

Test Report

No.: CANEC25028816301

Date: Nov 28, 2025

Page 1 of 4

Client Name:

Client Address:

Sample Name: Cylindrical Lithium-ion Rechargeable Cell

Model No.: IMR18650-1200mAh

Sample Type: Portable battery (non-zinc-air button cell)

The above sample(s) and information were provided by the client.

SGS Job No.: GZP25-032904

Sample Receiving Date: Nov 20, 2025

Testing Period: Nov 20, 2025 ~ Nov 28, 2025

Test Requested: Select test(s) as requested by the client.

Test Method(s): Please refer to next page(s).

Test Result(s): Please refer to next page(s).

Test Requirement	Conclusion
Annex I of Regulation (EU) 2023/1542– Heavy Metals Content in batteries and waste batteries	Pass

Signed for and on behalf of
SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch

Catty Gong

Catty Gong

Approved Signatory

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SGS-CSTC Standards Technical Services Co., Ltd.
Guangzhou Branch

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No.198, Kezhu Road, Science City, Economic & Technological Development Area, Guangzhou, Guangdong, China 510663
中国·广东·广州高新技术产业开发区科学城科珠路198号 邮编: 510663

t (86-20) 82155555 www.sgsgroup.com.cn
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Test Result(s):

Test Part Description:

SN ID	Sample No.	SGS Sample ID	Description
SN1	A	CAN25-0288163-0001	"Battery"

Remarks:

- (1) 1 mg/kg = 1 ppm = 0.0001%
- (2) MDL = Method Detection Limit
- (3) ND = Not Detected (< MDL)
- (4) "-" = Not Regulated

Annex I of Regulation (EU) 2023/1542– Heavy Metals Content in batteries and waste batteries

Test Method: SGS In House Method (GZTC CHEM-TOP-068), analysis was performed by ICP-OES or AAS or Hg-analyzer.

Test Item(s)	Limit	Unit(s)	MDL	A
Lead(Pb)	0.01	%	0.0010	ND
Cadmium(Cd)	0.002	%	0.0010	ND
Mercury(Hg)	0.0005	%	0.0001	ND
Conclusion				Pass

Notes:

- (1) Restriction on substances

Column 1 Designation of the substance or group of substances	Column 2 Conditions of restriction
1. Mercury CAS No 7439-97-6 EC No 231-106-7 and its compounds	Batteries, whether or not incorporated into appliances, light means of transport or other vehicles, shall not contain more than 0,0005 % of mercury (expressed as mercury metal) by weight
2. Cadmium CAS No 7440-43-9 EC No 231-152-8 and its compounds	Portable batteries, whether or not incorporated into appliances, light means of transport or other vehicles, shall not contain more than 0,002 % of cadmium (expressed as cadmium metal) by weight
3. Lead CAS No 7439-92-1 EC No 231-100-4 and its compounds	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.

(2) According to the EU New Battery Regulation (EU) 2023/1542, portable batteries (non portable zinc-air button cells) containing between 0,004 %-0.01 % lead, shall be marked with the chemical symbol for the metal concerned: Pb.

Unless otherwise stated, the decision rule for conformity reporting is based on Binary Statement for Simple Acceptance Rule (w=0) stated in ILAC-G8:09/2019.



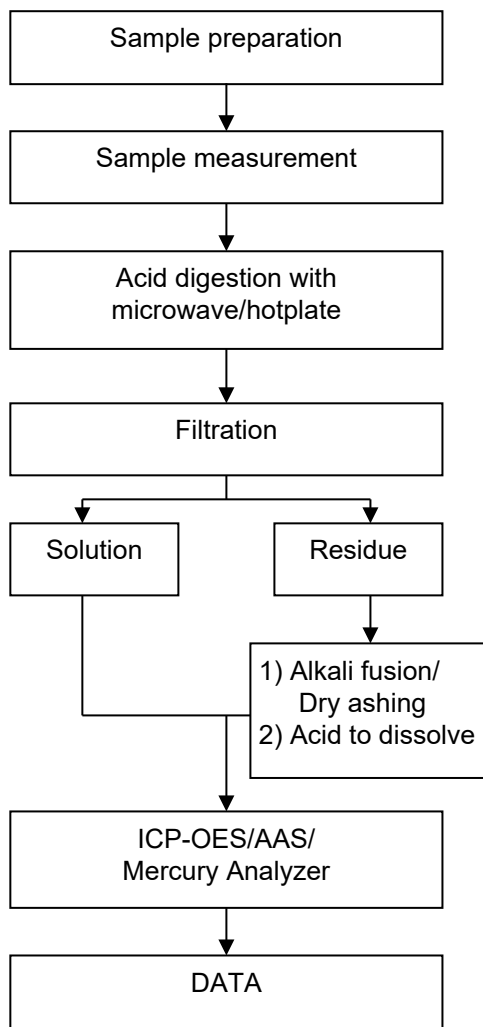
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Guangzhou Branch Technical Laboratory

