



中国认可
国际互认
检测
TESTING
CNAS L6478



TEST REPORT

Report No. : WTF23F10222496C
Applicant : Mid Ocean Brands B.V.
Address : 7/F., Kings Tower, 111 King Lam Street, Cheung Sha Wan,
Kowloon, Hong Kong
Manufacturer : 114276
Sample Name : Aluminium cork base speaker
Sample Model : MO2205
Test Requested : In according to the EU Directive 2023/1542, to determine the
heavy metals content in the submitted sample.
Test Method : With reference to IEC 62321-5:2013 & IEC 62321-4:2013+
AMD1:2017 CSV, analysis was performed by ICP-OES
Test Conclusion : The submitted battery sample does not exceed the limit
mentioned in Directive (EU) 2023/1542.
Date of Receipt sample : 2023-10-18
Testing period : 2023-10-18 to 2023-10-27
Date of Issue : 2023-10-30
Test Result : Refer to next page (s)
Note : As per client's request, labelling assessment of the battery
was not conducted.

Prepared By:

Waltek Testing Group (Foshan) Co., Ltd.

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Signed for and on behalf of
Waltek Testing Group (Foshan) Co., Ltd.

Swing.Liang



Report No.: WTF23F10222496C

Sample photo:



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Test Results:

Test Item(s)	Unit	Test Result	LOQ	Maximum Allowable Limit
		No.72		
Lead (Pb)	%	ND	0.0002	0.01 (See comment if $0.01 \geq \text{Pb} > 0.004$)
Cadmium (Cd)	%	ND	0.0002	0.002 (See comment if $\text{Cd} > 0.002$)
Mercury (Hg)	%	ND	0.0002	0.0005

Note:

- (1) ND = Not Detected or lower than limit of quantitation
- (2) LOQ = Limit of quantitation
- (3) % = percentage by weight

Comment:

(1) Marking requirement:

According to EU Directive 2023/1542, all batteries, accumulators and battery packs shall be appropriately marked with the symbol as below:



Covered area on battery, accumulator or battery pack:

- Cylindrical cells: 1.5 % of surface area (maximum 5x5 cm);
 - Others: 3 % of surface area of the largest side (maximum 5 x 5 cm)
 - When the size of the battery, accumulator or battery pack is such that the symbol would be smaller than 0.5 x 0.5 cm, a symbol at least 1 x 1 cm shall be printed on the packaging.
- Symbols shall be printed visibly, legibly and indelibly

(2) When the sample consists lead exceeding 0.004% and less than 0.01%, the product is to be labeled with heavy metal content with the requirements as below:

- Mark with the chemical symbol for the metal concerned: Pb
- Print beneath the symbol
- Cover an area of at least ¼ of the size of the symbol

When the sample consists cadmium exceeding 0.002%, the product is to be labeled with heavy metal content with the requirements as below:

- Mark with the chemical symbol for the metal concerned: Cd
- Print beneath the symbol
- Cover an area of at least ¼ of the size of the symbol

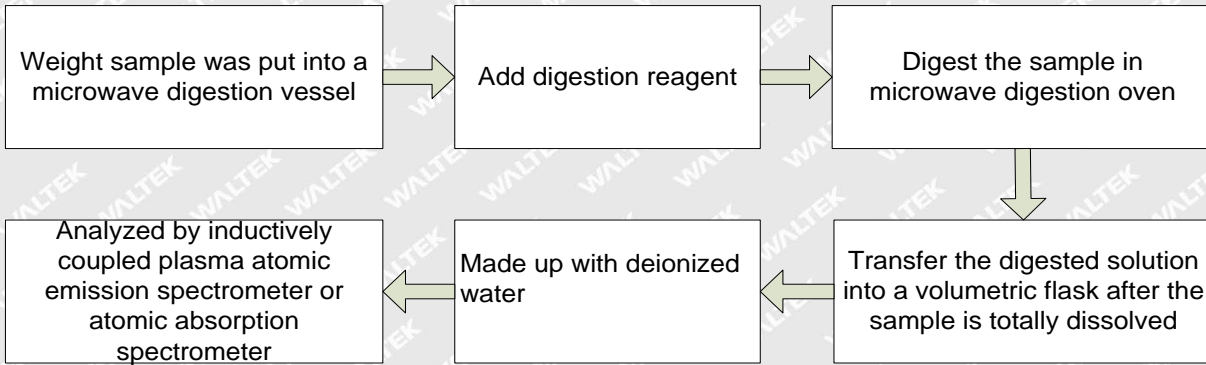
Description for Specimen:

Specimen No.	Specimen Description
72	Silvery battery





Testing flow chart:



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Report No.: WTF23F10222496C

Remarks:

1. The results shown in this test report refer only to the sample(s) tested;
2. This test report cannot be reproduced, except in full, without prior written permission of the company;
3. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver;
4. The Applicant name and Address, the sample(s) and sample information was/were provided by the applicant who should be responsible for the authenticity which Waltek hasn't verified;
5. If the report is not stamped with the accreditation recognized seal, it will only be used for scientific research, education, and internal quality control activities, and is not used for the purpose of issuing supporting data to the society.
6. The sample material information (Model No. information) is provided by client, not verified by test laboratory. The samples of reference Model No. are not tested. Test laboratory not responsible for the accuracy, appropriateness, completeness and authenticity of the information provided by client.

