

TEST REPORT

ST/SG/AC.10/11/Rev.6/Amend.1

Recommendations on the Transport of Dangerous Goods

Manual of Test and Criteria

(Section 38.3: Lithium batteries)

Applicant's name 鴻翔國際電通股份有限公司

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Test specification:

Standard ST/SG/AC.10/11/Rev.6/Amend.1 Section 38.3

Test procedure Test Report

Non-standard test method N/A

Date of receipt of test item 2020-07-07

Date(s) of performance of test 2020-07-07 to 2020-08-03

Date of issue 2020-09-24

Tested by Project Handler

(printed name and signature) Ray Huang



Approved by Reviewer

(printed name and signature) Brian Chien



Test item description Rechargeable Li-ion Cell

Trade Mark GREPOW

Model/Type reference 373026

Ratings (V & Wh) 3.8Vdc, 245mAh / 0.931Wh

Particulars: Test Item vs. Test Requirements	
Classification	<input type="checkbox"/> Lithium metal batteries; <input type="checkbox"/> Lithium metal cells; <input type="checkbox"/> Lithium ion batteries; <input checked="" type="checkbox"/> Lithium ion cells;
SamplesType	<input type="checkbox"/> Large battery; <input type="checkbox"/> Large cell; <input type="checkbox"/> Small battery; <input checked="" type="checkbox"/> Small cell <input type="checkbox"/> Component cell; <input type="checkbox"/> Single cell battery; <input type="checkbox"/> Primary cell; <input type="checkbox"/> Primary battery; <input checked="" type="checkbox"/> Rechargeable cell; <input type="checkbox"/> Rechargeable battery; <input type="checkbox"/> Button cell
Packing Material	AL case
Shape	Prismatic
Dimension	Thickness max.3.65mm, Width max.30.0 mm, Length max.26.7 mm
Mass of equipment (Kg)	0.004
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)
General Remarks:	
<p>The test results presented in this report relate only to the object tested.</p> <p>This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.</p> <p>Throughout this report a point is used as the decimal separator.</p>	
General Product Information:	
<p>This cell is rechargeable lithium ion polymer cell, using for component cell of system devices.</p> <p>Report test data reference information: N/A</p>	
Statement concerning the uncertainty of the measurement systems used for the tests:	
<p>The lab has reduced the uncertainty risk factor from test equipment, environment and staff technicians which according to the standard on contract. Therefore, the test result will only be determined by standard requirement.</p>	
Test Conducted and result:	
Test 1: Altitude simulation	<input checked="" type="checkbox"/> Pass ; <input type="checkbox"/> Fail ; <input type="checkbox"/> Not Applicable
Test 2: Thermal Test	<input checked="" type="checkbox"/> Pass ; <input type="checkbox"/> Fail ; <input type="checkbox"/> Not Applicable
Test 3: Vibration.....	<input checked="" type="checkbox"/> Pass ; <input type="checkbox"/> Fail ; <input type="checkbox"/> Not Applicable
Test 4: Shock.....	<input checked="" type="checkbox"/> Pass ; <input type="checkbox"/> Fail ; <input type="checkbox"/> Not Applicable
Test 5: External short circuit.....	<input checked="" type="checkbox"/> Pass ; <input type="checkbox"/> Fail ; <input type="checkbox"/> Not Applicable
Test 6: Impact /Crush	<input checked="" type="checkbox"/> Pass ; <input type="checkbox"/> Fail ; <input type="checkbox"/> Not Applicable
Test 7: Overcharge	<input type="checkbox"/> Pass ; <input type="checkbox"/> Fail ; <input checked="" type="checkbox"/> Not Applicable
Test 8: Forced Discharge	<input checked="" type="checkbox"/> Pass ; <input type="checkbox"/> Fail ; <input type="checkbox"/> Not Applicable