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t (86-20) 82155555 www.sgsgroup.com.cn
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Battery Testing Flow Chart



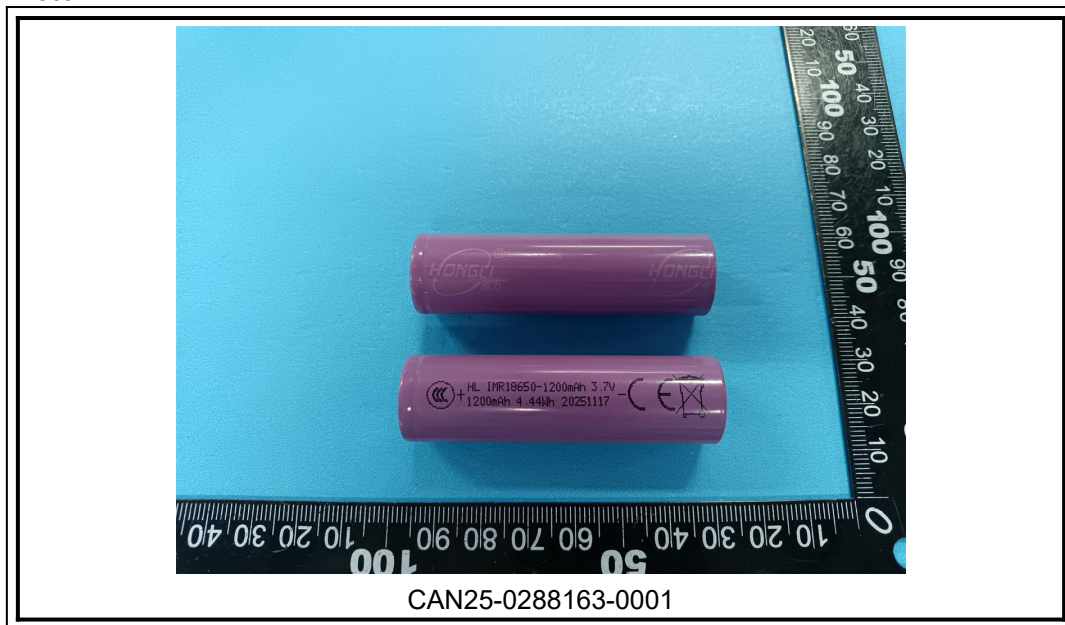
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Sample Photo:



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*** End of Report ***



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中国·广东·广州高新技术产业开发区科学城科珠路198号 邮编: 510663

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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 reference No.: DSP26091036-1

Tested by (name+ signature): Aiden Yu

Aiden Yu

Compiled by (name+ signature): Amy Xie

Amy Xie

Approved by (name+ signature): Ailis Ma

Ailis Ma

Date of issue: 2026-09-29

Total number of pages: 24 Pages.

Name of Testing Laboratory preparing the Report Dongguan ZRLK Testing Technology Co., Ltd.
Building 2, No.1, Technology 10th Road, Songshan Lake Park,
Dongguan, Guangdong, China**Applicant's name**

Address

Manufacturer's name

Address

Test specification

Standard: IEC 62133-2:2017/AMD1:2021

Test procedure: Type approved

Procedure deviation: N/A

Non-standard test method: N/A

This test report is specially limited to the above client company and product model only, It may not be duplicated without prior written consent of Dongguan ZRLK Testing Technology Co., Ltd.