===== End of Report =====

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Test Report issued under the responsibility of:



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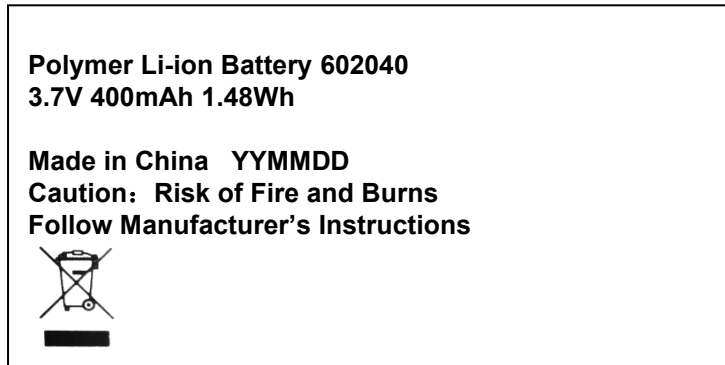
TEST REPORT IEC 62133-2 Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications –Part 2: Lithium systems	
Report Number:	TCTTJ20220202965ZB-BR01
Date of issue:	March 19,2022
Total number of pages:	See page 3 for details
Name of Testing Laboratory preparing the Report:	Shenzhen Tiansu Calibration and Testing Co.,Ltd
Applicant's name:	
Address:	
Test specification:	
Standard:	IEC 62133-2:2017
Test procedure:	CB Scheme
Non-standard test method:	N/A
Test Report Form No:	IEC62133_2A
Test Report Form(s) Originator:	DEKRA
Master TRF:	Dated 2017-08-10
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General disclaimer: The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the Issuing CB Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.	

Test item description..... :	Polymer Li-ion Battery	
Trade Mark..... :	N/A	
Manufacturer..... :		
Model/Type reference..... :	602040	
Ratings..... :	400mAh 1.48Wh 3.7V	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
<input type="checkbox"/> Testing Laboratory:	Shenzhen Tiansu Calibration and Testing Co.,Ltd	
Testing location/ address..... :	Building1/4, No.2, Jinlong Road, Longgang District, Shenzhen, Guangdong, China	
Tested by (name, function, signature)..... :	Liang Jun Peng Test Engineer	<i>Liang Jun Peng</i>
Approved by (name, function, signature)... :	Huang Zhuan Technology Supervisor	<i>Huang Zhuan</i>
<input type="checkbox"/> Testing procedure: CTF Stage 1:		
Testing location/ address..... :		
Tested by (name, function, signature)..... :		
Approved by (name, function, signature)... :		
<input type="checkbox"/> Testing procedure: CTF Stage 2:		
Testing location/ address..... :		
Tested by (name + signature)..... :		
Witnessed by (name, function, signature).. :		
Approved by (name, function, signature)... :		
<input type="checkbox"/> Testing procedure: CTF Stage 3:		
<input type="checkbox"/> Testing procedure: CTF Stage 4:		
Testing location/ address..... :		
Tested by (name, function, signature)..... :		
Witnessed by (name, function, signature).. :		
Approved by (name, function, signature)... :		
Supervised by (name, function, signature) :		

<p>List of Attachments (including a total number of pages in each attachment):</p> <ul style="list-style-type: none"> - Pages 1 to 23 for IEC 62133 TRF (main report) - Appendix 1 (2 Pages): Product Photos 	
<p>Summary of testing:</p>	
<p>Tests performed (name of test and test clause):</p> <p>7.1 Charging procedure for test purposes;</p> <p>7.2.1 Continuous charging at constant voltage (cells);</p> <p>7.3.1 External short circuit (cell);</p> <p>7.3.3 Free fall</p> <p>7.3.4 Thermal abuse (cells);</p> <p>7.3.5 Crush (cells);</p> <p>7.3.7 Forced discharge (cells);</p> <p>7.3.9 Design evaluation – Forced internal short circuit (cells)</p>	<p>Testing location:</p> <p>Shenzhen Tiansu Calibration and Testing Co.,Ltd Building1/4,No.2, Jinlong Road, Longgang District, Shenzhen, Guangdong,China</p>
<p>Summary of compliance with National Differences (List of countries addressed):</p> <p><input checked="" type="checkbox"/> The product fulfils the requirements of IEC 62133-2: 2017 and EN 62133-2: 2017</p>	

Copy of marking plate:

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

**Remark:**

Above plate will be printed on the surface of the cell.

The code "YYMMDD" represents that:

YY for Year.

MM for Month.

DD for Day.

Test item particulars : Polymer Li-ion Battery	
Classification of installation and use : To be defined in final product	
Supply Connection : Lead wire	
Recommend charging method declared by the manufacturer :	200mA constant current charge to 4.20V, then constant voltage 4.20V charge till charge current declines to 4mA.
Discharge current (0,2 It A) : 80mA	
Specified final voltage : 3.0V	
Upper limit charging voltage per cell : 4.20V	
Maximum charging current : 400mA	
Charging temperature upper limit : 45°C	
Charging temperature lower limit : 0°C	
Polymer cell electrolyte type : <input type="checkbox"/> gel polymer <input type="checkbox"/> solid polymer <input checked="" type="checkbox"/> N/A	
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)	
Testing :	
Date of receipt of test item : February 27,2022	
Date (s) of performance of tests : February 27,2022 to March 17, 2022	
General remarks:	
"(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report.	
Throughout this report a <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator.	
Manufacturer's Declaration per sub-clause 4.2.5 of IEC62133:	
The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided..... :	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> Not applicable
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies) : See Applicant	

General product information and other remarks:

The product covered by this report is Polymer Li-ion Battery (model: 602040) which tested with appliance as per IEC 62133-2:2017 in the report.

