



TEST REPORT



中国认可
国际互认
检测
TESTING
CNAS L10844

Report No.: AZT250106011C-E0

Date of issue: January 10, 2025

Page 1 of 4

Applicant :

Address :

Manufacturer :

Address :

Report on the submitted samples said to be:

Sample Name : Rechargeable Li-ion Cell

Tested model : IMR14500-500mAh

Date of Sample Received : January 06, 2025

Testing Period : January 06, 2025~ January 10, 2025

Results : Please refer to next page(s).

TEST REQUEST

Regulation (EU) 2023/1542 amending Directive 2008/98/EC and Regulation (EU)
2019/1020 - Lead, Cadmium & Mercury content

Conclusion

Pass

Signed for and on behalf of AZT



Jack Zhong



Shenzhen AZT Technology Co., Ltd.

No.502, Building 1, Yibaolai Industrial City, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Tel: 0755-23501189; E-mail: azt-ep@azt-tech.com; Http: www.azt-tech.com



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Tested part(s):

01 Rechargeable Li-ion Cell

Results:

A.1. Regulation (EU) 2023/1542 amending Directive 2008/98/EC and Regulation (EU) 2019/1020 - Lead, Cadmium & Mercury content

Test Method: With reference to IEC 62321-5:2013 & IEC 62321-4:2013+AMD1:2017 CSV, analysis was performed by Inductively Coupled Plasma-Optical Emission Spectrometer (ICP-OES).

Test Items	Unit	Results	MDL	Limit
		01		
Lead (Pb)	%	N.D.	0.0005	0.01*
Mercury (Hg)	%	N.D.	0.0005	0.0005
Cadmium(Cd)	%	N.D.	0.0005	0.002

Remark:

Battery label requirements:

- 1. General information of batteries:** The information on all battery labels should include ten items: manufacturer information, battery type and identification information, manufacturing address, production date (month and year), weight, capacity, chemical composition, harmful substances present in the battery (excluding mercury, cadmium or lead), available fire extinguishing agents, and key raw materials;
- 2. Capacity information labels:** Rechargeable portable batteries, LMT batteries, and SLI batteries should have labels containing their capacity information;
- 3. Separate collection symbol:** All batteries should be marked with a cross marked wheeled trash can symbol. In addition, batteries with cadmium content exceeding 0.002% or lead content exceeding 0.004% should have corresponding chemical element symbols added to the trash can label; The relevant chemical symbols indicating the content of heavy metals should be printed below the separately collected symbols and cover at least a quarter of the area of the symbol;
- 4. QR code:** All batteries should be labeled with a QR code;
- 5. CE Mark and EU Declaration of Conformity:** Batteries should be labeled with a CE mark before being placed on the market, and an EU Declaration of Conformity should be drafted.

Note:

- *=1. From 18 August 2024, portable batteries, whether or not incorporated into appliances, shall not contain more than 0,01 % of lead (expressed as lead metal) by weight.
2. The restriction set out in point 1 shall not apply to portable zinc-air button cells until 18 August 2028.
- N.D. = Not Detected or less than MDL
- MDL = Method Detection Limit
- mg/kg = milligram per kilogram = ppm
- % = percentage by weight, 0.0001% = 1 mg/kg
- Results shown are of total weight of the battery sample.
- Flow chart is included
- Photo appendix is included



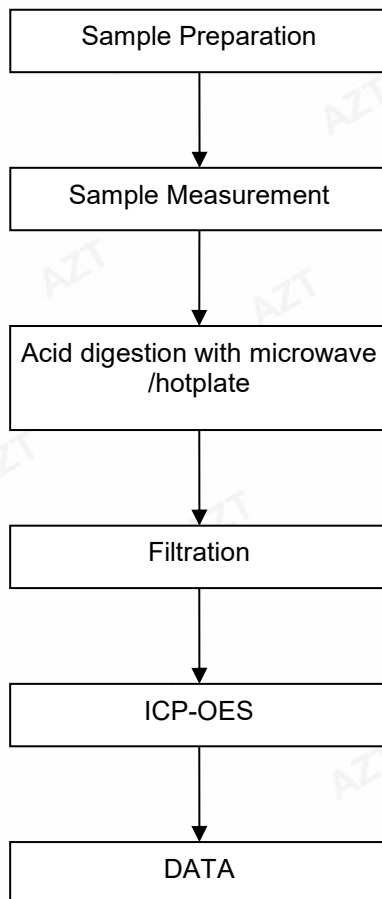
Shenzhen AZT Technology Co., Ltd.

No.502, Building 1, Yibaolai Industrial City, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
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Appendix

Lead /Cadmium/Mercury Testing Flow Chart





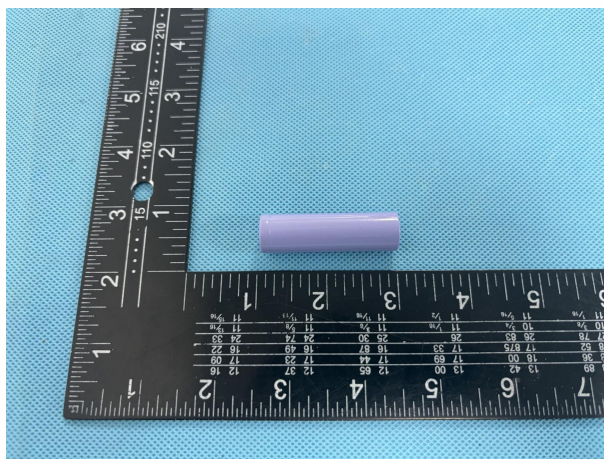
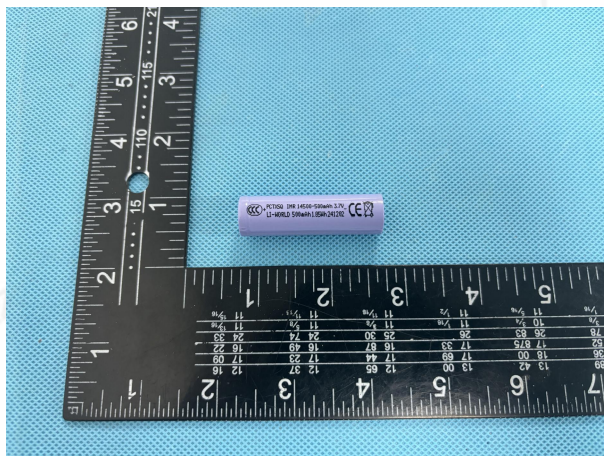
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The photo of the sample



AZT authenticate the photo on original report only

Statement:

1. This test report is invalid without the signature of the approver and the special seal of the company's report.
2. The copy of the test report is invalid if the "special seal for testing" or "Special Seal for testing" or the official seal of the testing unit is not re-stamped.
3. After the test report is altered, the test report is invalid.
4. If there is any objection to the test report, please submit written comments to the laboratory within 15 days from the date of receipt of the report.
5. This test is only responsible for samples provided by customers.
6. This report shall not be reproduced in whole or in part without the written authorization of the Company.
7. The laboratory is not responsible for sampling, all samples are provided by customers.
8. The test results in this test report are only related to the samples provided by the customer.