Test item description: Cylindrical Lithium-Ion Rechargeable Cell**Trade Mark**: N/A**Model/type reference**: IMR18650-800mAh, IMR18650-1200mAh**Ratings**: IMR18650-800mAh: 3.7V, 800mAh, 2.96Wh;
IMR18650-1200mAh: 3.7V, 1200mAh, 4.44Wh

Particulars: test item vs. test requirements

Classification of installation and use	To be defined in final product
Supply connection	DC terminals
Discharge current (0,2 It A)	160mA for IMR18650-800mAh, 240mA for IMR18650-1200mAh
Upper limit charging voltage per cell.....	4.2V
Charging temperature upper limit	45°C
Charging temperature lower limit.....	0°C
Shape of Cell	☐ Prismatic ☐ Pouch ☐ Coin/button ☒ Cylindrical ☐ gel polymer ☐ solid polymer ☒ Other
Polymer cell electrolyte type	☐ solid polymer ☒ Other

Possible test case verdicts:

- test case does not apply to the test object	N/A
- test object does meet the requirement	P(ass)
- test object does not meet the requirement	F(ail)

Testing:

Date of receipt of test item	2026-09-10
Date(s) of performance of test	2026-09-10 to 2026-09-23

General remarks:

"(see remark #)" refers to a remark appended to the report,
 "(see appended table)" refers to a table appended to the report,
 Throughout this report a comma is used as the decimal separator,
 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 testing laboratory,
 Clause numbers between brackets refer to clauses in IEC 62133-2:2017/AMD1:2021 (Optional remark).

Name and address of factory (ies)

General product information:

This cell consists of the positive electrode plate, negative electrode plate, separator, electrolyte and case.
 The positive and negative electrode plates are housed in the case in the state being separated by the separator.
 The cells have the same dimensions, chemistry, voltage, but different capacities.
 Details information of the cell, as following:

Product	Cylindrical Lithium-Ion Rechargeable Cell	
Model No.	IMR18650-800mAh	IMR18650-1200mAh
Nominal voltage	3.7V	3.7V

	Rated capacity	800mAh	1200mAh	
	Recommend charging method declared by the manufacturer	Charging the cell with 0.2C constant current, 4.2V constant voltage until current reaches 0.02C		
	Maximum charging current	400mA	600mA	
	Maximum discharge current	400mA	600mA	
	Maximum charging voltage	4.2V	4.2V	
	Specified final voltage	3.0V	3.0V	

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/AMD1:2021.

Test items:

- cl.7.1 Charging procedure for test purposes (for cells);
- cl.7.2.1 Continuous charging at constant voltage (cells);
- cl.7.3.1 External short circuit (cells);
- cl.7.3.3 Free fall (cells);
- cl.7.3.4 Thermal abuse (cells);
- cl.7.3.5 Crush (cells);
- cl.7.3.7 Forced discharge (cells);
- cl.7.3.9 Design evaluation – Forced internal short circuit (cells);
- cl.8.2 Small cell and battery safety information.

☒ **The product fulfils the requirements of EN 62133-2:2017/A1:2021**

Testing location:

Dongguan ZRLK Testing Technology Co., Ltd.
Building 2, No.1, Technology 10th Road, Songshan Lake Park, Dongguan, Guangdong, China

Test conclusion:

The Cylindrical Lithium-Ion Rechargeable Cell submitted by _____ are tested according to 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.

Test result: Pass.

Copy of marking plate:

The artwork below may be only a draft.

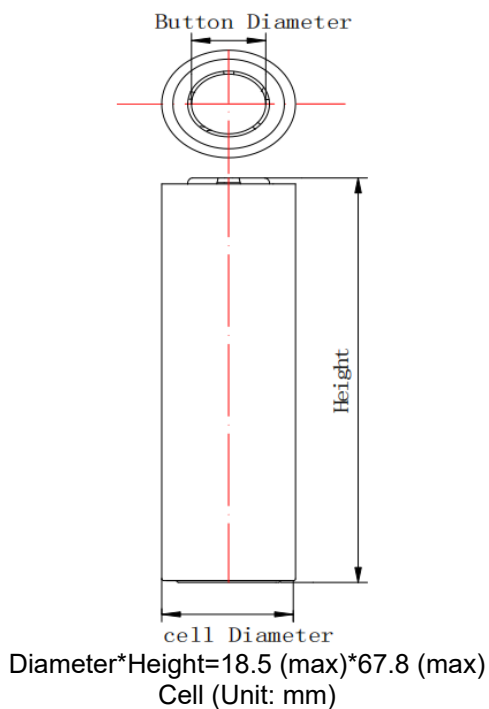
Cylindrical Lithium-Ion Rechargeable Cell
+ IMR18650-800mAh IMR19/68 -
3.7V, 800mAh, 2.96Wh YYYYMMDD

Model: IMR18650-800mAh

Cylindrical Lithium-Ion Rechargeable Cell
+ IMR18650-1200mAh IMR19/68 -
3.7V, 1200mAh, 4.44Wh YYYYMMDD

Model: IMR18650-1200mAh

Remark: "YYYYMMDD" represents the date of manufacture. "YYYY" represents the year, "MM" represents the month, "DD" represents the day.