Model no.	Cell: 602040
Recommend charging voltage	4.20V
Recommend charging current	200mA
Max. charging current	400mA
Recommend discharging voltage	3.0V
Recommend discharging current	80mA
Max. discharging current	400mA
Operation Temperature	0~45°C

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
4	PARAMETER MEASUREMENT TOLERANCES		P
	Parameter measurement tolerances		P
5	GENERAL SAFETY CONSIDERATIONS		P
5.1	General		P
	Cells and batteries so designed and constructed that they are safe under conditions of both intended use and reasonably foreseeable misuse		P
5.2	Insulation and wiring		P
	The insulation resistance between the positive terminal and externally exposed metal surfaces of the battery (excluding electrical contact surfaces) is not less than 5 MΩ	No externally exposed metal surfaces.	N/A
	Insulation resistance (MΩ)..... :	>5MΩ	—
	Internal wiring and insulation are sufficient to withstand maximum anticipated current, voltage and temperature requirements		P
	Orientation of wiring maintains adequate clearance and creepage distances between conductors		P
	Mechanical integrity of internal connections accommodates reasonably foreseeable misuse		P
5.3	Venting		P
	Battery cases and cells incorporate a pressure relief mechanism or are constructed so that they relieve excessive internal pressure at a value and rate that will preclude rupture, explosion and self-ignition		P
	Encapsulation used to support cells within an outer casing does not cause the battery to overheat during normal operation nor inhibit pressure relief	No outer casing.	N/A
5.4	Temperature, voltage and current management	Only cell	N/A
	Batteries are designed such that abnormal temperature rise conditions are prevented		N/A
	Batteries are designed to be within temperature, voltage and current limits specified by the cell manufacturer		N/A
	Batteries are provided with specifications and charging instructions for equipment manufacturers so that specified chargers are designed to maintain charging within the temperature, voltage and current limits specified		N/A
5.5	Terminal contacts		N/A
	The size and shape of the terminal contacts ensure that they can carry the maximum anticipated current	Lead wire used.	N/A

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	External terminal contact surfaces are formed from conductive materials with good mechanical strength and corrosion resistance		N/A
	Terminal contacts are arranged to minimize the risk of short-circuit		N/A
5.6	Assembly of cells into batteries	Only cell	N/A
5.6.1	General		N/A
	Each battery have an independent control and protection for current, voltage, temperature and any other parameter required for safety and to maintain the cells within their operating region		N/A
	This protection may be provided external to the battery such as within the charger or the end devices		N/A
	If protection is external to the battery, the manufacturer of the battery provide this safety relevant information to the external device manufacturer for implementation		N/A
	If there is more than one battery housed in a single battery case, each battery have protective circuitry that can maintain the cells within their operating regions		N/A
	Manufacturers of cells specify current, voltage and temperature limits so that the battery manufacturer/designer may ensure proper design and assembly		N/A
	Batteries that are designed for the selective discharge of a portion of their series connected cells incorporate circuitry to prevent operation of cells outside the limits specified by the cell manufacturer		N/A
	Protective circuit components added as appropriate and consideration given to the end-device application		N/A
	The manufacturer of the battery provide a safety analysis of the battery safety circuitry with a test report including a fault analysis of the protection circuit under both charging and discharging conditions confirming the compliance		N/A
5.6.2	Design recommendation		N/A
	For the battery consisting of a single cell or a single cellblock, it is recommended that the charging voltage of the cell does not exceed the upper limit of the charging voltage specified in Table 2		N/A

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	For the battery consisting of series-connected plural single cells or series-connected plural cellblocks, it is recommended that the voltages of any one of the single cells or single cellblocks does not exceed the upper limit of the charging voltage, specified in Table 2, by monitoring the voltage of every single cell or the single cellblocks		N/A
	For the battery consisting of series-connected plural single cells or series-connected plural cellblocks, it is recommended that charging is stopped when the upper limit of the charging voltage is exceeded for any one of the single cells or single cellblocks by measuring the voltage of every single cell or the single cellblocks		N/A
	For batteries consisting of series-connected cells or cell blocks, nominal charge voltage not be counted as an overcharge protection		N/A
	For batteries consisting of series-connected cells or cell blocks, cells have closely matched capacities, be of the same design, be of the same chemistry and be from the same manufacturer		N/A
	It is recommended that the cells and cell blocks not discharged beyond the cell manufacturer's specified final voltage		N/A
	For batteries consisting of series-connected cells or cell blocks, cell balancing circuitry incorporated into the battery management system		N/A
5.6.3	Mechanical protection for cells and components of batteries		N/A
	Mechanical protection for cells, cell connections and control circuits within the battery provided to prevent damage as a result of intended use and reasonably foreseeable misuse		N/A
	The mechanical protection can be provided by the battery case or it can be provided by the end product enclosure for those batteries intended for building into an end product	To be evaluated in end-product.	N/A
	The battery case and compartments housing cells designed to accommodate cell dimensional tolerances during charging and discharging as recommended by the cell manufacturer		N/A
	For batteries intended for building into a portable end product, testing with the battery installed within the end product considered when conducting mechanical tests		N/A
5.7	Quality plan		P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	The manufacturer prepares and implements a quality plan that defines procedures for the inspection of materials, components, cells and batteries and which covers the whole process of producing each type of cell or battery	ISO 9001: 2015 certificate of factory provided.	P
5.8	Battery safety components		N/A
	According annex F		N/A

