



TEST - REPORT

UN manual of tests and criteria,
part III, sub-section 38.3,
Lithium metal and lithium ion batteries

Model : SCL – 03

Test Report Number : SC Q190610

June 10, 2019



Table of contents

1. General information	3
2. Technical information	4
2-1. Summary of test results	4
2-2. Test environment	5
2-3. Test instrument list	5
3. Test results	6
3-1. Possible test case verdicts	6
3-2. Test purpose/procedure/requirements	6
3-3. Test procedure	17
3-4. Test results	19
4. Documentations	23
4-1. Specifications	31
4-2. Pictures	32

Reliability Test Report

1. General information

- ◆ Apparatus - - - - - Lithium Primary Battery(Li/SOCl₂), Cell
- ◆ Type Reference - - - - SCL-03
- ◆ Ratings - - - - - 3.6V, 1.2Ah
- ◆ Test Standards - - - - ST/SG/AC. 10/11/Rev.5
 Recommendations on the Transport of Dangerous Goods :
 Manual of Tests and Criteria, Part III, Sub-Section 38.3
 Lithium metal and lithium ion batteries
 UNITED NATIONS
- ◆ Manufacturer - - - - S-Connect Co., Ltd
 33,Jeongoksandan-12gil, Seoshin-myeon, Hwaseong-City,
 Kyunggi-Do, Korea
- ◆ Date of Tests - - - - - April. 10, 2019 ~ May. 09, 2019
- ◆ Date of Issue - - - - - June. 10, 2019

Tested	Seong-Jin Kim (Project Engineer)	
Verified	Jong-Sun Park (Technical Manager)	
Approved	Sang-Pil Kim (Research institute director)	

2. Technical information

2-1. Summary of test results

No.	Test items	Criteria	Results
1	Test T.1 : Altitude Simulation	- No mass loss, no leakage, no venting, no disassembly, no rupture and no fire. - The open circuit voltage of each cells after testing is not less than 90% of its voltage immediately prior to the procedure	PASS
2	Test T.2 : : Thermal Test	- No mass loss, no leakage, no venting, no disassembly, no rupture and no fire. - The open circuit voltage of each cells after testing is not less than 90% of its voltage immediately prior to the procedure	PASS
3	Test T.3 : : Vibration	- No mass loss, no leakage, no venting, no disassembly, no rupture and no fire. - The open circuit voltage of each cells after testing is not less than 90% of its voltage immediately prior to the procedure	PASS
4	Test T.4 : Shock	- No mass loss, no leakage, no venting, no disassembly, no rupture and no fire. - The open circuit voltage of each cells after testing is not less than 90% of its voltage immediately prior to the procedure	PASS
5	Test T.5 : External Short Circuit	- Their external temperature does not exceed 170 °C and there is no disassembly, no rupture and no fire within six hours of this test.	PASS
6	Test T.6 : Impact	- Their external temperature does not exceed 170 °C and there is no disassembly and no fire within six hours of this test.	PASS
7	Test T.7 : Over Charge	- There is no disassembly and no fire within seven days of the test.	N/A
8	Test T.8 : Forced Discharge	- There is no disassembly and no fire within seven days of the test.	PASS

2-2. Test environment

**Unless specified otherwise in the individual tests shall be conducted under the following ambient conditions.*

Temperature ----- 20°C ± 5°C
 Relative Humidity ----- Not specified
 Air Pressure ----- Not specified
 Altitude of test laboratory ----- 51m

2-3. Test instrument list

No.	Measurement Equipment
1	VO-10X Jeio Tech. (Vacuum Oven), Jisico KOR
2	Low & Constant Temp. Humidity Chamber, Jisico KOR
3	SJTA-2000S. (Vibration Tester), Sejin Technology KOR
4	SJTC-300. (Shock Tester), Sejin Technology KOR
5	Q-BloxxA 108/104 & Qterm-CJC-A104, (Short Circuit Tester) KOR
6	DX-2040(Recorder), Yokogawa JPA
7	732(01) Digital Multimeter, Yokogawa JPA
8	CAS MWP KOR
9	Electronic Load PLZ-50F/PLZ-150U, Kikusui JPA
10	KR100(Recorder), Thermocouple, Konise KOR
11	DC Power Supply GP-4303TP EZ Digital KOR
12	mΩ Hitester 3540, Hioki JPA

3. Test results

3-1. Possible test case verdicts

- * Test case does not apply to the test object ----- N/A
- * Test object does meet the requirement ----- P (Pass)
- * Test object does not meet the requirement ----- F (Fail)