*** End of Report ***



Shenzhen AZT Technology Co., Ltd.

No.502, Building 1, Yibaolai Industrial City, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Tel: 0755-23501189; E-mail: azt-ep@azt-tech.com; Http: www.azt-tech.com

	Test Report issued under the responsibility of:	
NCB TÜV SÜD PSB Pte. Ltd. 15 International Business Park, TÜV SÜD@IBP Singapore 609937		
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. : 211-282250117-000 Date of issue : 2025-03-17 Total number of pages : 28 pages		
Name of Testing Laboratory preparing the Report : TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch		
Applicant's name : Address :		
Test specification: Standard : IEC 62133-2:2017, IEC 62133-2:2017/AMD1:2021 Test procedure : CB Scheme Non-standard test method : N/A		
TRF template used : IECEE OD-2020-F1:2021, Ed.1.4 Test Report Form No. : IEC62133_2C Test Report Form(s) Originator : DEKRA Certification B.V. Master TRF : Dated 2022-07-01		
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If this Test Report Form is used by non-IECEE members, the IECEE/IEC logo and the reference to the CB Scheme procedure shall be removed.		
This report is not valid as a CB Test Report unless signed by an approved IECEE Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.		
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 NCB. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.		

Test item description..... :	Rechargeable Li-ion Cell	
Trade Mark(s) :	LI-WORLD	
Manufacturer :	Same as applicant	
Model/Type reference :	1) IMR14500-300mAh; 2) IMR14500-400mAh; 3) IMR14500-500mAh	
Ratings :	1) For model IMR14500-300mAh: 3.7Vd.c., 300mAh; 2) For model IMR14500-400mAh: 3.7Vd.c., 400mAh; 3) For model IMR14500-500mAh: 3.7Vd.c., 500mAh	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
☒	CB Testing Laboratory:	TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Testing location/ address..... :		Building A2, Jin'ao Industrial Park, No.150, Jingfang Road, Fuhai, Bao'an District, Shenzhen, Guangdong 518103, China
Tested by (name, function, signature)..... :		Red Chen Project Handler
Approved by (name, function, signature).... :		Sean Pan Project Reviewer
 		
☐	Testing procedure: CTF Stage 1:	
Testing location/ address..... :		
Tested by (name, function, signature)..... :		
Approved by (name, function, signature).... :		
☐	Testing procedure: CTF Stage 2:	
Testing location/ address..... :		
Tested by (name + signature) :		
Witnessed by (name, function, signature) . :		
Approved by (name, function, signature).... :		
☐	Testing procedure: CTF Stage 3:	
☐	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) :		

List of Attachments (including a total number of pages in each attachment): Attachment No.1: 3 pages of (Republic of Korea) NATIONAL DIFFERENCES; Attachment No.2: 5 pages of Photo Documentation.	
Summary of testing:	
Tests performed (name of test and test clause): Tests are made with the number of samples specified in Table 1 of IEC 62133-2:2017, IEC 62133-2:2017/AMD1:2021. clause 7.2.1 Continuous charging at constant voltage (cells) clause 7.3.1 External short circuit (cell) clause 7.3.3 Free fall clause 7.3.4 Thermal abuse (cells) clause 7.3.5 Crush (cells) clause 7.3.7 Forced discharge (cells) clause 7.3.9 Forced internal short-circuit (cells) All tests above were conducted on models: IMR14500-300mAh, IMR14500-400mAh and IMR14500-500mAh. The samples comply with the requirements of IEC 62133-2:2017, IEC 62133-2:2017/AMD1:2021.	Testing location: TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch Address: Building A2, Jin'ao Industrial Park, No.150, Jingfang Road, Fuhai, Bao'an District, Shenzhen, Guangdong 518103, China
Summary of compliance with National Differences (List of countries addressed): Republic of Korea ☒ The product fulfils the requirements of <u>EN 62133-2:2017/A1:2021</u>	

Use of uncertainty of measurement for decisions on conformity (decision rule) :

☒ No decision rule is specified by the IEC standard, when comparing the measurement result with the applicable limit according to the specification in that standard. The decisions on conformity are made without applying the measurement uncertainty ("simple acceptance" decision rule, previously known as "accuracy method").

☐ Other:... (to be specified, for example when required by the standard or client, or if national accreditation requirements apply)

Information on uncertainty of measurement:

The uncertainties of measurement are calculated by the laboratory based on application of criteria given by OD-5014 for test equipment and application of test methods, decision sheets and operational procedures of IECEE.

IEC Guide 115 provides guidance on the application of measurement uncertainty principles and applying the decision rule when reporting test results within IECEE scheme, noting that the reporting of the measurement uncertainty for measurements is not necessary unless required by the test standard or customer.

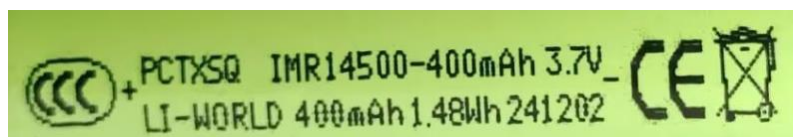
Calculations leading to the reported values are on file with the NCB and testing laboratory that conducted the testing.

Copy of marking plate:

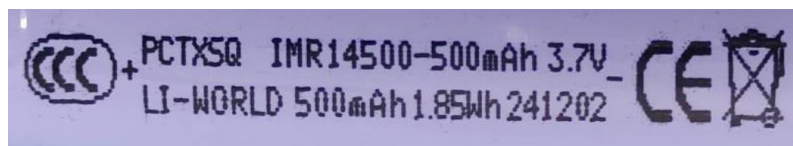
The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.



For model: IMR14500-300mAh



For model: IMR14500-400mAh



For model: IMR14500-500mAh

Remark:

By agreement between the cell manufacturer and battery and/or end product manufacturer, cells used in the assembly of a battery need not be marked.

Test item particulars.....:	
Classification of installation and use.....:	Use in portable applications
Supply Connection	Supply by positive cap and negative can
Recommend charging method declared by the manufacturer	Charge at constant current 0.2ItA until voltage reaches 4.2V, and then charge at constant voltage 4.2V till charge current is 0.01ItA.
Discharge current (0,2 It A)	See Page 7
Specified final voltage.....:	2.75V
Upper limit charging voltage per cell.....:	4.25V
Maximum charging current	1ItA (See page 7)
Charging temperature upper limit	45°C
Charging temperature lower limit.....:	0°C
Polymer cell electrolyte type.....:	☐ gel polymer ☐ solid polymer ☒ 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	2025-02-12
Date (s) of performance of tests	2025-02-12 to 2025-03-14
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 ☐ comma / ☒ point is used as the decimal separator.	
Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:	
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:	☐ Yes ☒ Not applicable
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies) : Same as applicant	

General product information and other remarks:

1. The Rechargeable Li-ion Cell, models: 1) IMR14500-300mAh, 2) IMR14500-400mAh, 3) IMR14500-500mAh are used in portable applications.