6	TYPE TEST AND SAMPLE SIZE		P
	Tests are made with the number of cells or batteries specified in Table 1 using cells or batteries that are not more than six months old	Tests are performed according to specified in Table 1 of this standard. The samples are not more than six months old.	P
	Coin cells with resistance $\leq 3 \Omega$ (measured according annex D) are tested according table 1	Not coin cell.	N/A
	Unless otherwise specified, tests are carried out in an ambient temperature of $20 \text{ }^\circ\text{C} \pm 5 \text{ }^\circ\text{C}$		P
	The safety analysis of 5.6.1 identify those components of the protection circuit that are critical for short-circuit, overcharge and overdischarge protection	Only cell	N/A
	When conducting the short-circuit test, consideration given to the simulation of any single fault condition that is likely to occur in the protecting circuit that would affect the short-circuit test		N/A

7	SPECIFIC REQUIREMENTS AND TESTS		P
7.1	Charging procedure for test purposes		P
7.1.1	First procedure		P
	This charging procedure applies to subclauses other than those specified in 7.1.2		P
	Unless otherwise stated in this document, the charging procedure for test purposes is carried out in an ambient temperature of $20 \text{ }^\circ\text{C} \pm 5 \text{ }^\circ\text{C}$, using the method declared by the manufacturer		P
	Prior to charging, the battery have been discharged at $20 \text{ }^\circ\text{C} \pm 5 \text{ }^\circ\text{C}$ at a constant current of 0,2 It A down to a specified final voltage		P
7.1.2	Second procedure		P
	This charging procedure applies only to 7.3.1, 7.3.4, 7.3.5, and 7.3.9		P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	After stabilization for 1 h and 4 h, respectively, at ambient temperature of highest test temperature and lowest test temperature, as specified in Table 2, cells are charged by using the upper limit charging voltage and maximum charging current, until the charging current is reduced to 0,05 It A, using a constant voltage charging method	Charging temperature specified by client is 0-45°C, 45°C and 0°C were used as highest test temperature and lowest test temperature during tests. The upper limit charging voltage is 4.20V. The maximum charging current is 400mA.	P
7.2	Intended use		P
7.2.1	Continuous charging at constant voltage (cells)	Tested complied.	P
	Fully charged cells are subjected for 7 days to a charge using the charging method for current and standard voltage specified by the cell manufacturer		P
	Results: No fire. No explosion. No leakage..... :	(See appended table 7.2.1)	P
7.2.2	Case stress at high ambient temperature (battery)	Only cell	N/A
	Oven temperature (°C)..... :		—
	Results: No physical distortion of the battery case resulting in exposure of internal protective components and cells		N/A
7.3	Reasonably foreseeable misuse		P
7.3.1	External short-circuit (cell)	Tested complied.	P
	The cells were tested until one of the following occurred:		P
	- 24 hours elapsed; or		N/A
	- The case temperature declined by 20 % of the maximum temperature rise		P
	Results: No fire. No explosion..... :	(See appended table 7.3.1)	P
7.3.2	External short-circuit (battery)	Only cell	N/A
	The batteries were tested until one of the following occurred:		N/A
	- 24 hours elapsed; or		N/A
	- The case temperature declined by 20 % of the maximum temperature rise		N/A
	In case of rapid decline in short circuit current, the battery pack remained on test for an additional one hour after the current reached a low end steady state condition		N/A
	A single fault in the discharge protection circuit conducted on one to four (depending upon the protection circuit) of the five samples before conducting the short-circuit test		N/A

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	A single fault applies to protective component parts such as MOSFET, fuse, thermostat or positive temperature coefficient (PTC) thermistor		N/A
	Results: No fire. No explosion..... :		N/A
7.3.3	Free fall	Tested complied.	P
	Results: No fire. No explosion		P
7.3.4	Thermal abuse (cells)	Tested complied.	P
	Oven temperature (°C)..... :	130	—
	Results: No fire. No explosion		P
7.3.5	Crush (cells)	Tested complied.	P
	The crushing force was released upon:		P
	- The maximum force of 13 kN ± 0,78 kN has been applied; or		P
	- An abrupt voltage drop of one-third of the original voltage has been obtained		N/A
	Results: No fire. No explosion..... :	(See appended table 7.3.5)	P
7.3.6	Over-charging of battery	Only cell	N/A
	The supply voltage which is:		N/A
	- 1,4 times the upper limit charging voltage presented in Table A.1 (but not to exceed 6,0 V) for single cell/cell block batteries or		N/A
	- 1,2 times the upper limit charging voltage resented in Table A.1 per cell for series connected multi-cell batteries, and		N/A
	- Sufficient to maintain a current of 2,0 It A throughout the duration of the test or until the supply voltage is reached		N/A
	Test was continued until the temperature of the outer casing:		N/A
	- Reached steady state conditions (less than 10 °C change in 30-minute period); or		N/A
	- Returned to ambient		N/A
	Results: No fire. No explosion..... :		P
7.3.7	Forced discharge (cells)	Tested complied.	P
	If the discharge voltage reaches the negative value of upper limit charging voltage within the testing duration, the voltage is maintained at the negative value of the upper limit charging voltage by reducing the current for the remainder of the testing duration		N/A
	If the discharge voltage does not reach the negative value of upper limit charging voltage within the testing duration, the test is terminated at the end of the testing duration		P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Results: No fire. No explosion..... :	(See appended table 7.3.7)	
7.3.8	Mechanical tests (batteries)	Only cell	N/A
7.3.8.1	Vibration		N/A
	Results: No fire, no explosion, no rupture, no leakage or venting..... :		N/A
7.3.8.2	Mechanical shock	Only cell	N/A
	Results: No leakage, no venting, no rupture, no explosion and no fire..... :		N/A
7.3.9	Design evaluation – Forced internal short-circuit (cells)	Tested complied.	P
	The cells complied with national requirement for..... :	France, Japan, Republic of Korea, Switzerland	—
	The pressing was stopped upon:		P
	- A voltage drop of 50 mV has been detected; or		N/A
	- The pressing force of 800 N (cylindrical cells) or 400 N (prismatic cells) has been reached	400 N for prismatic cells	P
	Results: No fire..... :	(See appended table 7.3.9)	P

