



Test Report issued under the responsibility of:



TEST REPORT
IEC 60086-4
Primary batteries
Part 4: Safety of lithium batteries

Report Number..... : SHES240601293001

Date of issue..... : 2024-06-25

Total number of pages : 13 Pages

Name of Testing Laboratory SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.
preparing the Report

Applicant's name SUZHOU XINLVZHOU ELECTRONICS CO., LTD

Address..... : SHANJI ROAD 158, XIANGCHENG DISTRICT, SUZHOU,
JIANGSU, CHINA

Test specification:

Standard IEC 60086-4: 2019

Test procedure CB Scheme

Non-standard test method N/A

Test Report Form No. : IEC60086_4C

Test Report Form(s) Originator : DEKRA

Master TRF Dated 2019-06-19

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General disclaimer:

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Test item description..... :	Primary Battery	
Trade Mark..... :	warriors	
Manufacturer	Same as applicant	
Model/Type reference	CR2032	
Ratings	Rated Voltage: 3 V Rated Capacity: 210 mAh	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
☒	CB Testing Laboratory:	SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.
Testing location/ address..... :		588 West Jindu Road, Xinqiao, Songjiang, 201612 Shanghai, China.
Tested by (name, function, signature)		Vivian Ni / Project Engineer <i>Vivian Ni</i>
Approved by (name, function, signature)...		Bruce Wu / Report Reviewer <i>Bruce Wu</i>
☐	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 1: 1 page of Photos;
 Attachment 2: 1 page of Information for safety;
 Attachment 3: 1 page of Packaging;
 Attachment 4: 1 page of Product specification.

Summary of testing:

The sample(s) tested complies with the requirements of IEC 60086-4: 2019.

No decision rule is specified by 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").

All test data in this report were copied from original test report SHES220300359402, dated 2024-03-18 and SHES220300359401, dated 2022-04-01 with following changes:

- Add critical components information, details please refer to Table of Critical components information.

After comparison, no additional test was considered necessary.

Remark:

1. The samples were subjected to full tests as far as applicable.

Tests performed (name of test and test clause):

- ☒ 6.4.1 Altitude
- ☒ 6.4.2 Thermal cycling
- ☒ 6.4.3 Vibration
- ☒ 6.4.4 Shock
- ☒ 6.5.1 External short-circuit
- ☐ 6.5.2 Impact
- ☒ 6.5.3 Crush
- ☒ 6.5.4 Forced discharge
- ☒ 6.5.5 Abnormal charging
- ☒ 6.5.6 Free fall
- ☒ 6.5.7 Thermal abuse
- ☐ 6.5.8 Incorrect installation
- ☐ 6.5.9 Overdischarge

Testing location:

SGS-CSTC Standards Technical Services
 (Shanghai) Co., Ltd.
 588 West Jindu Road, Xinqiao, Songjiang, 201612
 Shanghai, China.

Summary of compliance with National Differences (List of countries addressed):

EU Group difference.

☒ **The product fulfils the requirements of EN IEC 60086-4:2019.**

Copy of marking plate:**Note:**

1. “22” represents manufacture date Feb. 2022; “20” represents manufacture date Oct. 2022; “2Y” represents manufacture date Nov. 2022; “2Z” represents manufacture date Dec. 2022.
2. Expiration of the recommended usage period is three years after manufacture date.

Test item particulars.....: --	
Classification of installation and use.....: --	
Supply Connection: --	
.....:	
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: 2024-06-20	
Date (s) of performance of tests: Original: 2022-03-02 to 2022-03-28	
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. This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at http://www.sgs.com/en/Terms-and-Conditions.aspx and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Document.aspx. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.	
Manufacturer's Declaration per sub-clause 4.2.5 of IEC60086 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:

Product description:	Primary Battery
Model:	CR2032
Rated voltage:	3,0 V
Rated capacity	210 mAh
Abnormal charge current:	15 mA

IEC 60086-4			
Clause	Requirement + Test	Result - Remark	Verdict
4	REQUIREMENTS FOR SAFETY		P
4.1	Design		P
	a) Abnormal temperature rise above the critical value prevented		P
	b) Temperature increases in the battery controlled		P
	c) Lithium cells and batteries designed to relieve excessive internal pressure or to preclude a violent rupture under conditions of transport, intended use and reasonably foreseeable misuse		P
4.2	Quality plan		P
	Manufacturer prepared and implemented a quality plan defining the procedures for the inspection of materials, components, cells and batteries during the course of manufacture, to be applied to the total process of producing a specific type of battery		P
	Manufactures understood their process capabilities and instituted the necessary process controls as they relate to product safety		P
5	TYPE TESTING AND SAMPLING		P
5.1	Validity of testing		P
5.2	Test samples	(See table 1 in the standard)	P
6	TESTING AND REQUIREMENTS		P
6.1	General		P
6.1.1	Test application matrix	(See table 2 in the standard)	P
	s: cell or single cell battery		N/A
	m: multi cell battery		P
6.1.3	Ambient temperature (°C) :	20 °C ± 5 °C	P
6.1.4	Parameter measurement tolerances		P
6.1.5	Predischarge		P
6.1.6	Additional cells		P
6.2	Evaluation of test criteria		P
6.2.1	Short-circuit		P
6.2.2	Excessive temperature rise		P
6.2.3	Leakage		P
6.2.4	Venting		P
6.2.5	Fire		P
6.2.6	Rupture		P
6.2.7	Explosion		P
6.3	Tests and requirements – Overview	(See table 4 in the standard)	P
6.4	Tests for intended use		P