2. The 3 models have the same dimensions, chemistry, voltage, from the same manufacturer, but different capacities. All tests were conducted on representative models: IMR14500-300mAh, IMR14500-400mAh and IMR14500-500mAh.

3. Additionally, details information of the cells as following:

Model	Rated capacity (mAh)	Nominal voltage (Vd.c.)	Recommend charge current 0.2ItA (mA)	0.2ItA discharge current (mA)	Charge voltage (V)	Final voltage (V)	Lower limit discharge voltage (V)
IMR14500-300mAh	300	3.7	60	60	4.2	2.75	2.3
IMR14500-400mAh	400	3.7	80	80	4.2	2.75	2.3
IMR14500-500mAh	500	3.7	100	100	4.2	2.75	2.3

Model	Max. charging current 1ItA (mA)	Maximum discharging current 1ItA (mA)	Upper limit charge voltage (V)	0.01ItA in First charging procedure (mA)	0.05ItA in Second charging procedure (mA)	Charging temperature upper/lower limit(°C)	Weight (g)
IMR14500-300mAh	300	300	4.25	3	15	45/0	12.5
IMR14500-400mAh	400	400	4.25	4	20	45/0	14.6
IMR14500-500mAh	500	500	4.25	5	25	45/0	16.3

Test procedures:

First charging procedure (20°C ± 5°C)	Charge at constant current 0.2ItA until voltage reaches 4.2V, then charge at constant voltage 4.2V till charge current is 0.01ItA.
Second charging procedure	After stabilization for 1h to 4h at 45°C and 0°C, respectively, cells are charged at constant current 1ItA until voltage reaches 4.25V, then charge at constant voltage 4.25V till charge current reduced to 0.05It A.

For this series, same parameter as below:

Cell designation according to IEC 61960-3:2017	IMR15/50
Dimensions	D×H Max.: (14.15×49.6)mm
Charging temperature range	0°C to 45°C
Discharging temperature range	-10°C to 60°C

Remark:

The final evaluation of the cell must be conducted in the end product for which the cell will be used.

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		N/A
	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		N/A
	Insulation resistance (MΩ) :		—
	Internal wiring and insulation are sufficient to withstand maximum anticipated current, voltage and temperature requirements		N/A
	Orientation of wiring maintains adequate clearances and creepage distances between conductors		N/A
	Mechanical integrity of internal connections accommodates reasonably foreseeable misuse		N/A
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		N/A
5.4	Temperature, voltage and current management		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		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 circuits		N/A
5.6	Assembly of cells into batteries		N/A
5.6.1	General		N/A
	Each battery has 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 has 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 are 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 are not 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 are 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 are 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 are 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		N/A
	The battery case and compartments housing cells are 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 is 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		P
5.8	Battery safety components		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		P
	The internal resistance of coin cells are measured in accordance with Annex D. Coin cells with internal resistance less than or equal to 3 Ω are tested in accordance with Table 1		N/A
	Unless otherwise specified, tests are carried out in an ambient temperature of 20 °C $\pm$ 5 °C		P
	The safety analysis of 5.6.1 identify those components of the protection circuit that are critical for short-circuit, overcharge and over discharge protection		N/A
	When conducting the short-circuit test, consideration is 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 °C $\pm$ 5 °C, using the method declared by the manufacturer		P
	Prior to charging, the battery has been discharged at 20 °C $\pm$ 5 °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 to 4 h, at an ambient temperature of the highest test temperature and the lowest test temperature, respectively, 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 current to constant voltage charging method		P
7.2	Intended use		P
7.2.1	Continuous charging at constant voltage (cells)		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)		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)		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)		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 is 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 (metal oxide semiconductor field-effect transistor), fuse, thermostat or positive temperature coefficient (PTC) thermistor		N/A
	Results: no fire, no explosion..... :		N/A
7.3.3	Free fall		P
	Results: no fire, no explosion		P
7.3.4	Thermal abuse (cells)		P
	Oven temperature (°C)..... :	130°C±2°C	—
	Results: no fire, no explosion		P
7.3.5	Crush (cells)		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		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..... :		N/A
7.3.7	Forced discharge (cells)		P
	Discharge a single cell to the lower limit discharge voltage specified by the cell manufacturer		P
	The discharged cell is then subjected to a forced discharge at 1 It A to the negative value of the upper limit charging voltage		P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	- 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
	- 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
	Results: no fire, no explosion..... :	(See appended table 7.3.7)	P
7.3.8	Mechanical tests (batteries)		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		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)		P
	The cells complied with national requirement for :	France, Japan, Korea and 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	800N	P
	Results: no fire..... :	(See appended table 7.3.9)	P
8	INFORMATION FOR SAFETY		P
8.1	General		P
	Manufacturers of secondary cells provides information about current, voltage and temperature limits of their products		P
	Manufacturers of batteries provides information regarding how to minimize and mitigate hazards to equipment manufacturers or end-users		N/A
	Systems analyses are 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 is provided to the end user		N/A

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Do not allow children to replace batteries without adult supervision		N/A
8.2	Small cell and battery safety information		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
	- 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		P
	Cells are marked as specified in IEC 61960, except coin cells		N/A
	Coin cells whose external surface area is too small to accommodate the markings on the cells show the designation and polarity		N/A
	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		N/A
	Batteries are 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		N/A
	Batteries are marked with an appropriate caution statement		N/A
	- Terminals have clear polarity marking on the external surface of the battery, or		N/A
	- 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		N/A
	Coin cells and batteries identified as small batteries include a caution statement regarding the hazards of ingestion in accordance with 8.2		N/A

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Small cells and batteries are intended for direct sale in consumer-replaceable applications, caution for ingestion is given on the immediate package		N/A
9.4	Other information		N/A
	The following information are marked on or supplied with the battery:		N/A
	- Storage and disposal instructions		N/A
	- Recommended charging instructions		N/A
10	PACKAGING AND TRANSPORT		N/A
	Packaging for coin cells are not be small enough to fit within the limits of the ingestion gauge of Figure 3		N/A
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		P
A.3.2.1	General		P
A.3.2.2	Explanation of safety viewpoint		P
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		P
A.4.2.1	General		P
A.4.2.2	Safety consideration when a different recommended temperature range is applied		P
A.4.3	High temperature range		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

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
A.4.4	Low temperature range		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
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		P
A.5.5.1	Insertion of nickel particle in winding core		P
A.5.5.2	Marking the position of the nickel particle on both ends of the winding core of the separator		P
A.5.6	Insertion of nickel particle in prismatic cell		N/A
A.6	Experimental procedure of the forced internal short-circuit test		P
A.6.1	Material and tools for preparation of nickel particle		N/A
A.6.2	Example of a nickel particle preparation procedure		N/A
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