8	INFORMATION FOR SAFETY		
8.1	General		P
	Manufacturers of secondary cells ensure that information is provided about current, voltage and temperature limits of their products	Information for safety mentioned in manufacturer's specifications	P
	Manufacturers of batteries ensure that equipment manufacturers and, in the case of direct sales, end-users are provided with information to minimize and mitigate hazards		N/A
	Systems analyses performed by device manufacturers to ensure that a particular battery design prevents hazards from occurring during use of a product		N/A
	As appropriate, any information relating to hazard avoidance resulting from a system analysis provided to the end user		N/A
	Do not allow children to replace batteries without adult supervision		N/A
8.2	Small cell and battery safety information	Not small battery.	N/A
	The following warning language is to be provided with the information packaged with the small cells and batteries or equipment using them:		N/A
	- Keep small cells and batteries which are considered swallowable out of the reach of children		N/A

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	- Swallowing may lead to burns, perforation of soft tissue, and death. Severe burns can occur within 2 h of ingestion		N/A
	- In case of ingestion of a cell or battery, seek medical assistance promptly		N/A
9	MARKING		P
9.1	Cell marking	See page 4.	P
	Cells marked as specified in IEC 61960, except coin cells		P
	Coin cells whose external surface area is too small to accommodate the markings on the cells show the designation and polarity		P
	By agreement between the cell manufacturer and the battery and/or end product manufacturer, component cells used in the manufacture of a battery need not be marked		P
9.2	Battery marking	Only cell	N/A
	Batteries marked as specified in IEC 61960, except for coin batteries		N/A
	Coin batteries whose external surface area is too small to accommodate the markings on the batteries show the designation and polarity. Batteries also marked with an appropriate caution statement	Not coin battery.	N/A
	Terminals have clear polarity marking on the external surface of the battery		N/A
	Batteries with keyed external connectors designed for connection to specific end products need not be marked with polarity markings if the design of the external connector prevents reverse polarity connections		N/A
9.3	Caution for ingestion of small cells and batteries	Not small battery.	N/A
	Coin cells and batteries identified as small batteries according to 8.2 include a caution statement regarding the hazards of ingestion in accordance with 8.2		N/A
	When small cells and batteries are intended for direct sale in consumer-replaceable applications, caution for ingestion given on the immediate package		N/A
9.4	Other information		P
	Storage and disposal instructions		P
	Recommended charging instructions		P
10	PACKAGING AND TRANSPORT		P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Packaging for coin cells not small enough to fit within the limits of the ingestion gauge of Figure 3	Not coin cells	N/A
	The materials and packaging design are chosen so as to prevent the development of unintentional electrical conduction, corrosion of the terminals and ingress of environmental contaminants		P

ANNEX A	CHARGING AND DISCHARGING RANGE OF SECONDARY LITHIUM ION CELLS FOR SAFE USE		P
A.1	General		P
A.2	Safety of lithium ion secondary battery		P
A.3	Consideration on charging voltage		P
A.3.1	General		P
A.3.2	Upper limit charging voltage	Upper limit charging voltage of cell is 4.20V.	P
A.3.2.1	General		P
A.3.2.2	Explanation of safety viewpoint		N/A
A.3.2.3	Safety requirements, when different upper limit charging voltage is applied		N/A
A.4	Consideration of temperature and charging current		P
A.4.1	General		P
A.4.2	Recommended temperature range	Charging temperature range declared by client is 0-45°C	P
A.4.2.1	General		P
A.4.2.2	Safety consideration when a different recommended temperature range is applied		N/A
A.4.3	High temperature range	45°C applied.	N/A
A.4.3.1	General		N/A
A.4.3.2	Explanation of safety viewpoint		N/A
A.4.3.3	Safety considerations when specifying charging conditions in the high temperature range		N/A
A.4.3.4	Safety considerations when specifying a new upper limit in the high temperature range		N/A
A.4.4	Low temperature range	0°C applied	N/A
A.4.4.1	General		N/A
A.4.4.2	Explanation of safety viewpoint		N/A
A.4.4.3	Safety considerations, when specifying charging conditions in the low temperature range		N/A
A.4.4.4	Safety considerations when specifying a new lower limit in the low temperature range		N/A