Construction:

Circuit diagram:

None, cell only

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	Cell only	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).....:	N/A	—
	Internal wiring and insulation are sufficient to withstand maximum anticipated current, voltage and temperature requirements		N/A
	Orientation of wiring maintains adequate clearance 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	Venting mechanism exists on the top of the cylindrical cell.	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	Cell only.	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		P
	The size and shape of the terminal contacts ensure that they can carry the maximum anticipated current	DC terminals complied with the requirements.	P

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	DC terminals complied with the requirements.	P
	Terminal contacts are arranged to minimize the risk of short-circuit		P
5.6	Assembly of cells into batteries	Cell only.	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	Complied.	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 provided.	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	Not coin cells	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	Charge temperature 0-45°C declared; 45°C used for upper limit test temperature; 0°C used for lower limit test temperature.	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	Charging for 7 days with 0.2C and 4.20V.	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)	Cell only.	N/A
	Oven temperature (°C).....	N/A	—
	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)	Cell only	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
	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

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Results: No fire. No explosion.....:	(See appended table 7.3.2)	N/A
7.3.3	Free fall	Tested complied.	P
	Results: No fire. No explosion	No fire. No explosion	P
7.3.4	Thermal abuse (cells)	Tested complied.	P
	Oven temperature (°C).....:	130	—
	Results: No fire. No explosion	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	Cell only	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.....:	(See appended table 7.3.6)	N/A
7.3.7	Forced discharge (cells)	Tested complied.	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
	- 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

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

	- 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)	Cell only.	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)	Tested complied.	P
	The cells complied with national requirement for	France, Japan, Republic of 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	800 N for cylindrical cells.	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	Information for safety mentioned in manufacturer's specifications.	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
	Do not allow children to replace batteries without adult supervision		N/A
8.2	Small cell and battery safety information	Not small cell.	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

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

	- 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	See marking plate on page 4.	P
	Cells are 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		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		N/A
9.2	Battery marking	Cell only.	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	Not small cells.	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
	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		P
	The following information are marked on or supplied with the battery:		P

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Clause	Requirement + Test	Result - Remark	Verdict

	- Storage and disposal instructions	Information for storage and disposal instructions mentioned in manufacturer's specifications.	P
	- Recommended charging instructions	Information for recommended charging instructions mentioned in manufacturer's specifications.	P

10	PACKAGING AND TRANSPORT		N/A
	Packaging for coin cells not small enough to fit within the limits of the ingestion gauge of Figure 3	Not coin cells.	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	Complied	P
A.3	Consideration on charging voltage	Complied	P
A.3.1	General		P
A.3.2	Upper limit charging voltage	4.2V	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	4.2V applied.	N/A
A.4	Consideration of temperature and charging current		P
A.4.1	General		P
A.4.2	Recommended temperature range	See A.4.2.2.	P
A.4.2.1	General		P
A.4.2.2	Safety consideration when a different recommended temperature range is applied	Charging temperature declared by client is: 0-45°C	P
A.4.3	High temperature range	Not higher than the temperature range specific in this standard.	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	45°C applied	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	Charging low temperature declared by client is: 0°C.	P

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Clause	Requirement + Test	Result - Remark	Verdict
A.4.4.1	General		P
A.4.4.2	Explanation of safety viewpoint		P
A.4.4.3	Safety considerations, when specifying charging conditions in the low temperature range	0°C applied	P
A.4.4.4	Safety considerations when specifying a new lower limit in the low temperature range	No documents provided by manufacturer explaining the lower limit exceed 10°C, 0°C applied for testing in this report for safety considerations.	P
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	Cell specified final voltage 3.0V.	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		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

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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		N/A
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	Not coin cells.	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	(See appended table D.2)	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