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
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		N/A
ANNEX D	MEASUREMENT OF THE INTERNAL AC RESISTANCE FOR COIN CELLS		N/A
D.1	General		N/A
D.2	Method		N/A
	A sample size of three coin cells is required for this measurement		N/A
	Coin cells with an internal resistance greater than 3 Ω require no further testing		N/A
	Coin cells with an internal resistance less than or equal to 3 Ω are subjected to the testing according to Clause 6 and Table 1		N/A
ANNEX E	PACKAGING AND TRANSPORT		N/A
ANNEX F	COMPONENT STANDARDS REFERENCES		N/A

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
For model: IMR14500-300mAh				
C1	4.2	0.06	4.185	A, B
C2	4.2	0.06	4.188	A, B
C3	4.2	0.06	4.187	A, B
C4	4.2	0.06	4.189	A, B
C5	4.2	0.06	4.188	A, B
For model: IMR14500-400mAh				
C1	4.2	0.08	4.185	A, B
C2	4.2	0.08	4.187	A, B
C3	4.2	0.08	4.189	A, B
C4	4.2	0.08	4.186	A, B
C5	4.2	0.08	4.187	A, B
For model: IMR14500-500mAh				
C1	4.2	0.1	4.186	A, B
C2	4.2	0.1	4.189	A, B
C3	4.2	0.1	4.187	A, B
C4	4.2	0.1	4.185	A, B
C5	4.2	0.1	4.188	A, B
Supplementary information: A - No fire or explosion B - No leakage C - Others (please explain)				

IEC 62133-2					
Clause	Requirement + Test			Result - Remark	Verdict
7.3.1	TABLE: External short circuit (cell)				P
Sample No.	Ambient (°C)	OCV at start of test (Vdc)	Resistance of circuit (mΩ)	Maximum case temperature rise ΔT (K)	Results
For model: IMR14500-300mAh					
Samples charged at charging temperature upper limit					
C6	55.5	4.221	89	78.0	A
C7	55.5	4.223	92	75.6	A
C8	55.5	4.225	84	77.5	A
C9	55.5	4.221	86	72.3	A
C10	55.5	4.222	87	76.2	A
Samples charged at charging temperature lower limit					
C11	55.3	4.176	85	76.5	A
C12	55.3	4.171	90	74.1	A
C13	55.3	4.174	86	72.0	A
C14	55.3	4.173	89	75.2	A
C15	55.3	4.175	93	76.8	A
For model: IMR14500-400mAh					
Samples charged at charging temperature upper limit					
C6	54.8	4.223	84	82.1	A
C7	54.8	4.224	91	83.8	A
C8	54.8	4.221	88	82.6	A
C9	54.8	4.225	86	85.9	A
C10	54.8	4.220	90	83.2	A
Samples charged at charging temperature lower limit					
C11	55.0	4.171	93	81.3	A
C12	55.0	4.175	87	83.5	A
C13	55.0	4.176	85	83.6	A
C14	55.0	4.174	89	80.8	A
C15	55.0	4.175	92	81.0	A
For model: IMR14500-500mAh					
Samples charged at charging temperature upper limit					
C6	55.5	4.220	86	85.2	A
C7	55.5	4.223	85	85.6	A
C8	55.5	4.222	92	87.8	A

IEC 62133-2					
Clause	Requirement + Test			Result - Remark	Verdict
C9	55.5	4.224	84	87.2	A
C10	55.5	4.221	90	88.2	A
Samples charged at charging temperature lower limit					
C11	55.0	4.173	91	83.6	A
C12	55.0	4.172	93	83.0	A
C13	55.0	4.175	88	86.0	A
C14	55.0	4.176	86	86.3	A
C15	55.0	4.174	85	84.4	A
Supplementary information: A - No fire or explosion B - Others (please explain)					

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: A - No fire or explosion B - Others (please explain)						

IEC 62133-2				
Clause	Requirement + Test		Result - Remark	Verdict
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
For model: IMR14500-300mAh				
Samples charged at charging temperature upper limit				
C26	4.223	4.223	13.03	A
C27	4.225	4.224	13.02	A
C28	4.221	4.220	13.03	A
C29	4.223	4.223	13.00	A
C30	4.222	4.221	13.00	A
Samples charged at charging temperature lower limit				
C31	4.173	4.173	13.01	A
C32	4.174	4.173	13.00	A
C33	4.175	4.174	13.02	A
C34	4.175	4.174	13.02	A
C35	4.173	4.173	13.01	A
For model: IMR14500-400mAh				
Samples charged at charging temperature upper limit				
C26	4.222	4.221	13.02	A
C27	4.221	4.220	13.01	A
C28	4.223	4.223	13.00	A
C29	4.223	4.222	13.02	A
C30	4.222	4.221	13.00	A
Samples charged at charging temperature lower limit				
C31	4.175	4.174	13.03	A
C32	4.173	4.172	13.01	A
C33	4.176	4.175	13.01	A
C34	4.172	4.172	13.02	A
C35	4.174	4.174	13.02	A
For model: IMR14500-500mAh				
Samples charged at charging temperature upper limit				
C26	4.221	4.220	13.03	A
C27	4.222	4.221	13.01	A
C28	4.224	4.223	13.02	A

IEC 62133-2				
Clause	Requirement + Test		Result - Remark	Verdict
C29	4.221	4.221	13.00	A
C30	4.223	4.222	12.98	A
Samples charged at charging temperature lower limit				
C31	4.176	4.175	12.98	A
C32	4.174	4.173	13.02	A
C33	4.175	4.175	13.03	A
C34	4.174	4.173	13.01	A
C35	4.173	4.172	13.00	A
Supplementary information: A - No fire or explosion B - Others (please explain)				

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:					
A - No fire or explosion					
B - Others (please explain)					

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

7.3.7	TABLE: Forced discharge (cells)				P
Sample No.	OCV before application of reverse charge (Vdc)	Measured reverse charge I _t (A)	Lower limit discharge voltage (Vdc)	Results	
For model: IMR14500-300mAh					
C36	2.935	0.3	2.3	A	
C37	2.938	0.3	2.3	A	
C38	2.940	0.3	2.3	A	
C39	2.944	0.3	2.3	A	
C40	2.934	0.3	2.3	A	
For model: IMR14500-400mAh					
C36	2.895	0.4	2.3	A	
C37	2.896	0.4	2.3	A	
C38	2.900	0.4	2.3	A	
C39	2.894	0.4	2.3	A	
C40	2.901	0.4	2.3	A	
For model: IMR14500-500mAh					
C36	2.880	0.5	2.3	A	
C37	2.879	0.5	2.3	A	
C38	2.824	0.5	2.3	A	
C39	2.903	0.5	2.3	A	
C40	2.877	0.5	2.3	A	
Supplementary information:					
A - No fire or explosion					
B - Others (please explain)					

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

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: A - No fire or explosion B - No rupture C - No leakage D - No venting E - Others (please explain)						

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: A - No fire or explosion B - No rupture C - No leakage D - No venting E - Others (please explain)						