3-2. Test purpose/procedure/requirements

Sub-Section 38.3 Lithium metal and Lithium ion batteries		
Clause	Requirement + Test	Verdict
38.3.3	When a cell or battery type is to be tested under this sub-section, the number and condition of cells and batteries of each type to be tested are as follows:	
	(a) When testing primary cells and batteries under tests 1 to 5 the following shall be tested in the quantity indicated :	P
	(i) ten cells in undischarged states,	P
	(ii) ten cells in fully discharged states,	P
	(iii) four small batteries in undischarged states,	N/A
	(iv) four small batteries in fully discharged states.	N/A
(v) four large batteries in undischarged states,	N/A	
(vi) four large batteries in fully discharged states.	N/A	
(b) When testing rechargeable cells and batteries under tests 1 to 5 the following shall be tested in the quantity indicated :	N/A	
(i) ten cells at first cycle, in fully charged states,	N/A	
(ii) four small batteries at first cycle, in fully charged states,	N/A	
(iii) four small batteries after 50cycle ending in fully charged states,	N/A	
(iv) two large batteries at first cycle, in fully charged states, and	N/A	
(v) two large batteries after 25cycle ending in fully charged states,	N/A	

Sub-Section 38.3 Lithium metal and Lithium ion batteries		
Clause	Requirement + Test	Verdict
38.3.3	(c) When testing primary and rechargeable cells under test 6, the following shall be tested in the quantity indicated :	P
	(i) for primary cells, five cells in undischarged states and five cells in fully discharged states,	P
	(ii) for component cells of primary batteries, five cells in undischarged states and five cells in fully discharged states,	N/A
	(iii) for rechargeable cells, five cells at first cycle at 50% of the design rated capacity, and	N/A
	(iv) for component cells of rechargeable batteries, five cells at first cycle at 50% of the design rated	N/A
	For prismatic cells, ten test cells are required for each of the states of charge being tested, instead of the five described above, so that the procedure can be carried out on five cells along the longitudinal axes and, separately, five cells along the other axes. In every case, the test cell is only subjected to one impact.	N/A
	(d) When testing rechargeable batteries under test 7, the following shall be tested in the quantity indicated :	N/A
	(ii) four small batteries at first cycle, in fully charged states,	N/A
	(iii) four small batteries after 50cycle ending in fully charged states,	N/A
	(iv) two large batteries at first cycle, in fully charged states, and	N/A
(v) two large batteries after 25cycle ending in fully charged states,	N/A	
Batteries not equipped with overcharge protection that are designed for use only in a battery assembly, which affords such protection, are not subject to the requirements of this test.	N/A	

Sub-Section 38.3 Lithium metal and Lithium ion batteries		
Clause	Requirement + Test	Verdict
38.3.3	(e) When testing primary and rechargeable cells under test 8, the following shall be tested in the quantity indicated: (i) ten primary cells in fully discharged states, (ii) ten rechargeable cells, at first cycle in fully discharged states, and (iii) ten rechargeable cells after 50 cycles ending in fully discharged states.	P P N/A N/A
	(f) When testing a battery assembly in which the aggregate lithium content of all anodes, when fully charged, is not more than 500g, or in the case of a lithium ion battery, with a Watt-hour rating of not more than 6,200Watt-hours, that is assembled from cells or batteries that have passed all applicable tests, one battery assembly in a fully charged state shall be tested under tests 3,4 and 5, and, in addition, test 7 in the case of a rechargeable battery assembly. For a rechargeable battery assembly, the assembly shall have been cycled at least 25cycle	N/A

Clause	Procedure	Verdict
38.3.4	Each cell and battery type must be subjected to tests 1 to 8. Tests 1 to 5 must be conducted in sequence on the same cell or battery. Tests 6 and 8 should be conducted using not otherwise tested cells or batteries. Test 7 may be conducted using undamaged batteries previously used in Tests 1 to 5 for purposes of testing on cycled batteries.	P

Sub-Section 38.3 Lithium metal and Lithium ion batteries		
Clause	Requirement + Test	Verdict
38.3.4.1	<i>Test T.1 : Altitude simulation</i>	P
38.3.4.1.1	<i>Purpose :</i> This test simulates air transport under low-pressure conditions.	
38.3.4.1.2	<i>Test Procedure :</i> Test cells and batteries shall be stored at a pressure of 11.6kPa or less for at least six hours at ambient temperature(20±5°C).	P
38.3.4.1.3	<i>Requirement :</i> Cells and batteries meet this requirement if there is no mass loss, no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.	P

* See appended 3-4.Test results(table T.1)

Sub-Section 38.3 Lithium metal and Lithium ion batteries		
Clause	Requirement + Test	Verdict
38.3.4.2	<i>Test T.2 : Thermal test</i>	P
38.3.4.2.1	<i>Purpose :</i> This test assesses cell and battery seal integrity and internal electrical connections. The test is conducted using rapid and extreme temperature changes.	
38.3.4.2.2	<i>Test Procedure :</i> Test cells and batteries are to be stored for at least six hours at a test temperature equal to $75\pm 2^{\circ}\text{C}$, followed by storage for at least six hours at a test temperature equal to $(-40\pm 2^{\circ}\text{C})$. The maximum time interval between test temperature extremes is 30 minutes. This procedure is to be repeated 10 times, after which all test cells and batteries are to be stored for 24 hours at ambient temperature $(20\pm 5^{\circ}\text{C})$. For large cells and batteries the duration of exposure to the test temperature extremes should be at least 12 hours.	P
38.3.4.2.3	<i>Requirement :</i> Cells and batteries meet this requirement if there is no mass loss, no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.	P