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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	
IMR18650-800mAh					
C01	4.20	0.16	4.18	P	
C02	4.20	0.16	4.18	P	
C03	4.20	0.16	4.19	P	
C04	4.20	0.16	4.19	P	
C05	4.20	0.16	4.18	P	
IMR18650-1200mAh					
C01	4.20	0.24	4.18	P	
C02	4.20	0.24	4.19	P	
C03	4.20	0.24	4.19	P	
C04	4.20	0.24	4.18	P	
C05	4.20	0.24	4.18	P	
Supplementary information:					
- No fire or explosion					
- No leakage					

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 (°C)	Results
IMR18650-800mAh					
Samples charged at charging temperature upper limit (45°C)					
C06	55.3	4.17	82	128.8	P
C07	55.3	4.18	89	122.4	P
C08	55.3	4.18	75	127.5	P
C09	55.3	4.17	76	116.8	P
C10	55.3	4.18	80	120.3	P
Samples charged at charging temperature lower limit (0°C)					
C11	54.2	4.08	75	133.9	P
C12	54.2	4.09	79	125.5	P
C13	54.2	4.09	86	131.3	P
C14	54.2	4.08	81	136.6	P
C15	54.2	4.08	78	136.4	P
IMR18650-1200mAh					

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

Samples charged at charging temperature upper limit (45°C)					
C06	55.6	4.17	89	125.4	P
C07	55.6	4.18	75	127.4	P
C08	55.6	4.18	77	133.3	P
C09	55.6	4.18	80	125.6	P
C10	55.6	4.17	84	128.5	P
Samples charged at charging temperature lower limit (0°C)					
C11	55.8	4.09	76	143.8	P
C12	55.8	4.10	84	143.2	P
C13	55.8	4.10	81	140.9	P
C14	55.8	4.09	77	138.8	P
C15	55.8	4.10	89	144.3	P
Supplementary information: - No fire or explosion					

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 (°C)	Component single fault condition	Results
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Supplementary information:						

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	
IMR18650-800mAh					
Samples charged at charging temperature upper limit (45°C)					
C29	4.18	4.12	13	P	
C30	4.17	4.09	13	P	
C31	4.17	4.13	13	P	

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Clause	Requirement + Test		Result - Remark	Verdict

C32	4.18	4.14	13	P
C33	4.17	4.12	13	P
Samples charged at charging temperature lower limit (0°C)				
C34	4.08	4.01	13	P
C35	4.09	4.03	13	P
C36	4.08	4.05	13	P
C37	4.08	4.02	13	P
C38	4.09	4.03	13	P
IMR18650-1200mAh				
Samples charged at charging temperature upper limit (45°C)				
C29	4.18	4.12	13	P
C30	4.18	4.11	13	P
C31	4.19	4.13	13	P
C32	4.18	4.08	13	P
C33	4.17	4.10	13	P
Samples charged at charging temperature lower limit (0°C)				
C34	4.10	4.04	13	P
C35	4.09	4.02	13	P
C36	4.09	4.05	13	P
C37	4.10	4.05	13	P
C38	4.10	4.03	13	P
Supplementary information: - No fire or explosion - Note: A 13kN force applied at the longitudinal axis of cylindrical cells.				

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	
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Supplementary information:					

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	
IMR18650-800mAh					
C39	3.03	0.8	3.0	P	
C40	3.04	0.8	3.0	P	
C41	3.04	0.8	3.0	P	
C42	3.04	0.8	3.0	P	
C43	3.06	0.8	3.0	P	
IMR18650-1200mAh					
C39	3.26	1.2	3.0	P	
C40	3.23	1.2	3.0	P	
C41	3.26	1.2	3.0	P	
C42	3.27	1.2	3.0	P	
C43	3.25	1.2	3.0	P	
Supplementary information:					
- No fire or explosion					

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	
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Supplementary information:						

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	
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Supplementary information:						