IEC 62133-2					
Clause	Requirement + Test			Result - Remark	Verdict
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
For model: IMR14500-300mAh					
Samples charged at charging temperature upper limit					
C41	45	4.223	1	800	A
C42	45	4.220	1	800	A
C43	45	4.221	1	800	A
C44	45	4.224	1	800	A
C45	45	4.223	1	800	A
Samples charged at charging temperature lower limit					
C46	0	4.175	1	800	A
C47	0	4.173	1	800	A
C48	0	4.176	1	800	A
C49	0	4.174	1	800	A
C50	0	4.173	1	800	A
For model: IMR14500-400mAh					
Samples charged at charging temperature upper limit					
C41	45	4.221	1	800	A
C42	45	4.223	1	800	A
C43	45	4.224	1	800	A
C44	45	4.222	1	800	A
C45	45	4.221	1	800	A
Samples charged at charging temperature lower limit					
C46	0	4.175	1	800	A
C47	0	4.173	1	800	A
C48	0	4.171	1	800	A
C49	0	4.172	1	800	A
C50	0	4.173	1	800	A
For model: IMR14500-500mAh					
Samples charged at charging temperature upper limit					
C41	45	4.223	1	800	A
C42	45	4.221	1	800	A
C43	45	4.220	1	800	A

IEC 62133-2					
Clause	Requirement + Test			Result - Remark	Verdict
C44	45	4.224	1	800	A
C45	45	4.223	1	800	A
Samples charged at charging temperature lower limit					
C46	0	4.172	1	800	A
C47	0	4.176	1	800	A
C48	0	4.175	1	800	A
C49	0	4.173	1	800	A
C50	0	4.175	1	800	A
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 aluminum foil and negative active material coated area. Remark: There is no particle location 2 for this cell. A - No fire B - Others (please explain)					

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 an internal resistance less than or equal to 3 Ω, see test result on corresponding tables according to Clause 6 and Table 1.					

IEC 62133-2						
Clause	Requirement + Test			Result - Remark	Verdict	
	TABLE: Critical components information					P
Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity ¹⁾	
1. Separator		HQ45.5	PP, Thickness: 25µm	IEC62133-2: 2017 IEC62133-2: 2017 /AMD1:2021	Tested with cell	
2. Electrolyte		DS-DLTX001	LiPF ₆ , EC, EMC, DMC, VC	IEC62133-2: 2017 IEC62133-2: 2017 /AMD1:2021	Tested with cell	
3. Positive electrode		Q110	LiMn ₂ O ₄	IEC62133-2: 2017 IEC62133-2: 2017 /AMD1:2021	Tested with cell	
4. Negative electrode		K10	Graphite, CMC, SBR	IEC62133-2: 2017 IEC62133-2: 2017 /AMD1:2021	Tested with cell	
5. Can		14500	Nickel plated steel can, Thickness: 0.22mm	IEC62133-2: 2017 IEC62133-2: 2017 /AMD1:2021	Tested with cell	
Supplementary information:						
¹⁾ Provided evidence ensures the agreed level of compliance. See OD-CB2039.						

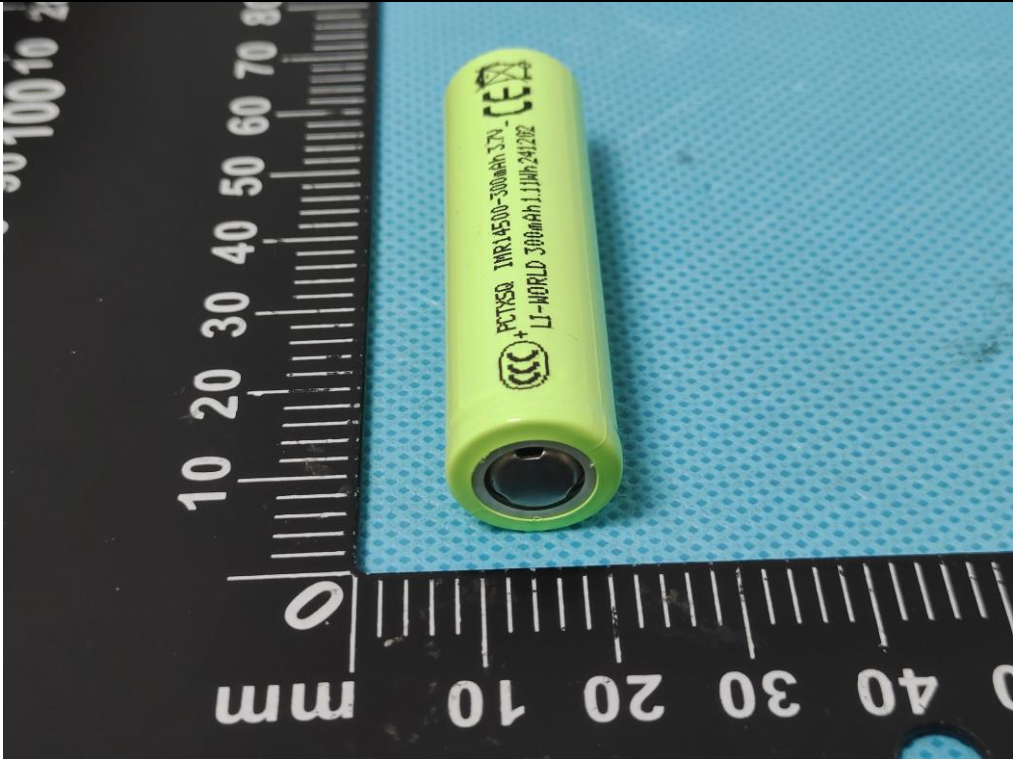
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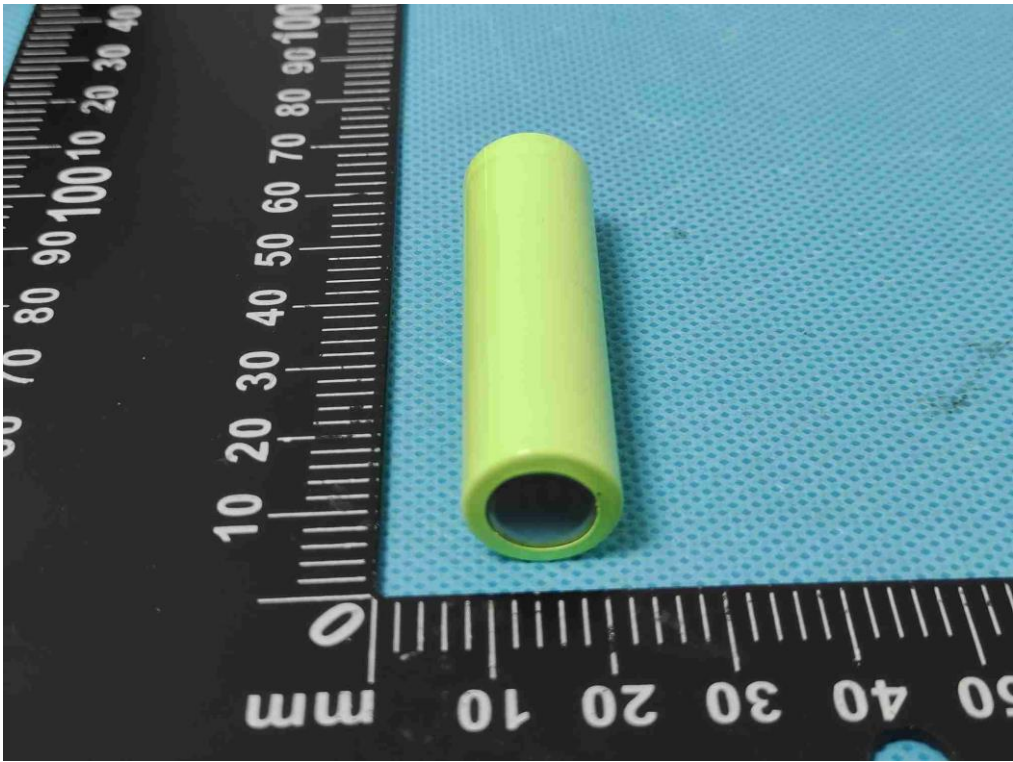
ATTACHMENT to IEC62133_2C			
Clause	Requirement + Test	Result - Remark	Verdict
ATTACHMENT TO TEST REPORT IEC 62133-2 (Republic of Korea) NATIONAL DIFFERENCES (Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for portable sealed secondary lithium cells, and for batteries made from them, for use in portable applications - Part 2: Lithium systems)			
Differences according to : National standard KC62133-2(2020-07)			
TRF template used:..... : IECEE OD-2020-F3:2022, Ed. 1.2			
Attachment Form No. : KR_ND_IEC62133_2C			
Attachment Originator : KTR			
Master Attachment..... : 2023-08-02			
Copyright © 2022 IEC System for Conformity Testing and Certification of Electrical Equipment (IECEE), Geneva, Switzerland. All rights reserved.			
	National Differences		P
7.3.6	Over-charging of battery		N/A
(Revision)	[Add the bolded text] b) Test The test shall be carried out in an ambient temperature of 20 °C ± 5 °C. Each test battery shall be discharged at a constant current of 0,2 I _A , to a final discharge voltage specified by the manufacturer. Sample batteries shall then be charged at a constant current of 2,0 I _A , using a supply voltage which is: • 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 • 1,2 times the upper limit charging voltage presented in Table A.1 per cell for series connected multi-cell batteries, and • sufficient to maintain a current of 2,0 I_A throughout the duration of the test or until the supply voltage is reached. <u>• In case the charging voltage specified by the manufacturer is higher than the overcharge test voltage, the maximum charging voltage specified by manufacturer should be applied with 2,0 I_A</u> <u>(e.g., quick charging power bank, etc.)</u>		N/A