ST/SG/AC.10/11/Rev.6/Amend.1 Section 38.3			
Clause	Requirement + Test	Result - Remark	Verdict
38.3	Lithium metal and lithium ion batteries		
38.3.1	Purpose		P
	This section presents the procedures to be followed for the classification of Lithium metal and lithium ion cells and batteries.		P
38.3.2	Scope		P
38.3.2.1	<p>All cell types shall be subjected to tests T.1 to T.6 and T.8.</p> <p>All non-rechargeable battery types, including those composed of previously tested cells, shall be subjected to tests T.1 to T.5.</p> <p>All rechargeable battery types, including those composed of previously tested cells, shall be subjected to tests T.1 to T.5 and T.7. In addition, rechargeable single cell batteries with overcharge protection shall be subjected to test T.7.</p> <p>A component cell that is not transported separately from the battery it is part of needs only to be tested according to tests T.6 and T.8.</p> <p>A component cell that is transported separately from the battery shall be subjected to tests T.1 to T.6 and T.8.</p>		P
38.3.2.2	Lithium metal and lithium ion cells and batteries which differ from a tested type by:		N/A
	a) For primary cells and batteries, a change of more than 0.1 g or 20% by mass, whichever is greater, to the cathode, to the anode, or to the electrolyte.		N/A
	b) For rechargeable cells and batteries, a change in nominal energy in Watt-hours of more than 20% or an increase in nominal voltage of more than 20%; or		N/A
	c) A change that would lead to failure of any tests.		N/A
	Shall be considered a new type and shall be subjected to the required test.		N/A
38.3.2.3	For the purposes of classification, the following definitions apply:	<input type="checkbox"/> Button cell <input type="checkbox"/> Component cell <input type="checkbox"/> Primary cell / battery <input checked="" type="checkbox"/> Rechargeable cell / battery <input type="checkbox"/> Single cell battery	—
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:		P
(a)	When testing primary cells and batteries under tests T.1 to T.5, the following shall be tested in the quantity indicated:	The requirement is not applicable to test cells.	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	(i) Ten cells in undischarged states;	Sample no.:	N/A
	(ii) Ten cells in fully discharged states;	Sample no.:	N/A
	(iii) Four small batteries in undischarged states;	Sample no.:	N/A
	(iv) Four small batteries in fully discharged states;	Sample no.:	N/A
	(v) Four large batteries in undischarged states;	Sample no.:	N/A
	(vi) Four large batteries in fully discharged states.	Sample no.:	N/A
(b)	When testing rechargeable cells and batteries under tests T.1 to T.5 the following shall be tested in the quantity indicated:		P
	(i) Five cells at first cycle, in fully charged states;	Sample no.: 02044-02048	P
	(ii) Five cells after 25 cycle ending in fully charged states;	Sample no.: 02049-02053	P
	(iii) Four small batteries at first cycle, in fully charged states;	Sample no.:	N/A
	(iv) Four small batteries after 25 cycle ending in fully charged states;	Sample no.:	N/A
	(v) Two large batteries at first cycle, in fully charged states;	Sample no.:	N/A
	(vi) Two large batteries after 25 cycle ending in fully charged states.	Sample no.:	N/A
(c)	When testing primary and rechargeable cells under test T.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;	Sample no.:	N/A
	(ii) For component cells of primary batteries, five cells in undischarged states and five cells in fully discharged states;	Sample no.:	N/A
	(iii) For rechargeable cells, five cells at first cycle at 50% of the design rated capacity and five cells after 25 cycles ending at 50% of the design rated capacity;	Sample no.: 02054-02058 at first cycle at 50% of the design rated capacity Sample no.: 02059-02063 after 25 cycles ending at 50% of the design rated capacity	P
	(iv) For component cells of rechargeable batteries, five cells at first cycle at 50% of the design rated capacity and five cells after 25 cycles ending at 50% of the design rated capacity.	Sample no.:	N/A
(d)	When testing rechargeable batteries or rechargeable single cell batteries under test T.7, the following shall be tested in the quantity indicated:	The requirement is not applicable to test cells.	N/A
	(i) Four small batteries at first cycle, in fully charged states;	Sample no.:	N/A
	(ii) Four small batteries after 25 cycles ending in	Sample no.:	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	fully charged states;		
	(iii) Two large batteries at first cycle, in fully charged states;	Sample no.:	N/A
	(iv) Two large batteries after 25 cycles ending in fully charged states.	Sample no.:	N/A
(e)	When testing primary and rechargeable cells and components cells under test T.8, the following shall be tested in the quantity indicated:		P
	(i) Ten primary cells in fully discharged states;	Sample no.:	N/A
	(ii) Ten primary component cells in fully discharged states;	Sample no.:	N/A
	(iii) Ten rechargeable cells, at first cycle in fully discharged states;	Sample no.: 02064-02073	P
	(iv) Ten rechargeable component cells, at first cycle in fully discharged states;	Sample no.:	N/A
	(v) Ten rechargeable cells after 25 cycles ending in fully discharged states;	Sample no.: 02074-02083	P
	(vi) Ten rechargeable component cells after 25 cycles ending in fully discharged states.	Sample no.:	N/A
(f)	When testing a battery assembly in which the aggregate lithium content of all anodes, when fully charged, is not more than 500 g, or in the case of a lithium ion battery, with a Watt-hour rating of not more than 6 200 Wh, that is assembled from batteries that have passed all applicable tests, one assembled battery in a fully charged state shall be tested under tests T.3, T.4 and T.5, and, in addition, test T.7 in the case of a rechargeable battery.	The requirement is not applicable to test cells.	N/A
(g)	When batteries that have passed all applicable tests are electrically connected to form a battery in which the aggregate lithium content of all anodes, when fully charged, is more than 500 g, or in the case of a lithium ion battery, with a Watt-hour rating of more than 6200 Wh, the assembled battery does not need to be tested if the assembled battery is of a type that has been verified as preventing: (i) Overcharge; (ii) Short circuits; and (iii) Over discharge between the batteries.	The requirement is not applicable to test cells.	N/A
38.3.4	Procedure		P
	Tests T.1 to T.5 shall be conducted in sequence on the same cell or battery. Tests T.6 and T.8 shall be conducted using not otherwise tested cells or batteries. Test T.7 may be conducted		P