* See appended 3-4.Test results(table T.2)

Sub-Section 38.3 Lithium metal and Lithium ion batteries		
Clause	Requirement + Test	Verdict
38.3.4.3	<i>Test T.3 : Vibration</i>	P
38.3.4.3.1	<i>Purpose :</i> This test simulates vibration during transport.	
38.3.4.3.2	<i>Test Procedure :</i> Cells and batteries are firmly secured to the platform of the vibration machine without distorting the cells in such a manner as to faithfully transmit the vibration. The vibration shall be a sinusoidal waveform with a logarithmic sweep between 7Hz and 200Hz and back to 7Hz traversed in 15 minutes. This cycle shall be repeated 12 times for a total of 3hrs for each of three mutually perpendicular mounting positions of the cell. One of the directions of vibration must be perpendicular to the terminal face. The logarithmic frequency sweep is as follows : from 7Hz a peak acceleration of 1G is maintained until 18Hz is reached. The amplitude is then maintained at 0.8mm (1.6mm total excursion) and the frequency increased until a peak acceleration of 8G occurs (approximately 50Hz). A peak acceleration of 8G is then maintained until the frequency is increased to 200 Hz.	P
38.3.4.3.3	<i>Requirement :</i> Cells and batteries meet this requirement if there is no mass loss, no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.	P

* See appended 3-4.Test results(table T.3)

Sub-Section 38.3 Lithium metal and Lithium ion batteries		
Clause	Requirement + Test	Verdict
38.3.4.4	<i>Test T.4 : Shock</i>	P
38.3.4.4.1	<i>Purpose :</i> This test simulates possible impacts during transport.	
38.3.4.4.2	<i>Test Procedure :</i> Test cells and batteries shall be secured to the testing machine by means of a rigid mount which will support all mounting surfaces of each test battery. Each cell or battery shall be subjected to a halfsine shock of peak acceleration of 150G and pulse duration of 6ms. Each cell or battery shall be subjected to three shocks in the positive direction followed by three shocks in the negative direction of three mutually perpendicular mounting positions of the cell or battery for a total of 18 shocks. However, large cells and large batteries shall be subjected to a half-sine shock of peak acceleration of 50G and pulse duration of 11ms. Each cell or battery is subjected to three shocks in the positive direction followed by three shocks in the negative direction of each of three mutually perpendicular mounting positions of the cell for a total of 18 shocks.	P
38.3.4.4.3	<i>Requirement :</i> Cells and batteries meet this requirement if there is no mass loss, no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.	P

* See appended 3-4.Test results(table T.4)

Sub-Section 38.3 Lithium metal and Lithium ion batteries		
Clause	Requirement + Test	Verdict
38.3.4.5	<i>Test T.5: External short circuit</i>	P
38.3.4.5.1	<i>Purpose :</i> This test simulates an external short circuit.	
38.3.4.5.2	<i>Test Procedure :</i> The cell or battery to be tested shall be temperature stabilized so that its external case temperature reaches $55\pm 2^{\circ}\text{C}$ and then the cell or battery shall be subjected to a short circuit condition with a total external resistance of less than 0.1Ω at $55\pm 2^{\circ}\text{C}$. This short circuit condition is continued for at least one hour after the cell or battery external case temperature has returned to $55\pm 2^{\circ}\text{C}$. The cell or battery must be observed for a further six hours for the test to be concluded.	P
38.3.4.5.3	<i>Requirement :</i> Cells and batteries meet this requirement if their external temperature does not exceed 170°C and there is no disassembly, no rupture and no fire within six hours of this test.	P