ATTACHMENT to IEC62133_2C			
Clause	Requirement + Test	Result - Remark	Verdict
	[Replace to the following statement] c) Acceptance criteria Filling beyond the manufacturer's specified limits should not result in ignition or explosion		N/A
Annex G	Definition for shape and materials of outer case for cell		—
(Addition)	G.1 General Annex G provides definitions for shape and materials of outer case for cell G.2 Shape of outer case for cell G 2.1 Cylindrical cell Cell with a cylindrical shape in which the overall height is equal to or greater than diameter. G 2.2 Prismatic cell Cell having the shape of a parallelepiped whose faces are rectangular G.3 Materials of outer case for cell G.3.1 Soft case Non-metallic outer case or container for cell G.3.2 Hard case Metallic outer case or container for cell.	(Shape of outer cases) ☒ Cylindrical ☐ Prismatic (Materials of outer cases) ☒ Hard ☐ Soft	—
Annex H	Calculation method of the volumetric energy density for cell		—
(Addition)	Annex H provide a calculation method of the volumetric energy density for cell in use of smart phone, tablet, notebook. H.1 General Unless otherwise stated in the Annex E, the dimensions for calculation are based on these for cell before shipment and the volumetric energy density shall be calculated with a maximum values specified by manufacturer. If the specification for cell can't be provided a dimension for calculation, the manufacturer's other documentation shall be provided to demonstrate compliance for its calculation.	Not use for smart phone, tablet, notebook.	—

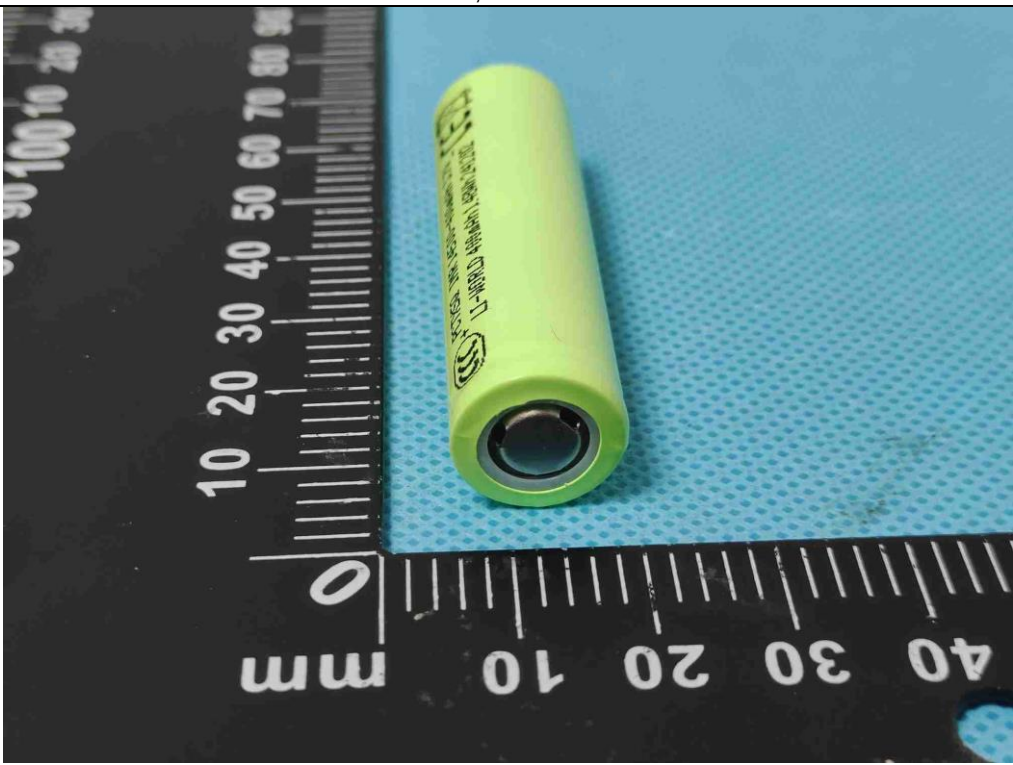
ATTACHMENT to IEC62133_2C			
Clause	Requirement + Test	Result - Remark	Verdict
	H.2 Calculation Method L : Length (max.) of cell (including terrace) W : Width (max.) of cell T : Thickness (max.) when shipping charge (For reference, Please Exclude the dimension of any tape that is attached to cell) $\text{Volumetric energy density (Wh/L)} = \frac{\text{Nominal voltage (V)} \times \text{Rated capacity (Ah)}}{\text{Length (L)} \times \text{Width (W)} \times \text{Thickness (T)}}$ [H.1 – Prismatic cell using soft case] L : Length (max.) of cell W : Width (max.) of cell T : Thickness when shipping charge (For reference, Please Exclude the dimension of any tape that is attached to cell) $\text{Volumetric energy density (Wh/L)} = \frac{\text{Nominal voltage (V)} \times \text{Rated capacity (Ah)}}{\text{Length (L)} \times \text{Width (W)} \times \text{Thickness (T)}}$ [H.2 – Prismatic cell using hard case] D : Diameter (max.) of cell L : Length (max.) of cell (According to shape of cell at shipping, The dimension of tube for cell may be included in overall dimension of cell) $\text{Volumetric energy density (Wh/L)} = \frac{\text{Nominal voltage (V)} \times \text{Rated capacity (Ah)}}{3.14159 \times \frac{\text{Diameter (D)}^2}{4} \times \text{Length(L)}}$ [H.3 – Cylindrical cell using hard case]		