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	
IMR18650-800mAh						
Samples charged at charging temperature upper limit (45°C)						
C44	45	4.17	1	800	P	
C45	45	4.16	1	800	P	
C46	45	4.17	1	800	P	
C47	45	4.17	1*	800	P	
C48	45	4.16	1*	800	P	
Samples charged at charging temperature lower limit (0°C)						
C49	0	4.07	1	800	P	
C50	0	4.07	1	800	P	
C51	0	4.08	1	800	P	
C52	0	4.08	1*	800	P	
C53	0	4.07	1*	800	P	
IMR18650-1200mAh						
Samples charged at charging temperature upper limit (45°C)						
C44	45	4.17	1	800	P	
C45	45	4.17	1	800	P	
C46	45	4.16	1	800	P	
C47	45	4.16	1*	800	P	
C48	45	4.17	1*	800	P	
Samples charged at charging temperature lower limit (0°C)						
C49	0	4.09	1	800	P	
C50	0	4.08	1	800	P	
C51	0	4.08	1	800	P	

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Clause	Requirement + Test	Result - Remark	Verdict

C52	0	4.09	1*	800	P
C53	0	4.09	1*	800	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.

- No fire or explosion

Remark: *No location 2 exist.

D.2	TABLE: Internal AC resistance for coin cells				N/A
Sample no.	Ambient T (°C)	Store time (h)	Resistance Rac (Ω)	Results ¹⁾	
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Supplementary information:

¹⁾ Coin cells with internal resistance less than or equal to 3 Ω, see test result on corresponding tables

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
Cell		IMR18650-800mAh, IMR18650-1200mAh	IMR18650-800mAh: 3.7V, 800mAh; IMR18650-1200mAh: 3.7V, 1200mAh	IEC 62133-2:2017/AM D1:2021	Tested with appliance
-Positive Electrode	Hunan Yuneng New Energy Battery Material Co., Ltd.	R747	LiMn ₂ O ₄	--	--
-Negative Electrode	Hunan Zhongke Electric Co., Ltd.	895	Graphite	--	--
-Separator	Shenzhen Senior Technology Material Co., Ltd.	14	PE, 0.014mm (T), Shutdown temperature: 125-135°C	--	--
-Electrolyte	Jiangsu Ruitai New Energy Materials Co., Ltd.	TC-E218#	LiPF ₆ , EC+EMC+DEC	--	--
-Cell Case	Anhui Zhengxin Electromechanical Technology Co., Ltd.	0.3	steel, 0.3mm (T)	--	--

Photos

Model: IMR18650-800mAh, IMR18650-1200mAh

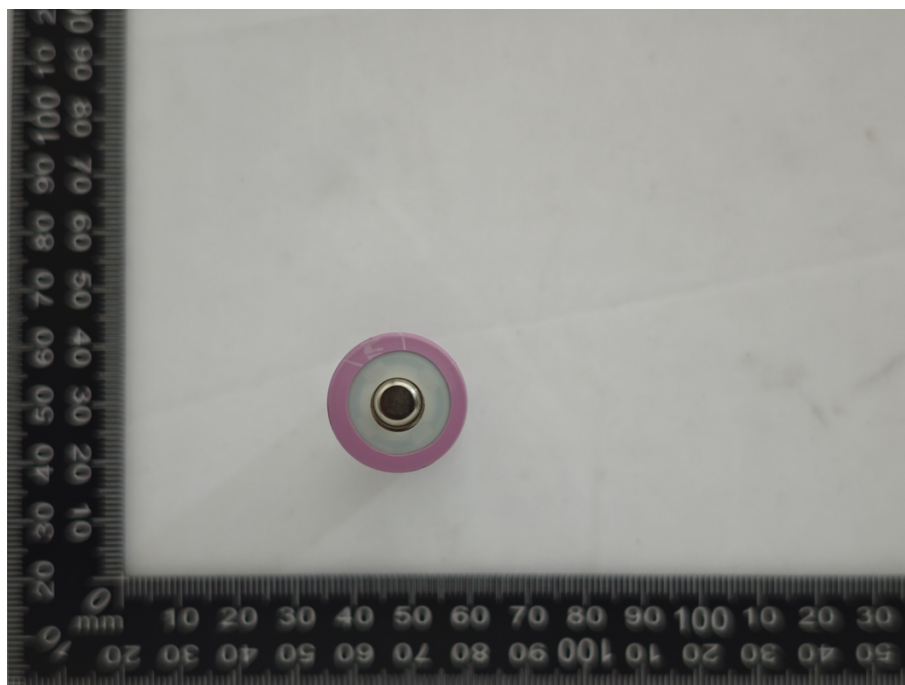


Figure 1 Terminal view of cell (IMR18650-800mAh)



Figure 2 Side view of cell (IMR18650-800mAh)