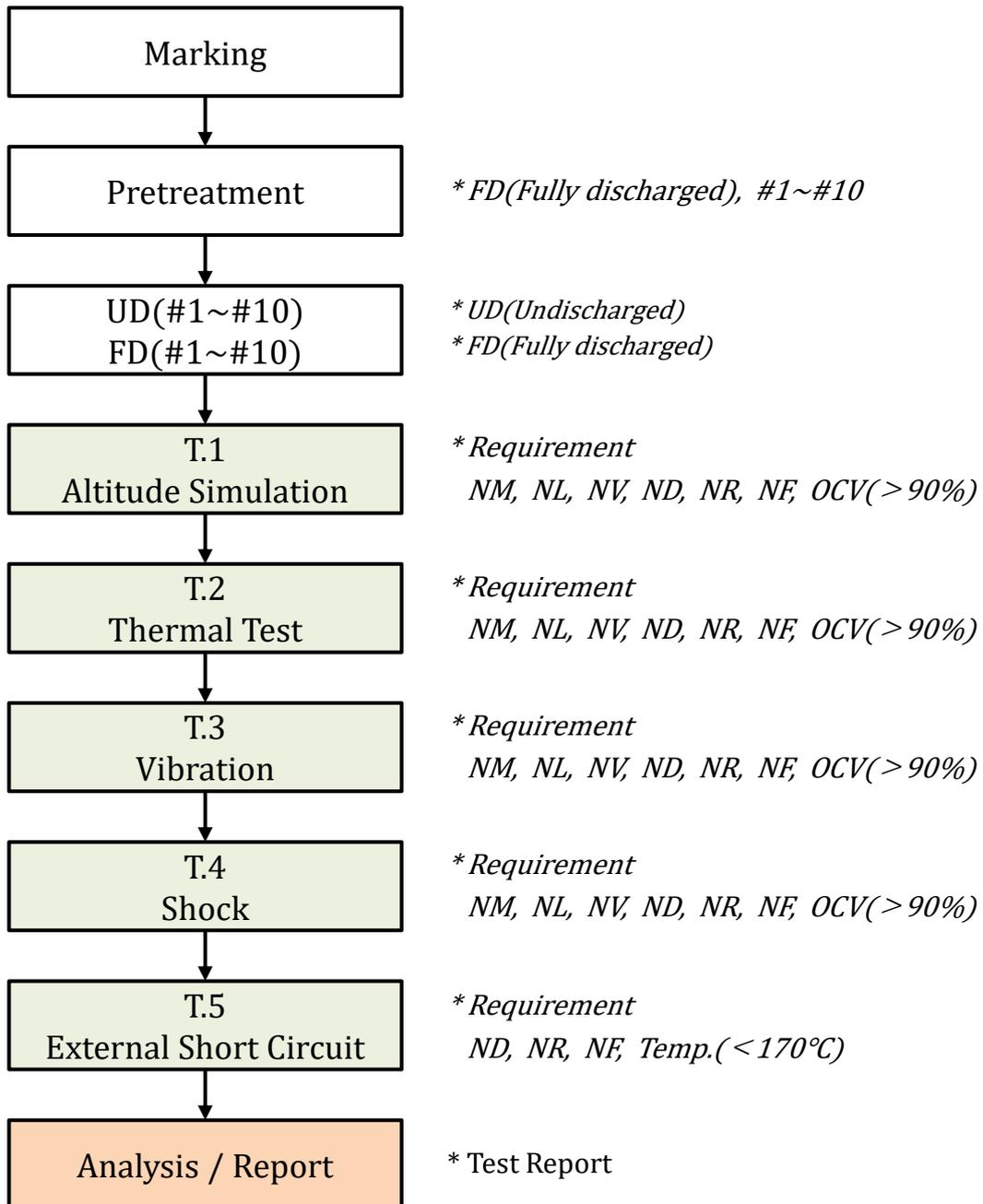
* See appended 3-4.Test results(table T.5)

Sub-Section 38.3 Lithium metal and Lithium ion batteries		
Clause	Requirement + Test	Verdict
38.3.4.6	<i>Test T.6: Impact</i>	P
38.3.4.6.1	<i>Purpose :</i> This test simulates an impact.	
38.3.4.6.2	<i>Test Procedure :</i> The test sample cell or component cell is to be placed on a flat surface. A 15.8mm diameter bar is to be placed across the center of the sample. A 9.1kg mass is to be dropped from a height of $61 \pm 2.5\text{cm}$ onto the sample. A cylindrical or prismatic cell is to be impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the 15.8mm diameter curved surface lying across the center of the test sample. A prismatic cell is also to be rotated 90 degrees around its longitudinal axis so that both the wide and narrow sides will be subjected to the impact. Each sample is to be subjected to only a single impact. Separate samples are to be used for each impact. A coin or button cell is to be impacted with the flat surface of the sample parallel to the flat surface and the 15.8mm diameter curved surface lying across its center.	P
38.3.4.6.3	<i>Requirement :</i> Cells and component cells meet this requirement if their external temperature does not exceed 170°C and there is no disassembly and no fire within six hours of this test.	P