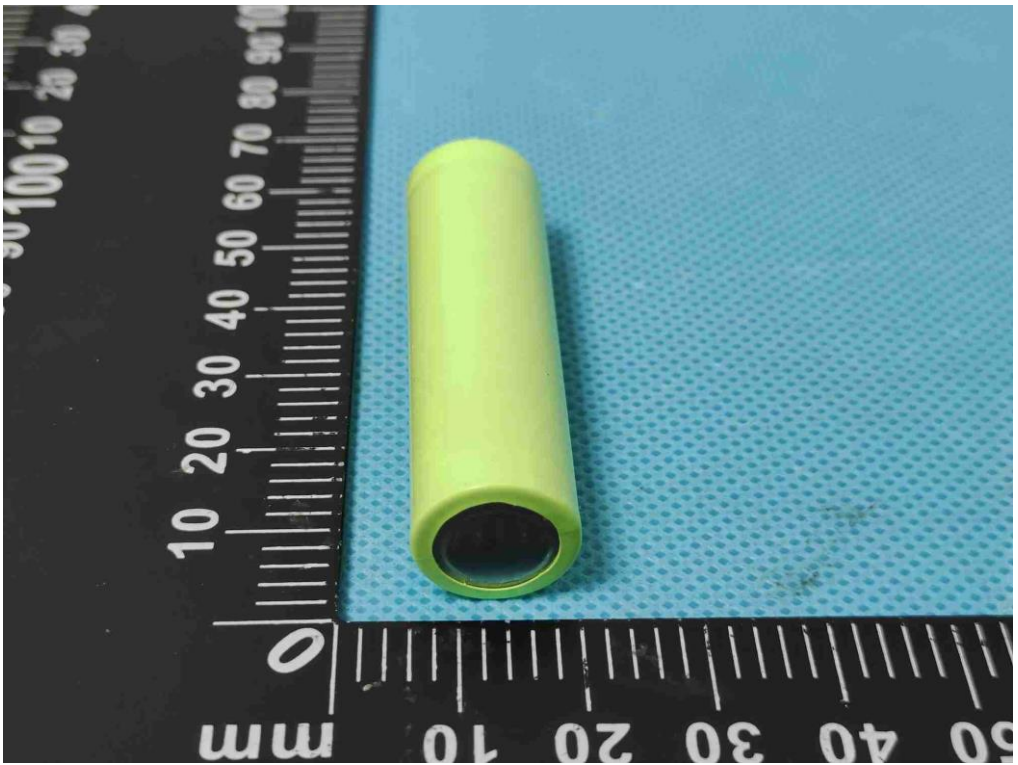
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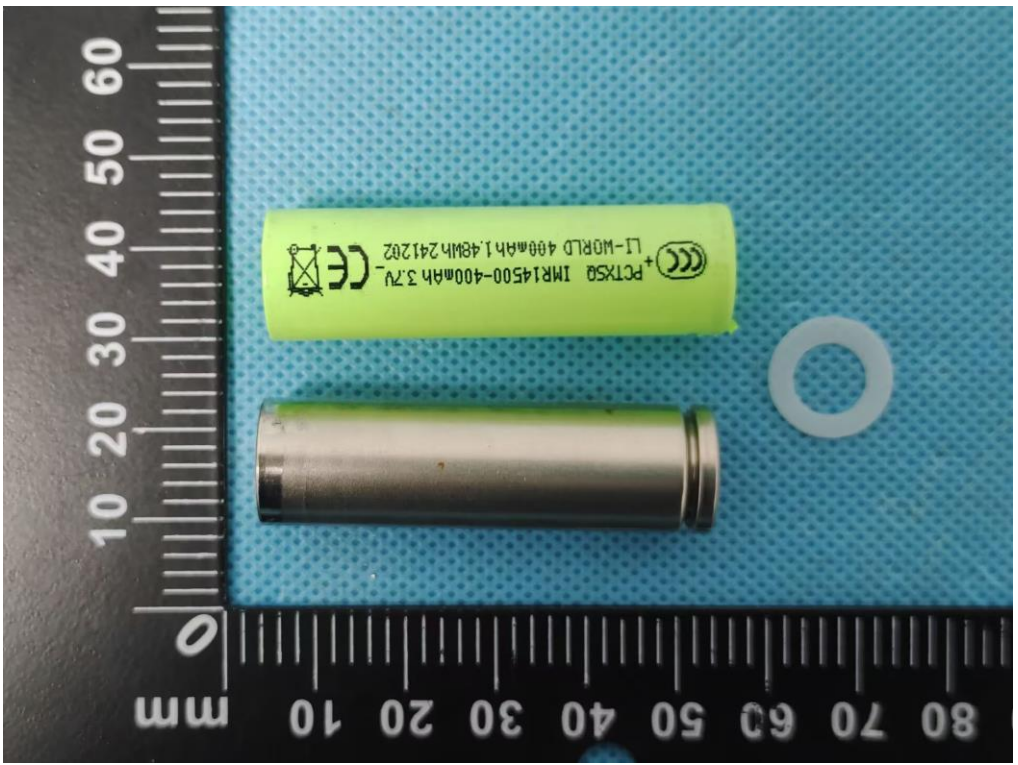
Details of:	Picture1: View 1 of the cell, cell model: IMR14500-300mAh
	 A photograph showing a yellow cylindrical battery cell (IMR14500-300mAh) lying horizontally on a blue textured surface. A black ruler with white markings is placed vertically next to the battery, showing measurements in millimeters. The battery has a silver-colored metal can with a central negative terminal. The text on the battery includes "PCTYSR IMR14500-300mAh 3.7V", "CC", "LT-MR14500-300mAh 1.11W 241202", and a CE mark.

