




문서번호	QAE-EF02-150915-PKSB10K12721	
Prepared	남익현	
	장승현	
Reviewed	남대호	
	박해나	
Approved	김병수	

SolutionPartner

UN38.3 Test Report

-SB10K12721(Nom. 44Wh, 11.4V)-

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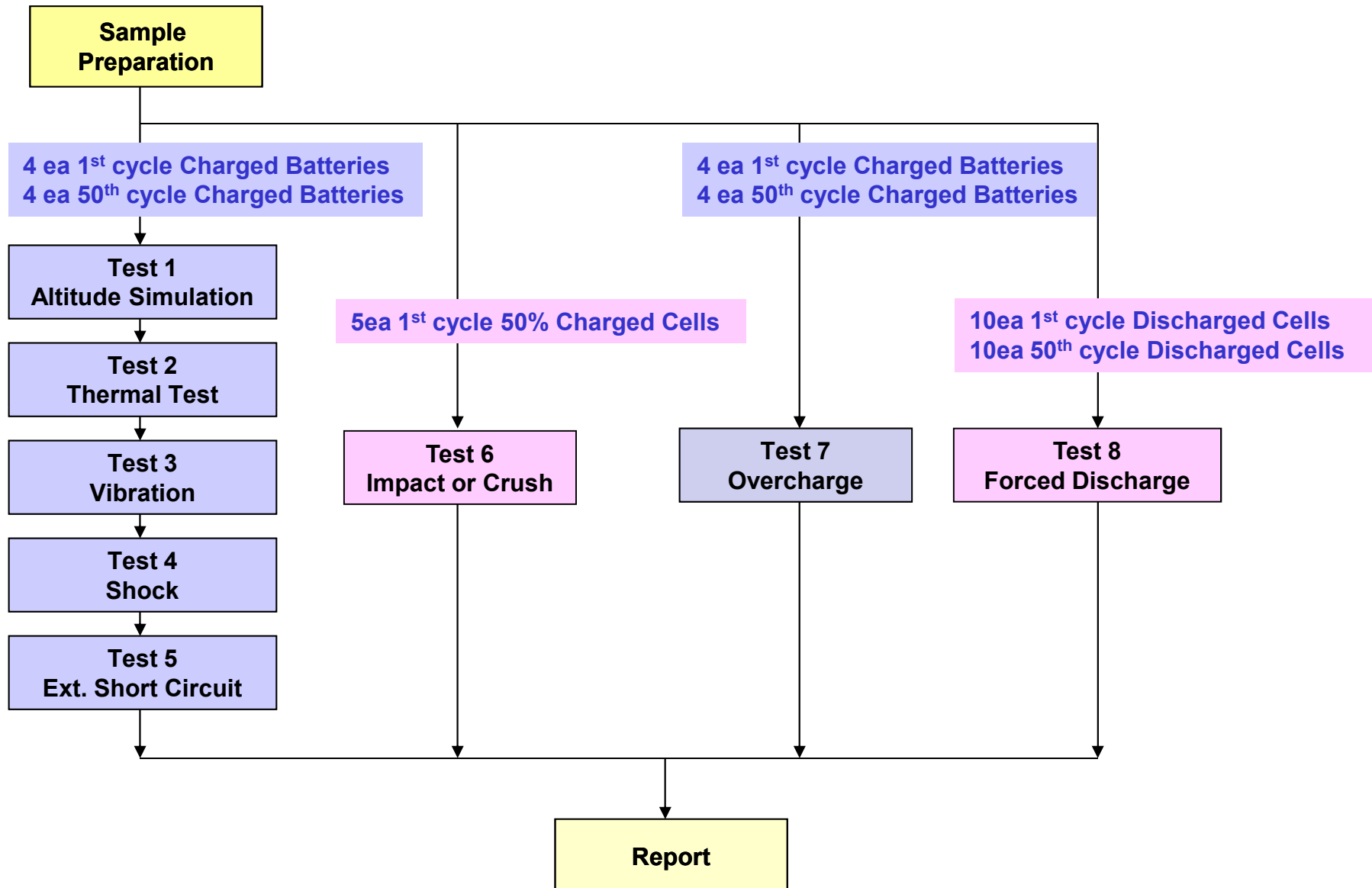
1. UN38.3 Transportation Regulation Test

