	C-1	3.779	25.01	Pass
	C-2	3.868	31.72	Pass
	C-3	3.779	26.04	Pass
	C-4	3.780	53.88	Pass
	C-5	3.872	123.73	Pass
MAX.		3.872	123.73	-

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 fire within 6 hours after the test

Forced Discharge (T8)

NO.	Initial OCV(V)	Max. Temp (°C)	Result
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A. 1st cycle fully discharged state

C-6	3.244	66.66	Pass
C-7	3.272	68.90	Pass
C-8	3.266	74.22	Pass
C-9	3.260	73.29	Pass
C-10	3.269	69.70	Pass
C-11	3.408	73.17	Pass
C-12	3.372	76.20	Pass
C-13	3.388	75.60	Pass
C-14	3.365	75.87	Pass
C-15	3.372	75.22	Pass
MAX.	3.408	76.20	-

B. 50th cycle fully discharged state

C-16	3.685	75.95	Pass
C-17	3.690	74.27	Pass
C-18	3.691	75.30	Pass
C-19	3.685	67.77	Pass
C-20	3.686	80.25	Pass
C-21	3.692	79.99	Pass
C-22	3.690	78.82	Pass
C-23	3.689	78.08	Pass
C-24	3.687	77.65	Pass
C-25	3.678	73.59	Pass
MAX.	3.692	80.25	-

Test Condition

- Discharge at max. discharge current
(with 12V DC power supply) : 4650mA
Duration time: rated capacity (40min)

Requirement

- No disassembly, no fire within 7 days after the test