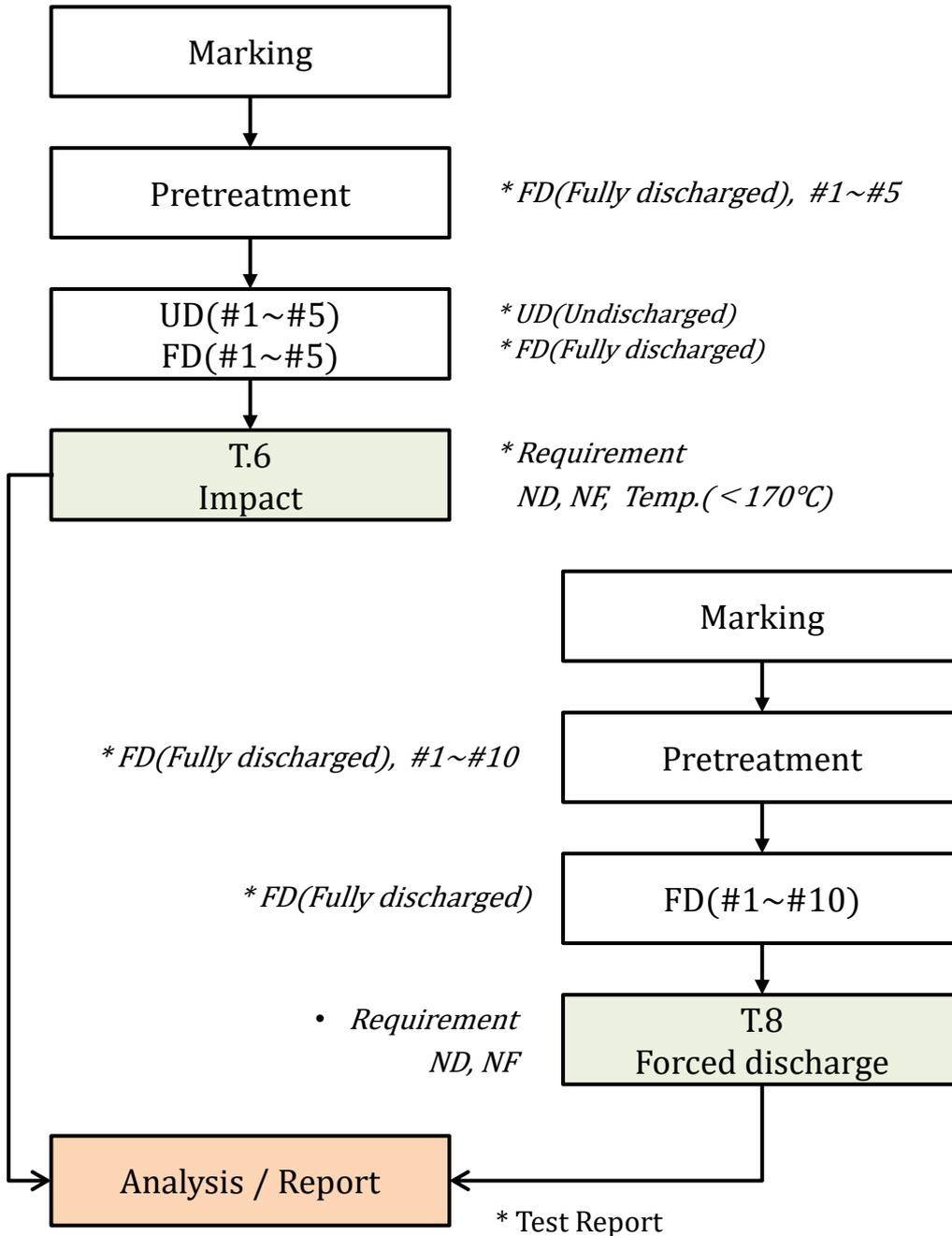
Sub-Section 38.3 Lithium metal and Lithium ion batteries		
Clause	Requirement + Test	Verdict
38.3.4.7	<i>Test T.7: Overcharge</i>	N/A
38.3.4.7.1	<i>Purpose :</i> This test evaluates the ability of a rechargeable battery to withstand an overcharge condition.	
38.3.4.7.2	<i>Test Procedure :</i> The charge current shall be twice the manufacturer's recommended maximum continuous charge current. The minimum voltage of the test shall be as follows: (a) when the manufacturer's recommended charge voltage is not more than 18V, the minimum voltage of the test shall be the lesser of two times the maximum charge voltage of the battery or 22V. (b) when the manufacturer's recommended charge voltage is more than 18V, the minimum voltage of the test shall be 1.2 times the maximum charge voltage. Tests are to be conducted at ambient temperature. The duration of the test shall be 24 hours.	N/A
38.3.4.7.3	<i>Requirement :</i> Rechargeable batteries meet this requirement if there is no disassembly and no fire within seven days of the test.	N/A

Sub-Section 38.3 Lithium metal and Lithium ion batteries		
Clause	Requirement + Test	Verdict
38.3.4.8	<i>Test T.8 : Forced discharge</i>	P
38.3.4.8.1	<i>Purpose :</i> This test evaluates the ability of a primary or a rechargeable cell to withstand a forced discharge condition.	
38.3.4.8.2	<i>Test Procedure :</i> Each cell shall be forced discharged at ambient temperature by connecting it in series with a 12V D.C. power supply at an initial current equal to the maximum discharge current specified by the manufacturer. The specified discharge current is to be obtained by connecting a resistive load of the appropriate size and rating in series with the test cell. Each cell shall be forced discharged for a time interval (in hours) equal to its rated capacity divided by the initial test current (in Ampere).	P
38.3.4.8.3	<i>Requirement :</i> Primary or rechargeable cells meet this requirement if there is no disassembly and no fire within seven days of the test..	P

3-3. Test procedure(Test T1 ~ T5)



3-3. Test procedure(Test T6 & T8)



- Test case does not apply to the test object
: T.7(Overcharge)