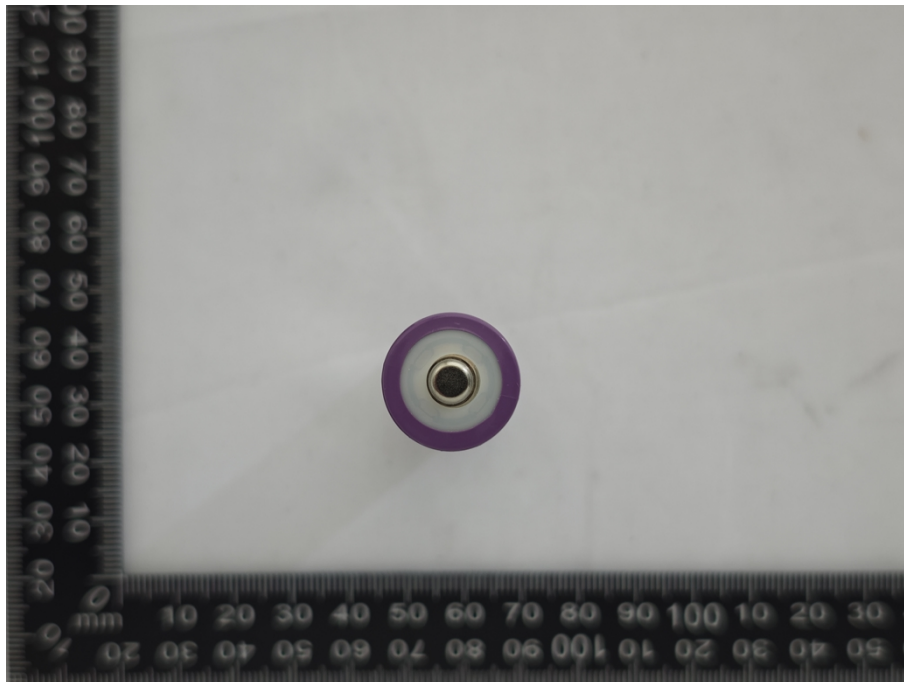


Figure 3 Terminal view of cell (IMR18650-1200mAh)

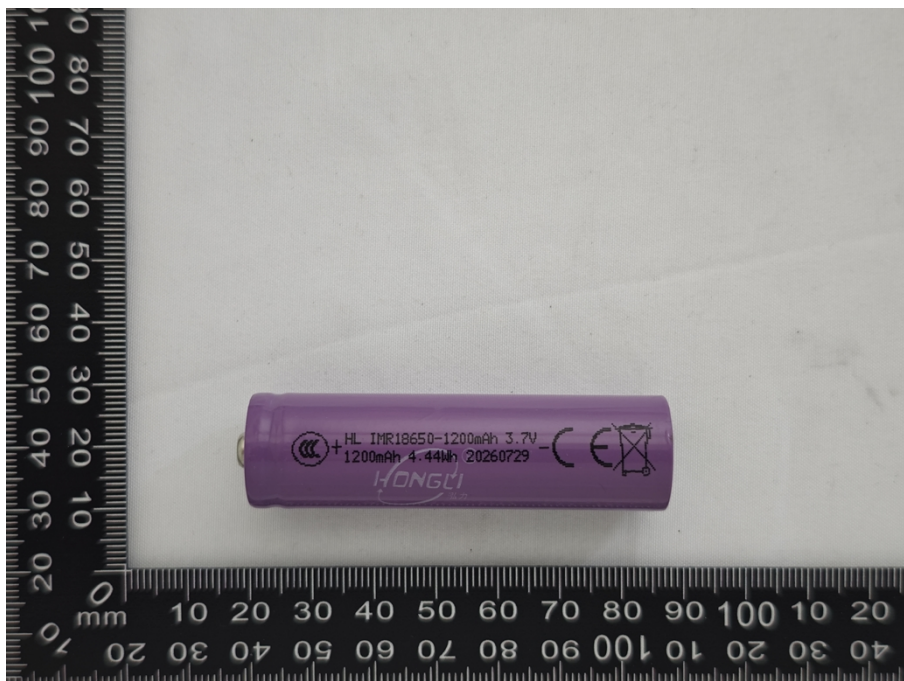


Figure 4 Side view of cell (IMR18650-1200mAh)

***** End of Test Report *****