IEC 60086-4			
Clause	Requirement + Test	Result - Remark	Verdict
6.4.1	Test A: Altitude	(See appended table 1)	P
6.4.2	Test B: Thermal cycling	(See appended table 1)	P
6.4.3	Test C: Vibration	(See appended table 1)	P
6.4.4	Test D: Shock	(See appended table 1)	P
6.5	Tests for reasonably foreseeable misuse		P
6.5.1	Test E: External short-circuit	(See appended table 1)	P
6.5.2	Test F: Impact	(See appended table 1)	N/A
6.5.3	Test G: Crush	(See appended table 1)	P
6.5.4	Test H: Forced discharge	(See appended table 1)	P
6.5.5	Test I: Abnormal charging	(See appended table 1)	P
6.5.6	Test J: Free fall	(See appended table 1)	P
6.5.7	Test K: Thermal abuse	(See appended table 1)	P
6.5.8	Test L: Incorrect installation	(See appended table 1)	N/A
6.5.9	Test M: Overdischarge	(See appended table 1)	N/A
6.6	Information given in the relevant specification		P
	a) Predischage current or resistive load and end-point voltage specified by the manufacturer.....		P
	b) Method to measure the energy of an explosion, if any		P
	c) Shape: prismatic, flexible, coin or cylindrical Diameter: less than 18 mm or not less than 18 mm	Crush test	P
	d) Maximum continuous discharge current specified by the manufacturer for test H.....	15 mA	P
	e) Rated capacity specified by the manufacturer for test H.....	210 mAh	P
	f) Abnormal charging current declared by the manufacturer for test I	15 mA	P
	g) Normal reverse current declared by the manufacturer which applied to the battery during its operating life.....		P
7	INFORMATION FOR SAFETY		P
7.1	Safety precautions during design of equipment		P
7.1.1	General		P
7.1.2	Charge protection		N/A
7.1.3	Parallel connection		N/A
7.2	Precautions during handling of batteries		P
7.3	Packaging		P
7.4	Handling of battery cartons		P

IEC 60086-4			
Clause	Requirement + Test	Result - Remark	Verdict
7.5	Transport		P
7.5.1	General		P
7.5.2	Air transport		P
7.5.3	Sea transport		P
7.5.4	Land transport		P
7.6	Display and storage		P
7.7	Disposal		P
8	INSTRUCTIONS FOR USE		P
9	MARKING AND PACKAGING		P
9.1	General		P
9.2	Swallowable batteries		P
9.3	Safety pictograms		N/A
ANNEX A	(INFORMATIVE) GUIDELINES FOR THE ACHIEVEMENT OF SAFETY OF LITHIUM BATTERIES		P
ANNEX B	(INFORMATIVE) GUIDELINES FOR DESIGNERS OF EQUIPMENT USING LITHIUM BATTERIES		P
ANNEX C	(INFORMATIVE) ADDITIONAL INFORMATION ON DISPLAY AND STORAGE		P
ANNEX D	(INFORMATIVE) SAFETY PICTOGRAMS		N/A
D.1	General		N/A
D.2	Pictograms		N/A
D.3	Instruction for use		N/A
ANNEX E	(NORMATIVE) CHILD RESISTANT PACKAGING OF COIN CELLS		N/A
E.1	General		N/A
E.2	Applicability		N/A
E.3	Packaging tests		N/A
E.3.1	General		N/A
E.3.2	Test items		N/A
E.3.3	Test procedure		N/A
E.3.4	Criteria		N/A
ANNEX F	(INFORMATIVE) USE OF THE KEEP OUT OF REACH OF CHILDREN SAFETY SIGN		P
F.1	General		P
F.2	Safety sign		P
F.3	Best practices for marking the packaging		P
F.4	Best practices for marking the cell		N/A