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
A.4.5	Scope of the application of charging current		P
A.4.6	Consideration of discharge		P
A.4.6.1	General		P
A.4.6.2	Final discharge voltage and explanation of safety viewpoint		P
A.4.6.3	Discharge current and temperature range		P
A.4.6.4	Scope of application of the discharging current		P
A.5	Sample preparation		P
A.5.1	General		P
A.5.2	Insertion procedure for nickel particle to generate internal short		P
A.5.3	Disassembly of charged cell		P
A.5.4	Shape of nickel particle		P
A.5.5	Insertion of nickel particle in cylindrical cell		N/A
A.5.5.1	Insertion of nickel particle in winding core		N/A
A.5.5.2	Marking the position of the nickel particle on both ends of the winding core of the separator		N/A
A.5.6	Insertion of nickel particle in prismatic cell		P
A.6	Experimental procedure of the forced internal short-circuit test		P
A.6.1	Material and tools for preparation of nickel particle		P
A.6.2	Example of a nickel particle preparation procedure		P
A.6.3	Positioning (or placement) of a nickel particle		P
A.6.4	Damaged separator precaution		P
A.6.5	Caution for rewinding separator and electrode		P
A.6.6	Insulation film for preventing short-circuit		P
A.6.7	Caution when disassembling a cell		P
A.6.8	Protective equipment for safety		P
A.6.9	Caution in the case of fire during disassembling		P
A.6.10	Caution for the disassembling process and pressing the electrode core		P
A.6.11	Recommended specifications for the pressing device		P
ANNEX B	RECOMMENDATIONS TO EQUIPMENT MANUFACTURERS AND BATTERY ASSEMBLERS		P
ANNEX C	RECOMMENDATIONS TO THE END-USERS		P
ANNEX D	MEASUREMENT OF THE INTERNAL AC RESISTANCE FOR COIN CELLS		N/A

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
D.1	General		N/A
D.2	Method		N/A
	A sample size of three coin cells is required for this measurement.....:	(See appended table D.2)	N/A
	Coin cells with an internal resistance of less than or equal to 3 Ω are subjected to the testing according to Clause 6 and Table 1		N/A
	Coin cells with an internal resistance greater than 3 Ω require no further testing		N/A
ANNEX E	PACKAGING AND TRANSPORT		P
ANNEX F	COMPONENT STANDARDS REFERENCES		N/A

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE: Critical components information					
Object / part No.	Manufacturer / trademark	Type / model	Technical data	Standard	Mark(s) of conformity ¹⁾
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

Supplementary information:
 1) Provided evidence ensures the agreed level of compliance. See OD-CB2039.
 2) Client did not provide relevant information.

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict

7.2.1	TABLE: Continuous charging at constant voltage (cells)				P
Sample no.	Recommended charging voltage Vc (Vdc)	Recommended charging current I _{rec} (A)	OCV before test (Vdc)	Results	
C1#	4.2	0.2	4.178	P	
C2#	4.2	0.2	4.179	P	
C3#	4.2	0.2	4.176	P	
C4#	4.2	0.2	4.178	P	
C5#	4.2	0.2	4.179	P	
Supplementary information:					
- No fire or explosion					
- No leakage					
- The ambient temperature is 23.1°C					

7.3.1	TABLE: External short-circuit (cell)					P
Sample no.	Ambient T (°C)	OCV before test (Vdc)	Resistance of circuit (mΩ)	Maximum case temperature rise ΔT (K)	Results	
Samples charged at charging temperature upper limit¹⁾						
C6#	53.8	4.155	83.9	49.9	P	
C7#	53.5	4.154	84.2	49.4	P	
C8#	53.5	4.151	84.8	45.0	P	
C9#	54.0	4.154	84.5	46.2	P	
C10#	53.8	4.152	84.6	49.3	P	
Samples charged at charging temperature lower limit²⁾						
C11#	54.2	4.106	85.2	53.5	P	
C12#	54.0	4.101	84.7	50.6	P	
C13#	53.8	4.101	84.3	47.4	P	
C14#	54.0	4.098	83.8	54.6	P	
C15#	54.2	4.095	84.1	51.6	P	
Supplementary information:						
- No fire or explosion						
¹⁾ Cells charged at 45°C						
²⁾ Cells charged at 0°C						

IEC 62133-2						
Clause	Requirement + Test				Result - Remark	Verdict
7.3.2	TABLE: External short-circuit (battery)					N/A
Sample no.	Ambient T (°C)	OCV before test (Vdc)	Resistance of circuit (mΩ)	Maximum case temperature rise ΔT (K)	Component single fault condition	Results
Supplementary information:						
- No fire or explosion						
- SC means short-circuit						

7.3.5	TABLE: Crush (cells)				P
Sample no.	OCV before test (Vdc)	OCV at removal of crushing force (Vdc)	Maximum force applied to the cell during crush (kN)	Results	
Samples charged at charging temperature upper limit¹⁾					
C29#	4.156	4.156	12.96	P	
C30#	4.153	4.153	12.92	P	
C31#	4.155	4.155	12.98	P	
C32#	4.151	4.151	13.01	P	
C33#	4.153	4.153	13.05	P	
Samples charged at charging temperature lower limit²⁾					
C34#	4.102	4.102	13.01	P	
C35#	4.105	4.105	12.96	P	
C36#	4.099	4.099	12.98	P	
C37#	4.102	4.102	13.03	P	
C38#	4.097	4.097	13.01	P	
Supplementary information:					
- No fire or explosion					
1) Cells charged at 45°C					
2) Cells charged at 0°C					
- The ambient temperature is 21.3°C					

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict

7.3.6	TABLE: Over-charging of battery			N/A
Constant charging current (A).....:				—
Supply voltage (Vdc).....:				—
Sample no.	OCV before charging (Vdc)	Total charging time (minute)	Maximum outer case temperature (°C)	Results
Supplementary information:				
- No fire or explosion				