3-4. Test results

Test T.1 : Altitude simulation					
Sample No.		Prior to the test		After the test	
		Mass M (g)	OCV (V)	Mass M (g)	OCV (V)
Un-Discharged	T 1-1	8.74	3.65	8.74	3.65
	T 1-2	8.71	3.66	8.71	3.66
	T 1-3	8.75	3.65	8.75	3.65
	T 1-4	8.72	3.65	8.72	3.65
	T 1-5	8.75	3.66	8.75	3.66
	T 1-6	8.74	3.65	8.74	3.65
	T 1-7	8.77	3.65	8.77	3.65
	T 1-8	8.70	3.65	8.70	3.65
	T 1-9	8.74	3.66	8.74	3.66
	T 1-10	8.73	3.65	8.73	3.65
Fully discharged	T 1-1	8.75	N/A	8.75	N/A
	T 1-2	8.77	N/A	8.77	N/A
	T 1-3	8.73	N/A	8.73	N/A
	T 1-4	8.74	N/A	8.74	N/A
	T 1-5	8.72	N/A	8.72	N/A
	T 1-6	8.71	N/A	8.71	N/A
	T 1-7	8.78	N/A	8.78	N/A
	T 1-8	8.74	N/A	8.74	N/A
	T 1-9	8.70	N/A	8.70	N/A
	T 1-10	8.75	N/A	8.75	N/A

Test T.1 : Altitude simulation					
Sample No.		Variation		Result	
		Mass M loss(%)	OCV (%)		
Un-discharged	T 1-1	0	100	NM, NL, NV ND, NR, NF	PASS
	T 1-2	0	100		
	T 1-3	0	100		
	T 1-4	0	100		
	T 1-5	0	100		
	T 1-6	0	100		
	T 1-7	0	100		
	T 1-8	0	100		
	T 1-9	0	100		
	T 1-10	0	100		
Fully discharged	T 1-1	0	N/A	NM, NL, NV ND, NR, NF	PASS
	T 1-2	0	N/A		
	T 1-3	0	N/A		
	T 1-4	0	N/A		
	T 1-5	0	N/A		
	T 1-6	0	N/A		
	T 1-7	0	N/A		
	T 1-8	0	N/A		
	T 1-9	0	N/A		
	T 1-10	0	N/A		

* NM(No mass loss), NL(No leakage), NV(No venting), ND(No disassembly), NR(No rupture), NF(No fire),

* OCV(Open circuit voltage) : Variation[(After/Prior)×100], Allowed(> 90%)

<i>Test T.2 : Thermal Test</i>					
Sample No.		Prior to the test		After the test	
		Mass M (g)	OCV (V)	Mass M (g)	OCV (V)
Un-discharged	T 2-1	8.74	3.65	8.74	3.69
	T 2-2	8.71	3.66	8.71	3.68
	T 2-3	8.75	3.65	8.75	3.69
	T 2-4	8.72	3.65	8.72	3.68
	T 2-5	8.75	3.66	8.75	3.68
	T 2-6	8.74	3.65	8.74	3.69
	T 2-7	8.77	3.65	8.77	3.68
	T 2-8	8.70	3.65	8.70	3.68
	T 2-9	8.74	3.66	8.74	3.69
	T 2-10	8.73	3.65	8.73	3.69
Fully discharged	T 2-1	8.75	N/A	8.75	N/A
	T 2-2	8.77	N/A	8.77	N/A
	T 2-3	8.73	N/A	8.73	N/A
	T 2-4	8.74	N/A	8.74	N/A
	T 2-5	8.72	N/A	8.72	N/A
	T 2-6	8.71	N/A	8.71	N/A
	T 2-7	8.78	N/A	8.78	N/A
	T 2-8	8.74	N/A	8.74	N/A
	T 2-9	8.70	N/A	8.70	N/A
	T 2-10	8.75	N/A	8.75	N/A

Test T.2 : Thermal Test					
Sample No.		Variation		Result	
		Mass M loss(%)	OCV (%)		
Un-discharged	T 2-1	0	101.1	NM, NL, NV ND, NR, NF	PASS
	T 2-2	0	100.5		
	T 2-3	0	101.1		
	T 2-4	0	100.8		
	T 2-5	0	100.5		
	T 2-6	0	101.1		
	T 2-7	0	100.8		
	T 2-8	0	100.8		
	T 2-9	0	100.8		
	T 2-10	0	101.1		
Fully discharged	T 2-1	0	N/A	NM, NL, NV ND, NR, NF	PASS
	T 2-2	0	N/A		
	T 2-3	0	N/A		
	T 2-4	0	N/A		
	T 2-5	0	N/A		
	T 2-6	0	N/A		
	T 2-7	0	N/A		
	T 2-8	0	N/A		
	T 2-9	0	N/A		
	T 2-10	0	N/A		

* NM(No mass loss), NL(No leakage), NV(No venting), ND(No disassembly), NR(No rupture), NF(No fire),

* OCV(Open circuit voltage) : Variation[(After/Prior)×100], Allowed(> 90%)

<i>Test T.3 : Vibration</i>					
Sample No.		Prior to the test		After the test	
		Mass M (g)	OCV (V)	Mass M (g)	OCV (V)
Un-discharged	T 3-1	8.74	3.69	8.74	3.69
	T 3-2	8.71	3.68	8.71	3.68
	T 3-3	8.75	3.69	8.75	3.68
	T 3-4	8.72	3.68	8.72	3.68
	T 3-5	8.75	3.68	8.75	3.68
	T 3-6	8.74	3.69	8.74	3.69
	T 3-7	8.77	3.68	8.77	3.68
	T 3-8	8.70	3.68	8.70	3.68
	T 3-9	8.74	3.69	8.74	3.69
	T 3-10	8.73	3.69	8.73	3.69
Fully discharged	T 3-1	8.75	N/A	8.75	N/A
	T 3-2	8.77	N/A	8.77	N/A
	T 3-3	8.73	N/A	8.73	N/A
	T 3-4	8.74	N/A	8.74	N/A
	T 3-5	8.72	N/A	8.72	N/A
	T 3-6	8.71	N/A	8.71	N/A
	T 3-7	8.78	N/A	8.78	N/A
	T 3-8	8.74	N/A	8.74	N/A
	T 3-9	8.70	N/A	8.70	N/A
	T 3-10	8.75	N/A	8.75	N/A