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Clause	Requirement + Test	Result - Remark	Verdict
	using undamaged batteries previously used in Tests T.1 to T.5 for purposes of testing on cycled batteries.		
38.3.4.1	Test T.1: Altitude Simulation		P
38.3.4.1.1	Purpose: This test simulates air transport under low-pressure conditions.		—
38.3.4.1.2	Test procedure		P
	stored at a pressure	11.6 kPa	—
	ambient temperature ($20 \pm 5^{\circ}\text{C}$).	23.6°C	—
	Stored times (≥ 6 hours)	8 hours	—
38.3.4.1.3	Requirement: Cells and batteries meet this requirement if there is 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.	No mass loss, no leakage, no venting, no disassembly, no rupture and no fire. Cells after testing are not less than 90% of its voltage immediately prior to this procedure. See appended table T.1 for details.	P
38.3.4.2	Test T.2: Thermal Test		P
38.3.4.2.1	Purpose: 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	Test procedure	See below	P
	Test temperature and stored hours	1) 72°C , $\geq 6\text{h}$ 2) -40°C , $\geq 6\text{h}$	—
	The maximum time interval	Between test temperature extremes is 30 minutes	—
	Test times	Repeated 10 times	—
	After which all test cells and batteries are to be stored for 24 hours at ambient temperature ($20 \pm 5^{\circ}\text{C}$)	23.8°C	—
	For large cells and batteries the duration of exposure to the test temperature extremes should be at least 12 hours.	Small cells	N/A
38.3.4.2.3	Requirement: Cells and batteries meet this requirement if there is 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	No mass loss, no leakage, no venting, no disassembly, no rupture and no fire. Cells after testing are not less than 90% of its voltage immediately prior to this	P

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Clause	Requirement + Test	Result - Remark	Verdict
	procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.	procedure. See appended table T.2 for details.	
38.3.4.3	Test T.3: Vibration		P
38.3.4.3.1	Purpose: This test simulates vibration during transport.		—
38.3.4.3.2	Test procedure	See below.	P
	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		
	Duration	15min	—
	Frequency range	7Hz to 200Hz to 7Hz	—
	Amplitude	0.8mm	—
	This cycle shall be repeated 12 times for a total of 3 hours for each of three mutually perpendicular mounting positions of the cell. One of the directions of vibration must be perpendicular to the terminal face.	A total of 3 hours for each axis.	—
38.3.4.3.3	Requirement: Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, no rupture and no fire during the test and after the test and if the open circuit voltage of each test cell or battery directly after testing in its third perpendicular mounting position 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.	No mass loss, no leakage, no venting, no disassembly, no rupture and no fire. Cells after testing are not less than 90% of its voltage immediately prior to this procedure. See appended table T.3 for details	P
38.3.4.4	Test T.4: Shock		P
38.3.4.4.1	Purpose: This test simulates vibration during transport.		—
38.3.4.4.2	Test procedure	See below.	
	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.	Small cells.	—
	a half-sine shock of peak acceleration (g_n)	150 g_n	—
	Pulse duration (ms)	6ms	—
	the positive direction followed	Three times shocks for each	—