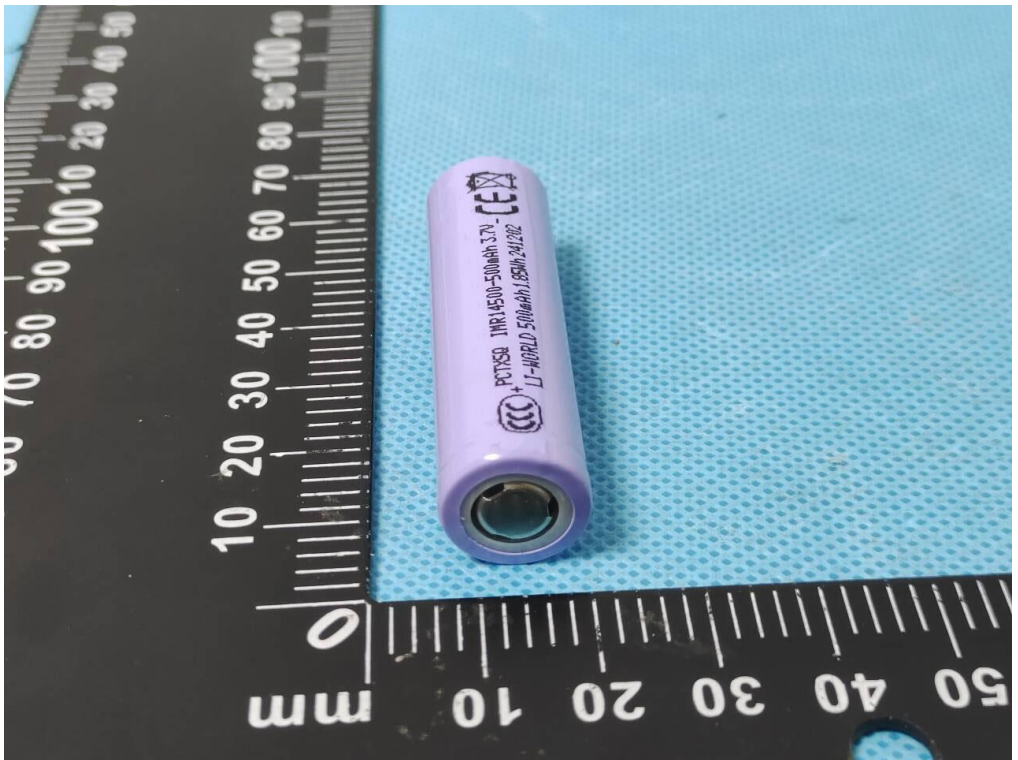
Details of:	Picture 2: View 2 of the cell, cell model: IMR14500-300mAh
	 A photograph showing the same yellow cylindrical battery cell (IMR14500-300mAh) lying horizontally on a blue textured surface. A black ruler with white markings is placed vertically next to the battery, showing measurements in millimeters. The battery is shown from a different angle, highlighting its cylindrical shape and the silver-colored metal can.

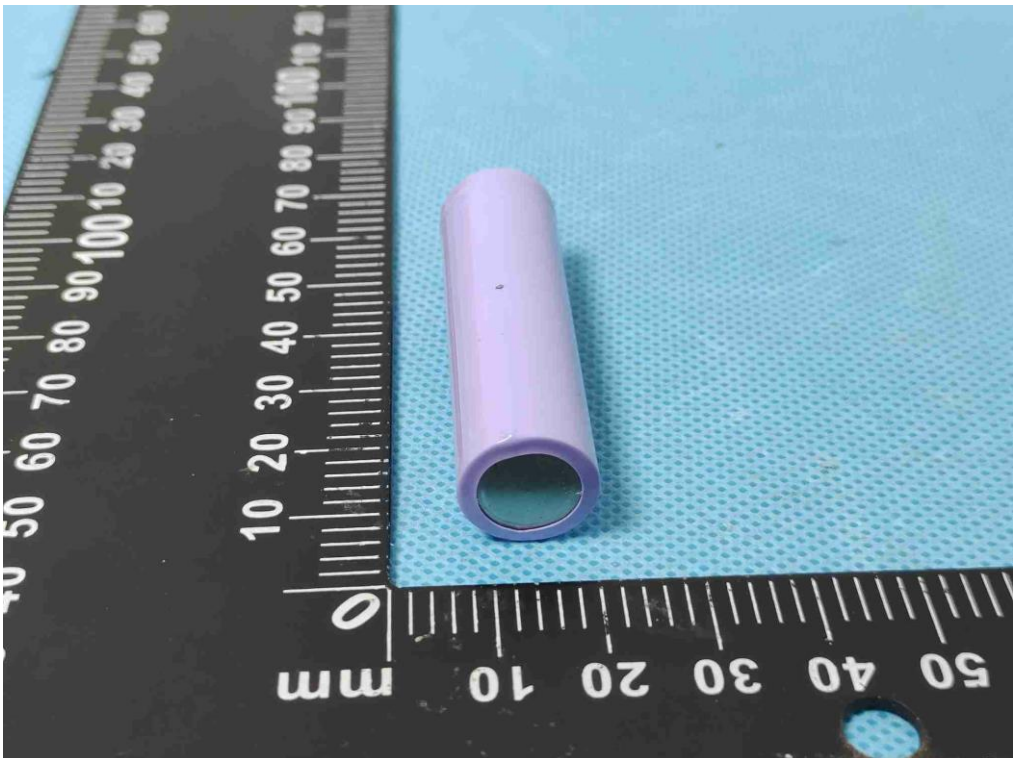
Details of:	Picture 3: View 3 of the cell, cell model: IMR14500-300mAh
	 A photograph showing the side of a cylindrical battery cell. The cell has a green top section with black text and a silver bottom section. The text on the green section includes a CCC logo, '+PCTXS0', 'IMR14500-300mAh 3.7V', 'LI-WORLD 300mAh 1.11Mh 241202', and a crossed-out CE mark. The cell is placed on a blue textured surface next to a black ruler with white markings. The ruler shows centimeters from 0 to 70 and millimeters from 0 to 10. A white circular mark is visible on the blue surface to the right of the cell.

Details of:	Picture4: View 1 of the cell, cell model: IMR14500-400mAh
	 A photograph showing the bottom of a cylindrical battery cell. The cell is green and has a silver base. It is placed on a blue textured surface next to a black ruler with white markings. The ruler shows centimeters from 0 to 100 and millimeters from 0 to 40. The cell is oriented vertically, showing the bottom terminal.

Details of:	Picture 5: View 2 of the cell, cell model: IMR14500-400mAh
	

Details of:	Picture 6: View 3 of the cell, cell model: IMR14500-400mAh
	

Details of:	Picture 7: View 1 of the cell, cell model: IMR14500-500mAh
	

Details of:	Picture 8: View 2 of the cell, cell model: IMR14500-500mAh
	

Details of:	Picture 9: View 3 of the cell, cell model: IMR14500-500mAh
	

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