Test T.3 : Vibration					
Sample No.		Variation		Result	
		Mass M loss(%)	OCV (%)		
Un-discharged	T 3-1	0	100	NM, NL, NV ND, NR, NF	PASS
	T 3-2	0	100		
	T 3-3	0	99.7		
	T 3-4	0	100		
	T 3-5	0	100		
	T 3-6	0	100		
	T 3-7	0	100		
	T 3-8	0	100		
	T 3-9	0	100		
	T 3-10	0	100		
Fully discharged	T 3-1	0	N/A	NM, NL, NV ND, NR, NF	PASS
	T 3-2	0	N/A		
	T 3-3	0	N/A		
	T 3-4	0	N/A		
	T 3-5	0	N/A		
	T 3-6	0	N/A		
	T 3-7	0	N/A		
	T 3-8	0	N/A		
	T 3-9	0	N/A		
	T 3-10	0	N/A		

* NM(No mass loss), NL(No leakage), NV(No venting), ND(No disassembly), NR(No rupture), NF(No fire),

* OCV(Open circuit voltage) : Variation[(After/Prior)×100], Allowed(> 90%)

<i>Test T.4 : Shock</i>					
Sample No.		Prior to the test		After the test	
		Mass M (g)	OCV (V)	Mass M (g)	OCV (V)
Un-discharged	T 4-1	8.74	3.69	8.74	3.69
	T 4-2	8.71	3.68	8.71	3.68
	T 4-3	8.75	3.68	8.75	3.68
	T 4-4	8.72	3.68	8.72	3.68
	T 4-5	8.75	3.68	8.75	3.68
	T 4-6	8.74	3.69	8.74	3.68
	T 4-7	8.77	3.68	8.77	3.68
	T 4-8	8.70	3.68	8.70	3.68
	T 4-9	8.74	3.69	8.74	3.68
	T 4-10	8.73	3.69	8.73	3.69
Fully discharged	T 4-1	8.75	N/A	8.75	N/A
	T 4-2	8.77	N/A	8.77	N/A
	T 4-3	8.73	N/A	8.73	N/A
	T 4-4	8.74	N/A	8.74	N/A
	T 4-5	8.72	N/A	8.72	N/A
	T 4-6	8.71	N/A	8.71	N/A
	T 4-7	8.78	N/A	8.78	N/A
	T 4-8	8.74	N/A	8.74	N/A
	T 4-9	8.70	N/A	8.70	N/A
	T 4-10	8.75	N/A	8.75	N/A

<i>Test T.4 : Shock</i>					
Sample No.		Variation		Result	
		Mass M loss(%)	OCV (%)		
Un-discharged	T 4-1	0	100	NM, NL, NV ND, NR, NF	PASS
	T 4-2	0	100		
	T 4-3	0	100		
	T 4-4	0	100		
	T 4-5	0	100		
	T 4-6	0	99.7		
	T 4-7	0	100		
	T 4-8	0	100		
	T 4-9	0	99.7		
	T 4-10	0	100		
Fully discharged	T 4-1	0	N/A	NM, NL, NV ND, NR, NF	PASS
	T 4-2	0	N/A		
	T 4-3	0	N/A		
	T 4-4	0	N/A		
	T 4-5	0	N/A		
	T 4-6	0	N/A		
	T 4-7	0	N/A		
	T 4-8	0	N/A		
	T 4-9	0	N/A		
	T 4-10	0	N/A		

* NM(No mass loss), NL(No leakage), NV(No venting), ND(No disassembly),
NR(No rupture), NF(No fire),

* OCV(Open circuit voltage) : Variation[(After/Prior)×100], Allowed(> 90%)

<i>Test T.5 : External short circuit</i>			
Sample No.		Open circuit voltage (V)	Measured maximum Temperature(°C)
Un-Discharged	T 5-1	3.69	84
	T 5-2	3.68	79
	T 5-3	3.68	81
	T 5-4	3.68	85
	T 5-5	3.68	83
	T 5-6	3.68	81
	T 5-7	3.68	88
	T 5-8	3.68	82
	T 5-9	3.68	87
	T 5-10	3.69	88
Fully Discharged	T 5-1	N/A	39
	T 5-2	N/A	41
	T 5-3	N/A	44
	T 5-4	N/A	40
	T 5-5	N/A	42
	T 5-6	N/A	43
	T 5-7	N/A	45
	T 5-8	N/A	40
	T 5-9	N/A	43
	T 5-10	N/A	44