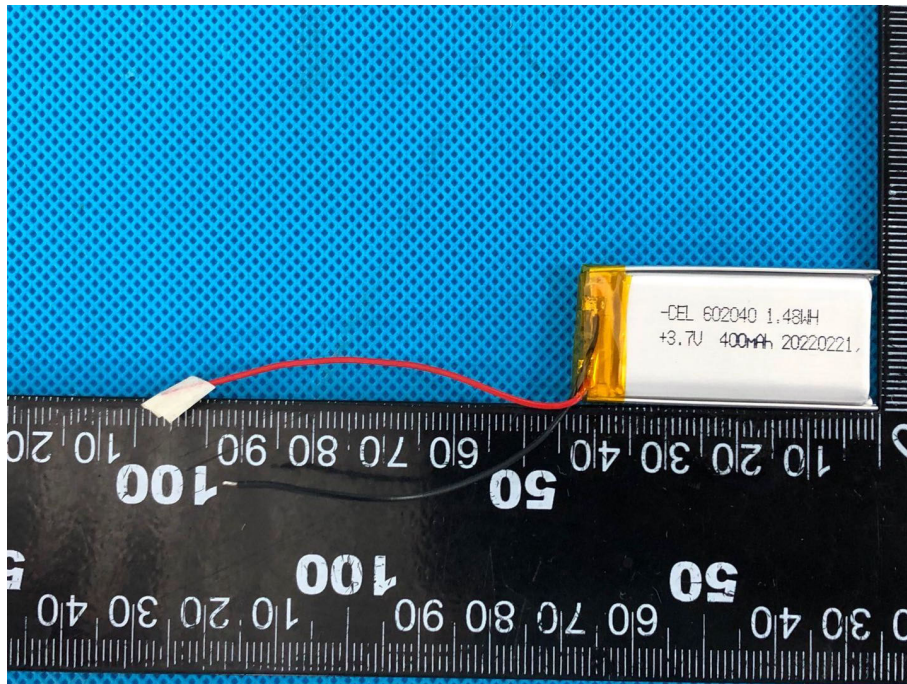
7.3.7	TABLE: Forced discharge (cells)				P
Sample no.	OCV before application of reverse charge (Vdc)	Measured reverse charge I_t (A)	Time for reversed charge, (minutes)	Results	
C39#	3.456	0.4	90.0	P	
C40#	3.452	0.4	90.0	P	
C41#	3.451	0.4	90.0	P	
C42#	3.448	0.4	90.0	P	
C43#	3.451	0.4	90.0	P	
Supplementary information:					
- No fire or explosion					
- The ambient temperature is 20.4°C					

7.3.8.1	TABLE: Vibration					N/A
Sample no.	OCV before test (Vdc)	OCV after test (Vdc)	Mass before test (g)	Mass after test (g)	Results	
Supplementary information:						
- No fire or explosion						
- No rupture						
- No leakage						
- No venting						

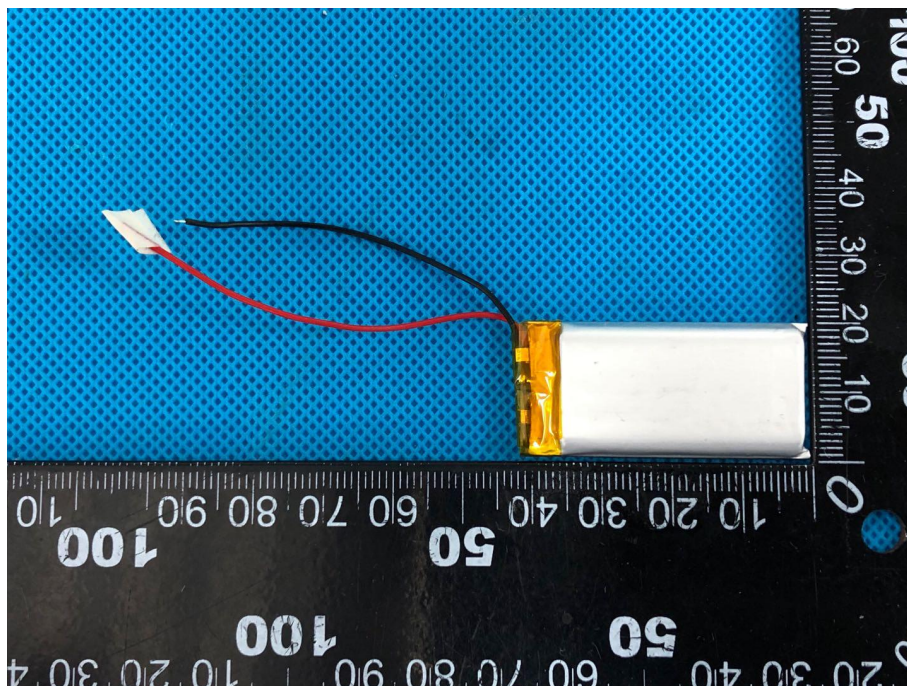
IEC 62133-2					
Clause	Requirement + Test			Result - Remark	Verdict
7.3.8.2	TABLE: Mechanical shock				N/A
Sample no.	OCV before test (Vdc)	OCV after test (Vdc)	Mass before test (g)	Mass after test (g)	Results
Supplementary information:					
<ul style="list-style-type: none"> - No fire or explosion - No rupture - No leakage - No venting 					