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Clause	Requirement + Test	Result - Remark	Verdict
		axis.	
	Each cell or battery shall be subjected to three shocks in the positive direction and to three shocks in the negative direction in each of three mutually perpendicular mounting positions of the cell or battery for a total of 18 shocks.	A total of 18 times shocks.	—
38.3.4.4.3	Requirement: Cells and batteries meet this requirement if there is 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.	No mass loss, no leakage, no venting, no disassembly, no rupture and no fire. Cells after testing are not less than 90% of its voltage immediately prior to this procedure. See appended table T.4 for details	P
38.3.4.5	Test T.5: External Short Circuit		P
38.3.4.5.1	Purpose: This test simulates an external short circuit.		—
38.3.4.5.2	Test procedure	See below.	P
	The cell or battery to be tested shall be heated for a period of time necessary to reach a homogeneous stabilized temperature of 57 ± 4 °C, measured on the external case.	All external case temperature reached 55°C.	—
	The exposure time shall be at least 6 hours for small cells and small batteries, and 12 hours for large cells and large batteries.	Further six hours.	—
	The cell or battery at 57 ± 4 °C shall be subjected to one short circuit condition with a total external resistance of less than 0.1 ohm.	Less than 0.1ohm.	—
	This short circuit condition is continued for at least one hour after the cell or battery external case temperature has returned to 57 ± 4 °C, or in the case of the large batteries, has decreased by half of the maximum temperature increase observed during the test and remains below that value.	One hour after returned to 55°C.	—
	The short circuit and cooling down phases shall be conducted at least at ambient temperature.	six hours after the test	—
38.3.4.5.3	Requirement: 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 during the test and within six hours after the test.	Cells external temperature does not exceed 170°C, and there is no disassembly, no fire and no rupture during the test and within six hours after this test. See appended table T.5 for details	P

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Clause	Requirement + Test	Result - Remark	Verdict
38.3.4.6	Test T.6: Impact / Crush		P
38.3.4.6.1	Purpose: These tests simulate mechanical abuse from an impact or crush that may result in an internal short circuit.	Crush test	—
38.3.4.6.2	Test procedure – Impact (applicable to cylindrical cells not less than 18.0 mm in diameter)		N/A
	Dropped height		—
	Mass		—
	Diameter bar		—
	Impact position: The vertical track or channel used to guide the falling mass shall be oriented 90 degrees from the horizontal supporting surface. The test sample is to be impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the 15.8 mm \pm 0.1 mm diameter curved surface lying across the centre of the test sample. Each sample is to be subjected to only a single impact.		—
38.3.4.6.3	Test Procedure – Crush (applicable to prismatic, pouch, coin/button cells and cylindrical cells less than 18.0 mm in diameter)		P
	The speed at the first point of contact.	1.5cm/s	—
	The crushing is to be stopped until the first of the three options below is reached: (a) The applied force reaches 13 kN \pm 0.78 kN; (b) The voltage of the cell drops by at least 100 mV; or (c) The cell is deformed by 50% or more of its original thickness.	(a)	—
38.3.4.6.4	Requirement: Cells and component cells meet this requirement if their external temperature does not exceed 170 °C and there is no disassembly and no fire during the test and within six hours after this test.	Cells external temperature does not exceed 170°C, and there is no disassembly, no fire and no rupture during the test and within six hours after this test See appended table T.6 for details	P
38.3.4.7	Test T.7: Overcharge		N/A
38.3.4.7.1	Purpose: This test evaluates the ability of a rechargeable battery or a single cell rechargeable battery to withstand an overcharge condition.	The requirement is not applicable to test cells.	—
38.3.4.7.2	Test procedure		N/A
	The charge current		—
	The minimum voltage of the test		—