<i>Test T.5 : External short circuit</i>					
Sample No.		Allowed		Result	
		Maximum Temperature(°C)			
Un-discharged	T 5-1	84		ND, NR, NF	PASS
	T 5-2	79			
	T 5-3	81			
	T 5-4	85			
	T 5-5	83			
	T 5-6	81			
	T 5-7	88			
	T 5-8	82			
	T 5-9	87			
	T 5-10	88			
Fully discharged	T 5-1	39		ND, NR, NF	PASS
	T 5-2	41			
	T 5-3	44			
	T 5-4	40			
	T 5-5	42			
	T 5-6	43			
	T 5-7	45			
	T 5-8	40			
	T 5-9	43			
	T 5-10	44			

* Supplementary information :

Their external temperature does not exceed 170°C and there is ND(No disassembly), NR(No rupture) and NF(No fire)

Test T.6 : Impact			
Sample No.		Open circuit voltage (V)	Measured maximum Temperature(°C)
Un-Discharged	T 6-1	3.65	55
	T 6-2	3.66	52
	T 6-3	3.65	47
	T 6-4	3.66	51
	T 6-5	3.66	45
Fully Discharged	T 6-1	N/A	41
	T 6-2	N/A	35
	T 6-3	N/A	37
	T 6-4	N/A	34
	T 6-5	N/A	36

Test T.6 : Impact				
Sample No.		Allowed	Result	
		Maximum Temperature(°C)		
Un-discharged	T 6-1	55	ND, NF	PASS
	T 6-2	52		
	T 6-3	47		
	T 6-4	51		
	T 6-5	45		
Fully discharged	T 6-1	41	ND, NF	PASS
	T 6-2	35		
	T 6-3	37		
	T 6-4	34		
	T 6-5	36		

- Supplementary information : Their external temperature does not exceed 170°C and there is ND(No disassembly), and NF(No fire)

<i>Test T.8 : Forced discharge</i>				
Sample No.		Open circuit voltage (V)	Result	
Fully Discharged	T 8-1	N/A	ND, NF	PASS
	T 8-2	N/A		
	T 8-3	N/A		
	T 8-4	N/A		
	T 8-5	N/A		
	T 8-6	N/A		
	T 8-7	N/A		
	T 8-8	N/A		
	T 8-9	N/A		
	T 8-10	N/A		

* Supplementary information : ND(No disassembly), NF(No fire)

4. Documentations

4-1. Specifications



SCL-03

ER14250
1/2 AA-SIZE BOBBIN CELL

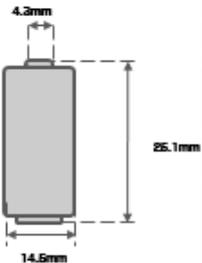


Performance Data

(Typical values stored at 25°C for one year)

▪ Nominal capacity <small>(at 1mA +20°C/2.0V cut-off)</small>	1.2Ah
▪ Nominal voltage	3.6V
▪ Max. continuous discharge current	30mA
▪ Max. pulse current capability	60mA
▪ Operating temperature range	-55 ~ +85°C
▪ Lithium metal content	approx. 0.3g
▪ Weight	9g
▪ Volume	4.3cm ³
▪ UL Approval	**





Dimensions in mm

(Unit:mm)

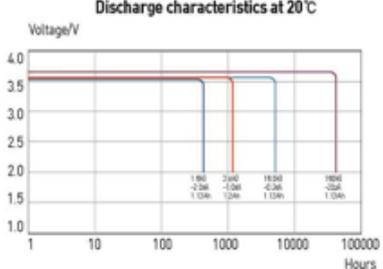
Available Terminal Type
STD, T1, T2, T3, T3/R, T3EU, T3EU/R, AX, Wire, Connector, Case1, Case2

Storage Condition
Please store batteries at clean, cool (not over +30°C), dried (less than 30% RH) and ventilated condition



WARNING
Fire, explosion, and severe burn hazard. Do not recharge, disassemble, heat above 100 °C, incinerate, or expose contents to water.

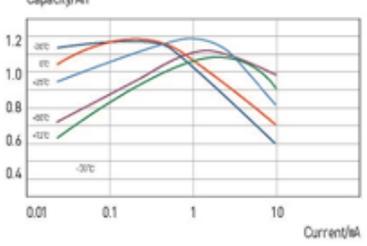
Discharge characteristics at 20°C



Voltage/V

Hours

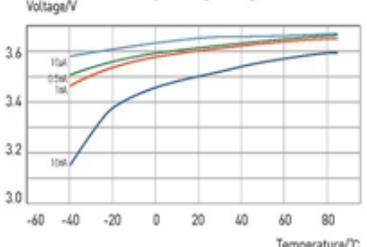
Available Capacity



Capacity/Ah

Current/mA

Operating voltage



Voltage/V

Temperature/°C

* Storage Condition
Please store at clean, cool (not over +30°C) dry and place.

Any or all information in product catalogues is for reference only. Contents are subject to change without notice and they are not guaranteed.
<http://www.aricel.co.kr>

4-2. Pictures