7.3.9	TABLE: Forced internal short circuit (cells)					P
Sample no.	Chamber ambient T (°C)	OCV before test (Vdc)	Particle location ¹⁾	Maximum applied pressure (N)	Results	
Samples charged at charging temperature upper limit²⁾						
C44#	45.0	4.155	1	402.1	P	
C45#	45.0	4.154	1	403.5	P	
C46#	45.0	4.153	1	398.9	P	
C47#	45.0	4.155	1	403.1	P	
C48#	45.0	4.151	1	411.3	P	
Samples charged at charging temperature lower limit³⁾						
C49#	0.0	4.103	1	408.2	P	
C50#	0.0	4.104	1	416.2	P	
C51#	0.0	4.103	1	397.9	P	
C52#	0.0	4.101	1	389.6	P	
C53#	0.0	4.101	1	412.7	P	
Supplementary information:						
¹⁾ Identify one of the following: 1: Nickel particle inserted between positive and negative (active material) coated area. 2: Nickel particle inserted between positive aluminium foil and negative active material coated area.						
²⁾ Cells charged at 45°C						
³⁾ Cells charged at 0°C						

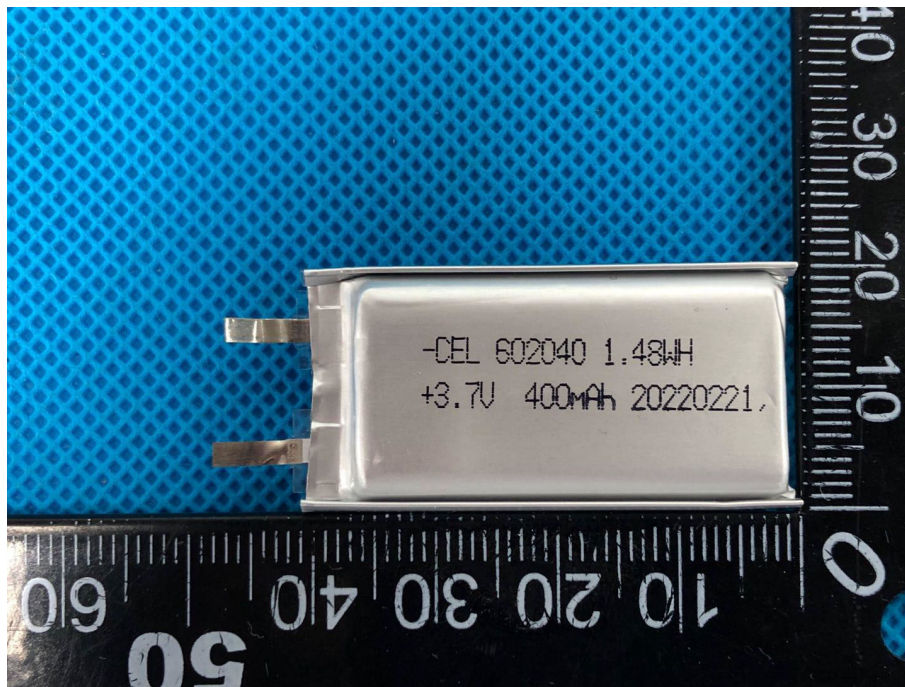
IEC 62133-2				
Clause	Requirement + Test	Result - Remark		Verdict
D.2	TABLE: Internal AC resistance for coin cells			N/A
Sample no.	Ambient T (°C)	Store time (h)	Resistance Rac (Ω)	Results ¹⁾
Supplementary information:				
¹⁾ Coin cells with internal resistance less than or equal to 3 Ω, see test result on corresponding tables				



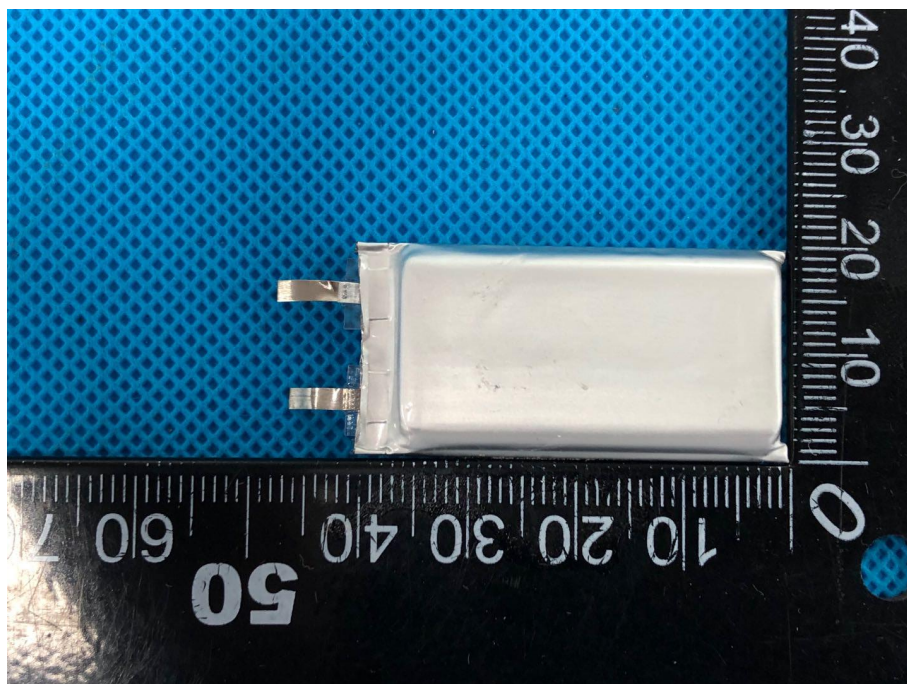
Front view



Back view



Front view



Back view