IEC 60086-4			
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⁾	
Cell	SUZHOU XINLVZHOU ELECTRONICS CO., LTD	CR2032	3,0 V; 210 mAh	IEC 60086-4: 2019 EN IEC 60086-4: 2019	Tested with appliance	
-Positive electrode	Changzhou Jintan Chaochuang Battery Co.,Ltd.	2032	MnO ₂ , Graphite, Carbon black, PTFE, SUS304 mesh	--	--	
-Negative electrode	Xinghua City Far Infrared Components Factory	Battery level lithium metal	≥99,9% purity	--	--	
-Electrolyte	Xinchuang battery materials (Wuxi) Co. , Ltd.	6033	PC+DME+DOL+Li ClO ₄	--	--	
-Separator	Changzhou Jiulian Battery Material Co., Ltd.	Glass fiber	0,35mm thickness	--	--	
-Case	Changzhou Jintan Chaochuang Battery Co.,Ltd.	2032G,K	SUS430 stainless steel	--	--	
-Gasket	Changzhou Jintan Chaochuang Battery Co.,Ltd.	SPM	PP+Rubber	--	--	
Supplementary information:						
¹⁾ Provided evidence ensures the agreed level of compliance. See OD-CB2039.						

IEC 60086-4			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE 1 (clause 6.4.1 – 6.5.9)					P
Tests	Cell / battery type	Discharge state	Number of test sample	Test result	Verdict
A to E	Cells and single cell batteries	Undischarged	10	Tests A-D: NL, NV, NC, NR, NE, NF Test E: NT, NR, NE, NF	P
		Fully discharged	10	Tests A-D: NL, NV, NC, NR, NE, NF Test E: NT, NR, NE, NF	P
	Multi-cell batteries	Undischarged	4		N/A
		Fully discharged	4		N/A
F	Cells and single cell batteries	Undischarged	5		N/A
		Fully discharged	5		N/A
	Multi-cell batteries	Undischarged	5 component cells		N/A
		Fully discharged	5 component cells		N/A
G	Cells and single cell batteries	Undischarged	5	NR, NE, NF	P
		Fully discharged	5	NR, NE, NF	P
	Multi-cell batteries	Undischarged	5 component cells		N/A
		Fully discharged	5 component cells		N/A
H	Cells and single cell batteries	Fully discharged	10	NE, NF	P
	Multi-cell batteries	Fully discharged	10 component cells		N/A
I to K	Cells and single cell batteries	Undischarged	5	Test I: NE, NF Test J: NV, NE, NF Test K: NE, NF	P
	Multi-cell batteries	Undischarged	5		N/A
L	Cells and single cell batteries	Undischarged	20		N/A
M	Cells and single cell batteries	50 % predischarged	20		N/A
		75 % predischarged	20		N/A

IEC 60086-4			
Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information:

NC: No short-circuit

NE: No explosion

NF: No fire

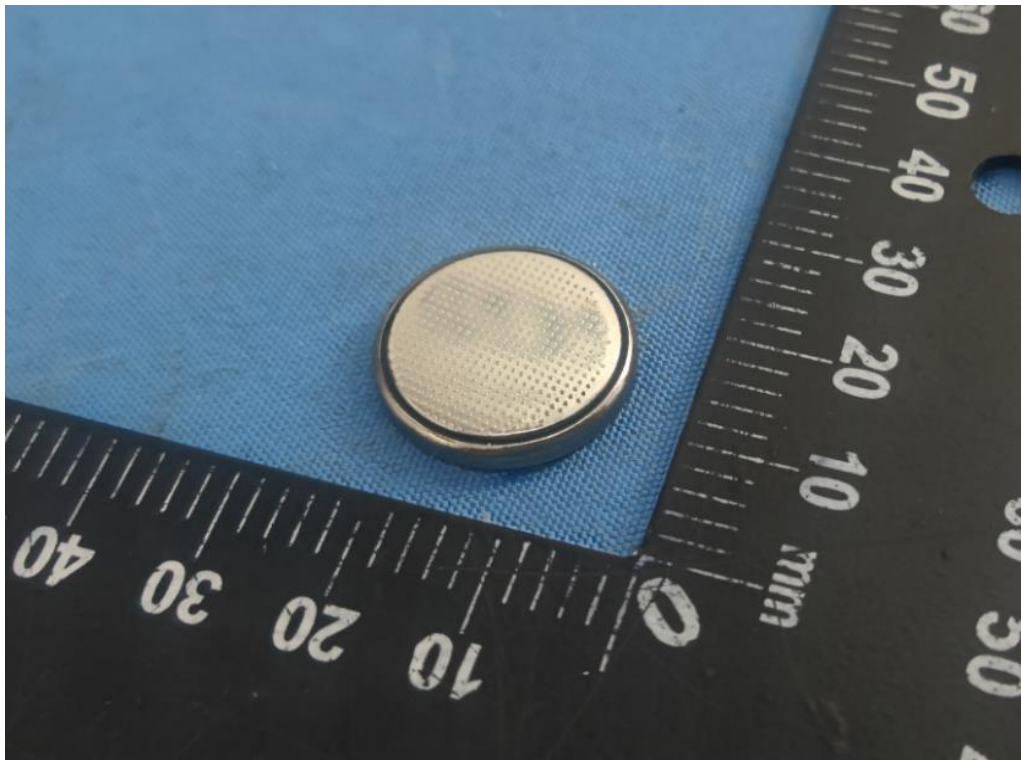
NL: No leakage

NR: No rupture

NT: No excessive temperature rise

NV: No venting

---End of Report---

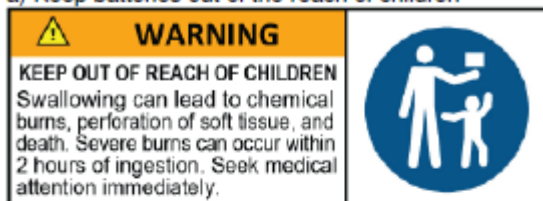
Attachment 1 Photo documentation

--- End of Attachment 1 ---

Attachment 2 Information for safety

Precautions during handling of batteries

- a) Keep batteries out of the reach of children



- b) Do not allow children to replace batteries without adult supervision
c) Always insert batteries correctly with regard to polarity (+ and -) marked on the battery and the equipment
d) Do not short-circuit batteries
e) Do not charge batteries
f) Do not force discharge batteries
g) Do not mix new and used batteries or batteries of different types or brands
h) Exhausted batteries should be immediately removed from equipment and properly disposed of
i) Do not heat batteries
j) Do not weld or solder directly to batteries
k) Do not dismantle batteries
l) Do not deform batteries
m) Do not dispose of batteries in fire
n) A lithium battery with a damaged container should not be exposed to water
o) Do not encapsulate and/or modify batteries
p) Store unused batteries in their original packaging away from metal objects. If already unpacked, do not mix or jumble batteries
q) Remove batteries from equipment if it is not to be used for an extended period of time unless it is for emergency purposes

Display and storage

- a) Store batteries in well ventilated, dry and cool conditions
b) Do not stack battery cartons on top of each other exceeding a specified height
c) Avoid storing or displaying batteries in direct sun or in places where they get exposed to rain
d) Store and display batteries in their original packing

Disposal

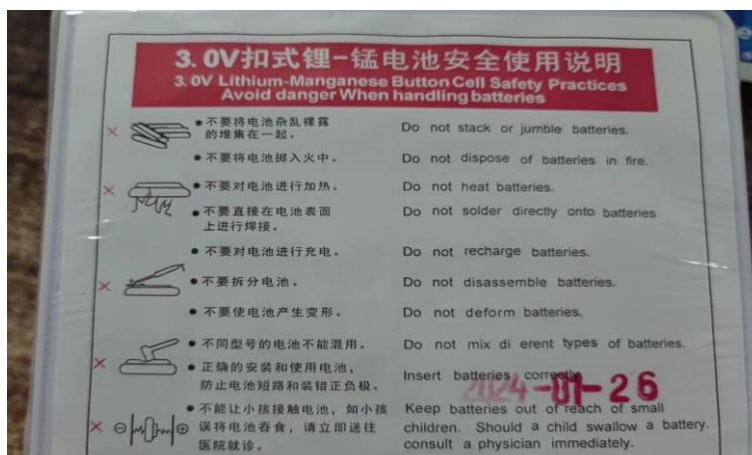
- a) Do not dismantle batteries
b) Do not dispose of batteries in fire except under conditions of approved and controlled incineration
c) Store collected batteries in a clean and dry environment out of direct sunlight and away from extreme heat
d) Store collected batteries in a well-ventilated area
e) Do not mix collected batteries with other materials
f) Protect battery terminals

Instructions for use

- a) Always select the correct size and type of battery most suitable for the intended use. Information provided with the equipment to assist correct battery selection should be retained for reference.
b) Replace all batteries of a set at the same time.
c) Clean the battery contacts and also those of the equipment prior to battery installation.
d) Ensure that the batteries are installed correctly with regard to polarity (+ and -).
e) Remove exhausted batteries promptly.

- - - End of Attachment 2 - - -

Attachment 3 Packaging



- - - End of Attachment 3 - - -

Attachment 4 Product SpecificationSpecification

Product description:	Primary Battery
Model:	CR2032
Rated voltage:	3,0 V
Rated capacity	210 mAh
Abnormal charge current:	15 mA
Expiration of the recommended usage period:	3 years after manufacture date

- - - End of Attachment 4 - - -