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Clause	Requirement + Test	Result - Remark	Verdict
	Ambient temperature.		—
	The duration of the test.		—
38.3.4.7.3	Requirement: Rechargeable batteries meet this requirement if there is no disassembly and no fire during the test and within seven days after the test.		N/A
38.3.4.8	Test T.8: Forced discharge		P
38.3.4.8.1	Purpose: This test evaluates the ability of a primary or a rechargeable cell to withstand a forced discharge condition.	This test evaluates the ability of a rechargeable cell.	—
38.3.4.8.2	Test procedure	See below	P
	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.	Equal to the maximum discharge current specified by the manufacturer.	P
	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	Requirement: Primary or rechargeable cells meet this requirement if there is no disassembly and no fire during the test and within seven days after the test.	There is no disassembly and no fire during the test and within seven days after the test. See appended table T.8 for details.	P

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Clause	Requirement + Test			Result - Remark			Verdict
T.1	Altitude Simulation						
Sample No.	Mass M of test cell/battery (g)			Open-circuit voltage (V)			Result
	M1(before test)	M2(after test)	Mass Loss (≤0.2%)	OCV1(before test)	OCV2(after test)	Voltage drop (≥90%)	
02044	4.158	4.155	0.07%	4.32	4.31	99.8%	O
02045	4.203	4.202	0.02%	4.31	4.31	100.0%	O
02046	4.182	4.182	0.00%	4.30	4.30	100.0%	O
02047	4.197	4.197	0.00%	4.30	4.30	100.0%	O
02048	4.183	4.183	0.00%	4.32	4.32	100.0%	O
02049	4.115	4.114	0.02%	4.32	4.32	100.0%	O
02050	4.103	4.103	0.00%	4.33	4.32	99.8%	O
02051	4.181	4.181	0.00%	4.31	4.31	100.0%	O
02052	4.144	4.144	0.00%	4.31	4.31	100.0%	O
02053	4.195	4.195	0.00%	4.30	4.30	100.0%	O
Result: L – Leakage; V – Venting; D – Disassembly; R – Rupture; F – Fire. O – No leakage, no venting, no disassembly, no rupture and no fire.							
Supplementary information: Five cells at first cycle, in fully charged states: Sample no: 02044-02048 Five cells after 25 cycle ending in fullycharged charged states: Sample no: 02049-02053							

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Clause	Requirement + Test	Result - Remark	Verdict
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T.2		Thermal Test					
Sample No.	Mass M of test cell/battery (g)			Open-circuit voltage (V)			Result
	M1(before test)	M2(after test)	Mass Loss ($\leq 0.2\%$)	OCV1(before test)	OCV2(after test)	Voltage drop ($\geq 90\%$)	
02044	4.155	4.151	0.10%	4.31	4.22	97.9%	O
02045	4.202	4.197	0.12%	4.31	4.23	98.1%	O
02046	4.182	4.180	0.05%	4.30	4.23	98.4%	O
02047	4.197	4.194	0.07%	4.30	4.22	98.1%	O
02048	4.183	4.181	0.05%	4.32	4.23	97.9%	O
02049	4.114	4.111	0.07%	4.32	4.24	98.1%	O
02050	4.103	4.099	0.10%	4.32	4.24	98.1%	O
02051	4.181	4.178	0.07%	4.31	4.22	97.9%	O
02052	4.144	4.142	0.05%	4.31	4.22	97.9%	O
02053	4.195	4.193	0.05%	4.30	4.22	98.1%	O

Result:

L – Leakage; V – Venting; D – Disassembly; R – Rupture; F – Fire.

O – No leakage, no venting, no disassembly, no rupture and no fire.

Supplementary information:

Five cells at first cycle, in fully charged states: Sample no: 02044-02048

Five cells after 25 cycle ending in fully charged states: Sample no: 02049-02053

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Clause	Requirement + Test			Result - Remark			Verdict
T.3	Vibration Test						
Sample No.	Mass M of test cell/battery (g)			Open-circuit voltage (V)			Result
	M1(before test)	M2(after test)	Mass Loss (≤0.2%)	OCV1(before test)	OCV2(after test)	Voltage drop (≥90%)	
02044	4.151	4.151	0.00%	4.22	4.22	100.0%	O
02045	4.197	4.196	0.02%	4.23	4.23	100.0%	O
02046	4.180	4.180	0.00%	4.23	4.22	99.8%	O
02047	4.194	4.194	0.00%	4.22	4.22	100.0%	O
02048	4.181	4.181	0.00%	4.23	4.23	100.0%	O
02049	4.111	4.110	0.02%	4.24	4.24	100.0%	O
02050	4.099	4.098	0.02%	4.24	4.24	100.0%	O
02051	4.178	4.178	0.00%	4.22	4.22	100.0%	O
02052	4.142	4.142	0.00%	4.22	4.22	100.0%	O
02053	4.193	4.193	0.00%	4.22	4.22	100.0%	O
Result: L – Leakage; V – Venting; D – Disassembly; R – Rupture; F – Fire. O – No leakage, no venting, no disassembly, no rupture and no fire.							
Supplementary information: Five cells at first cycle, in fully charged states: Sample no: 02044-02048 Five cells after 25 cycle ending in fully charged states: Sample no: 02049-02053							

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Clause	Requirement + Test			Result - Remark			Verdict
T.4	Shock Test						
Sample No.	Mass M of test cell/battery (g)			Open-circuit voltage (V)			Result
	M1(before test)	M2(after test)	Mass Loss (≤0.2%)	OCV1(before test)	OCV2(after test)	Voltage drop (≥90%)	
02044	4.151	4.151	0.00%	4.22	4.22	100.0%	O
02045	4.196	4.196	0.00%	4.23	4.23	100.0%	O
02046	4.180	4.180	0.00%	4.22	4.22	100.0%	O
02047	4.194	4.193	0.02%	4.22	4.22	100.0%	O
02048	4.181	4.181	0.00%	4.23	4.23	100.0%	O
02049	4.110	4.110	0.00%	4.24	4.24	100.0%	O
02050	4.098	4.098	0.00%	4.24	4.22	99.5%	O
02051	4.178	4.178	0.00%	4.22	4.22	100.0%	O
02052	4.142	4.142	0.00%	4.22	4.22	100.0%	O
02053	4.193	4.193	0.00%	4.22	4.22	100.0%	O
Result: L – Leakage; V – Venting; D – Disassembly; R – Rupture; F – Fire. O – No leakage, no venting, no disassembly, no rupture and no fire.							
Supplementary information: Five cells at first cycle, in fully charged states: Sample no: 02044-02048 Five cells after 25 cycle ending in fully charged states: Sample no: 02049-02053							

ST/SG/AC.10/11/Rev.6/Amend.1 Section 38.3				
Clause	Requirement + Test		Result - Remark	Verdict
T.5	External Short Circuit Test			
Sample No.	Initial open-circuit voltage (V)	Short circuit resistance (Ω)	External highest temperature ($^{\circ}\text{C}$)	Result
02044	4.22	0.082	94.3	O
02045	4.23	0.093	88.4	O
02046	4.22	0.091	92.4	O
02047	4.22	0.090	88.4	O
02048	4.23	0.087	86.4	O
02049	4.24	0.085	96.4	O
02050	4.22	0.096	91.8	O
02051	4.22	0.088	89.8	O
02052	4.22	0.083	90.3	O
02053	4.22	0.085	85.1	O
Result: D – Disassembly; R – Rupture; F – Fire; O – No disassembly, no rupture and no fire. Supplementary information: Five cells at first cycle, in fully charged states: Sample no: 02044-02048 Five cells after 25 cycle ending in fullycharged charged states: Sample no: 02049-02053				

ST/SG/AC.10/11/Rev.6/Amend.1 Section 38.3			
Clause	Requirement + Test	Result - Remark	Verdict
T.6	Impact / Crush		
Sample No.	External highest temperature (°C)	Result	
02054	24.0	O	
02055	24.1	O	
02056	24.0	O	
02057	23.8	O	
02058	24.0	O	
02059	24.9	O	
02060	24.9	O	
02061	24.9	O	
02062	24.7	O	
02063	24.9	O	
<u>Result:</u> D – Disassembly; F – Fire; O – No disassembly and no fire.			
<u>Supplementary information:</u> five cells at first cycle at 50% of the design rated capacity: Sample no: 02054-02058 five cells after 25 cycles ending at 50% of the design rated capacity: Sample no: 02059-02063			

ST/SG/AC.10/11/Rev.6/Amend.1 Section 38.3			
Clause	Requirement + Test	Result - Remark	Verdict
T.7	Overcharge Test		
Sample No.	During Test		Result
	Charge Current	Charge Voltage	
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Result: D – Disassembly; F – Fire; O – No disassembly and no fire.			