Test	Condition	Requirements	
Test 1. Altitude Simulation	Storing at (low pressure) 11.6kPa for 6hr at 20+/-5°C	- 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°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		- No disassembly, no rupture, no fire within 6 hours after the test - Temp. monitoring (max. 170°C)
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°C)
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	12.883	227.56	12.859	227.55	99.81	0.004	Pass	12.724	227.54	98.95	0.004	Pass	12.716	227.52	99.94	0.009	Pass	12.685	227.50	99.76	0.009	Pass
	2	12.846	228.45	12.824	228.44	99.83	0.004	Pass	12.687	228.42	98.93	0.009	Pass	12.684	228.41	99.98	0.004	Pass	12.624	228.41	99.53	0.000	Pass
	3	12.845	228.25	12.830	228.24	99.88	0.004	Pass	12.698	228.24	98.97	0.000	Pass	12.689	228.24	99.93	0.000	Pass	12.645	228.22	99.65	0.009	Pass
	4	12.846	228.06	12.831	228.06	99.88	0.000	Pass	12.694	228.05	98.93	0.004	Pass	12.689	228.04	99.96	0.004	Pass	12.593	228.04	99.24	0.000	Pass
	Ave.	12.855	228.08	12.836	228.07	99.85	0.003	-	12.701	228.06	98.95	0.004	-	12.695	228.05	99.95	0.004	-	12.637	228.04	99.54	0.004	-

B. 50th cycle fully charged state

Charge	5	12.861	227.73	12.843	227.72	99.86	0.004	Pass	12.668	227.71	98.64	0.004	Pass	12.659	227.70	99.93	0.004	Pass	12.633	227.69	99.79	0.004	Pass
	6	12.863	227.55	12.844	227.55	99.85	0.000	Pass	12.682	227.54	98.74	0.004	Pass	12.669	227.53	99.90	0.004	Pass	12.615	227.52	99.57	0.004	Pass
	7	12.870	227.43	12.845	227.41	99.81	0.009	Pass	12.659	227.41	98.55	0.000	Pass	12.657	227.40	99.98	0.004	Pass	12.584	227.39	99.42	0.004	Pass
	8	12.858	228.05	12.838	228.04	99.84	0.004	Pass	12.677	228.03	98.75	0.004	Pass	12.675	228.02	99.98	0.004	Pass	12.591	228.01	99.34	0.004	Pass
	Ave.	12.863	227.69	12.843	227.68	99.84	0.004	-	12.672	227.67	98.67	0.003	-	12.665	227.66	99.95	0.004	-	12.606	227.65	99.53	0.004	-

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

A. 1st cycle fully charged state

Charge	1	12.685	54.94	Pass
	2	12.624	55.74	Pass
	3	12.645	56.47	Pass
	4	12.593	55.33	Pass
	MAX.	12.685	56.47	-

Test Condition
- 100mΩ ext. short-circuit at 55±2°C

Over Charge (T7)				
	NO.	Initial OCV(V)	Max. Temp (°C)	Result

A. 1st cycle fully charged state

Charge	9	12.842	24.24	Pass
	10	12.847	23.93	Pass
	11	12.850	23.67	Pass
	12	12.849	23.72	Pass
	MAX.	12.850	24.24	-

Test Condition
- Max. Charge Current : 3825mA - CC/CV 2Imax(7650mA) 22.0V cut-off 24Hr

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

B. 50th cycle fully charged state

Charge	5	12.633	55.64	Pass
	6	12.615	55.49	Pass
	7	12.584	55.72	Pass
	8	12.591	56.63	Pass
	MAX.	12.633	56.63	-

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

B. 50th cycle fully charged state

Charge	13	12.822	24.90	Pass
	14	12.821	24.69	Pass
	15	12.822	24.71	Pass
	16	12.829	25.06	Pass
	MAX.	12.829	25.06	-

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

3-3. T6/T8 Test Result (ICP686170L1)

Crush (T6)				
Direction	NO.	Initial OCV(V)	Max. Temp (°C)	Result

A. 1st cycle 50% charged state

Flat	C-1	3.821	23.07	Pass
	C-2	3.823	23.12	Pass
	C-3	3.825	23.75	Pass
	C-4	3.822	22.01	Pass
	C-5	3.824	22.70	Pass
MAX.		3.825	23.75	-

Test Condition
- Crushing rate :1.5cm/s, until 13kN±0.78kN or 100mV drop or 50% deformation

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

A. 1st cycle fully discharged state

C-6	3.232	65.79	Pass
C-7	3.226	66.89	Pass
C-8	3.226	66.68	Pass
C-9	3.233	69.11	Pass
C-10	3.22	67.38	Pass
C-11	3.234	60.08	Pass
C-12	3.215	61.62	Pass
C-13	3.231	66.04	Pass
C-14	3.217	60.73	Pass
C-15	3.234	65.88	Pass
MAX.	3.234	69.11	-

B. 50th cycle fully discharged state

C-16	3.242	71.17	Pass
C-17	3.243	74.15	Pass
C-18	3.241	68.27	Pass
C-19	3.242	72.21	Pass
C-20	3.247	65.37	Pass
C-21	3.244	69.30	Pass
C-22	3.247	65.11	Pass
C-23	3.241	74.61	Pass
C-24	3.240	68.44	Pass
C-25	3.243	70.52	Pass
MAX.	3.247	74.61	-

Test Condition
- Discharge at max. discharge current (with 12V DC power supply) : 5738mA Duration time: rated capacity (40.0min)

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