ST/SG/AC.10/11/Rev.6/Amend.1 Section 38.3			
Clause	Requirement + Test	Result - Remark	Verdict
T.8	Forced Discharge Test		
Sample No.	Discharge Current	Discharge Duration	Result
02064	0.245A	greater than 60min	O
02065	0.245A	greater than 60min	O
02066	0.245A	greater than 60min	O
02067	0.245A	greater than 60min	O
02068	0.245A	greater than 60min	O
02069	0.245A	greater than 60min	O
02070	0.245A	greater than 60min	O
02071	0.245A	greater than 60min	O
02072	0.245A	greater than 60min	O
02073	0.245A	greater than 60min	O
02074	0.245A	greater than 60min	O
02075	0.245A	greater than 60min	O
02076	0.245A	greater than 60min	O
02077	0.245A	greater than 60min	O
02078	0.245A	greater than 60min	O
02079	0.245A	greater than 60min	O
02080	0.245A	greater than 60min	O
02081	0.245A	greater than 60min	O
02082	0.245A	greater than 60min	O
02083	0.245A	greater than 60min	O
Result: D – Disassembly; F – Fire; O – No disassembly and no fire. Supplementary information: Ten cells at first cycle in fully discharged states: Sample no: 02064-02073 Ten cells after 25 cycles ending in fully discharged states: Sample no: 02074-02083			

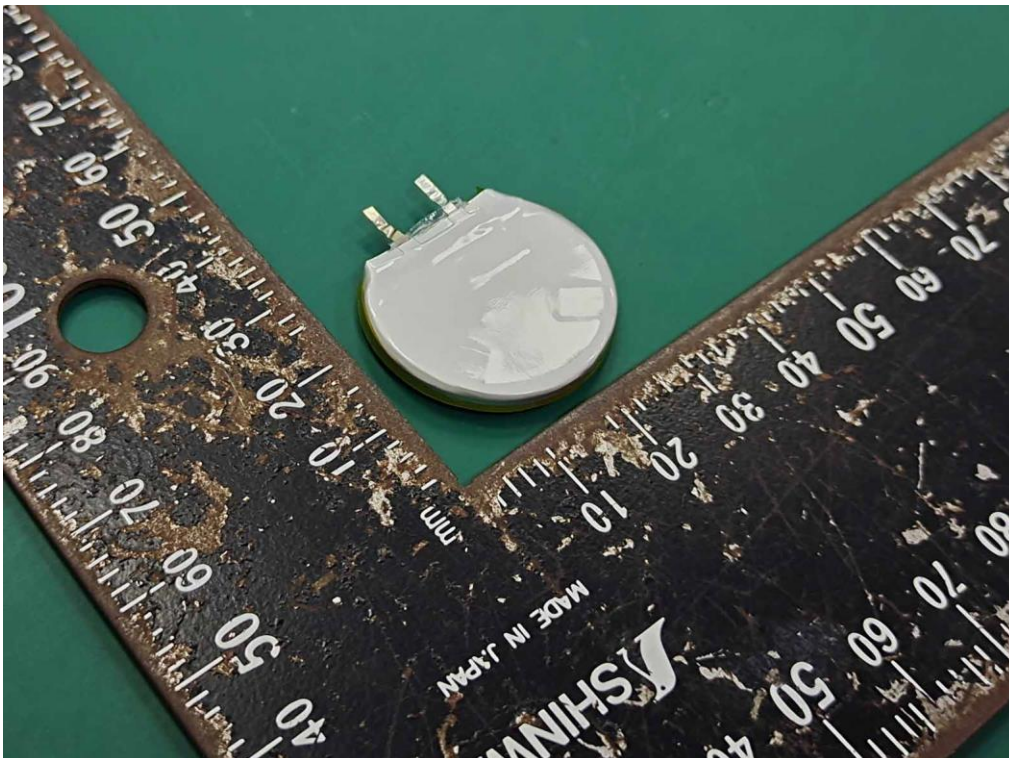


Photo

Front view



Rear view



End of the Report