

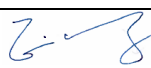


TEST REPORT IEC 60086-4 Primary batteries Part 4: Safety of lithium batteries	
Report Number. : SHES210500976504 Date of issue..... : 2024-10-22 Total number of pages : 14 Pages	
Name of Testing Laboratory preparing the Report	SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.
Applicant's name..... : LIYUAN BATTERY TECHNOLOGY (SHENZHEN) CO., LTD. Address..... : 201, Building B, Gushu Hongwan Joint Stock Company, Sanwei Community, Hangcheng Street, Baoan District, Shenzhen, Guangdong	
Test specification: Standard : IEC 60086-4: 2019 (Fifth Edition) Test procedure : Commission testing according to the requirements of Applicant. Non-standard test method : N/A	
Test Report Form No. : IEC60086_4 B Test Report Form(s) Originator.... : DEKRA Master TRF..... : Dated 2019-06-19	
Test item description..... : Primary Battery Trade Mark..... : -- Manufacturer : Same as applicant Model/Type reference..... : CR2032 Ratings..... : 3 V; 210 mAh	

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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.

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
☒	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 
Approved by (name, function, signature)....:		Eric Wang / Project Reviewer 
☐	Testing procedure: TMP	N/A
Testing location/ address.....:		
Tested by (name, function, signature).....:		
Approved by (name, function, signature)....:		
☐	Testing procedure: WMT	N/A
Testing location/ address.....:		
Tested by (name + signature)		
Witnessed by (name, function, signature)..:		
Approved by (name, function, signature)....:		
☐	Testing procedure: SMT	N/A
Testing location/ address.....:		
Tested 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: 2 pages of Photos.	
Summary of testing: 1. Test were arranged according to IEC 60086-4: 2019 and EN 60086-4:2019. 2. 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.) 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: none.	

Copy of marking plate:



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..... : 2024-09-23	
Date (s) of performance of tests : Original date: 2023-02-27 to 2023-03-02 2021-05-24 to 2021-06-18	
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 IEC 60086-2:	
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:	12 mA

Note:

The original Test Report No. SHES210500976503, dated 2024-03-11, were modified on 2024-10-22 to include the following changes:

- Update marking and photo of battery.
- Change verdict of clause 7, 8, 9 and Annex A to F except Annex E.

After comparison, clause 7, 8, 9 and Annex A to F were considered necessary except Annex E.

Test report No. SHES210500976503, date 2024-03-11 is not valid and replaced by Test Report Ref. No. SHES210500976504, dated 2024-10-22.

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	Single cell battery	P
	m: multi cell battery		N/A
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

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

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
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)	P
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	Impact test	P
	d) Maximum continuous discharge current specified by the manufacturer for test H.....	20 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	12 mA	P
	g) Normal reverse current declared by the manufacturer which applied to the battery during its operating life.....		P

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

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
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		P
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		P
D.1	General		P
D.2	Pictograms		P
D.3	Instruction for use		P
ANNEX E	(NORMATIVE) CHILD RESISTANT PACKAGING OF COIN CELLS	Relevant document was not provided.	Not checked
ANNEX F	(INFORMATIVE) USE OF THE KEEP OUT OF REACH OF CHILDREN SAFETY SIGN		P

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

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		P

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	Cylindrical cells; NT, NE, NF	P
		Fully discharged	5	Cylindrical cells; NT, NE, NF	P
	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

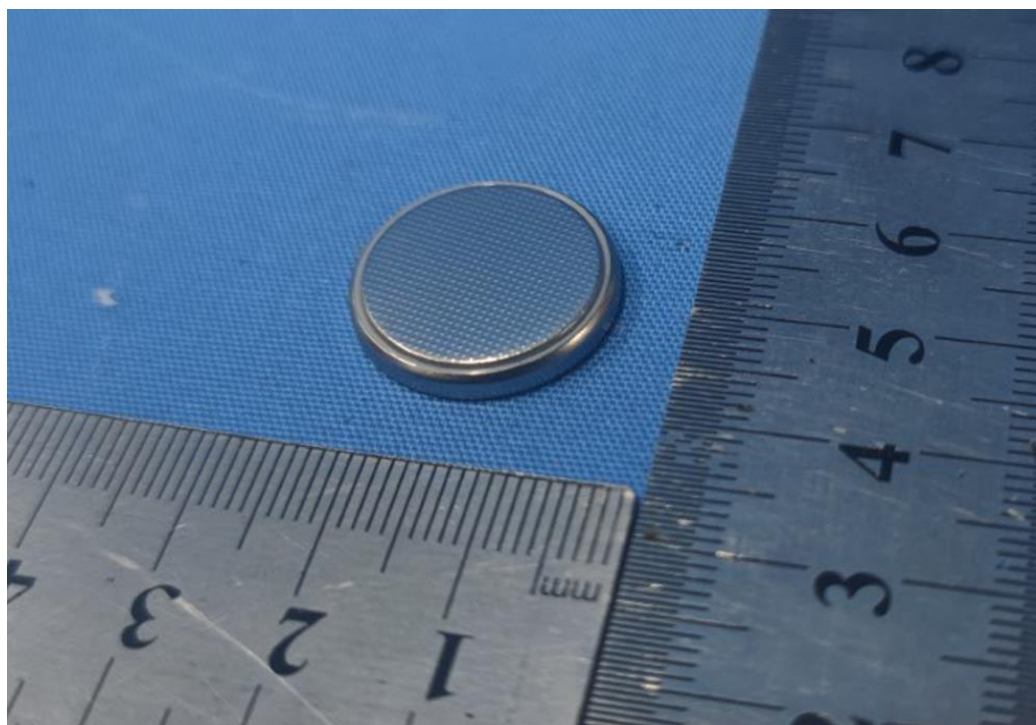
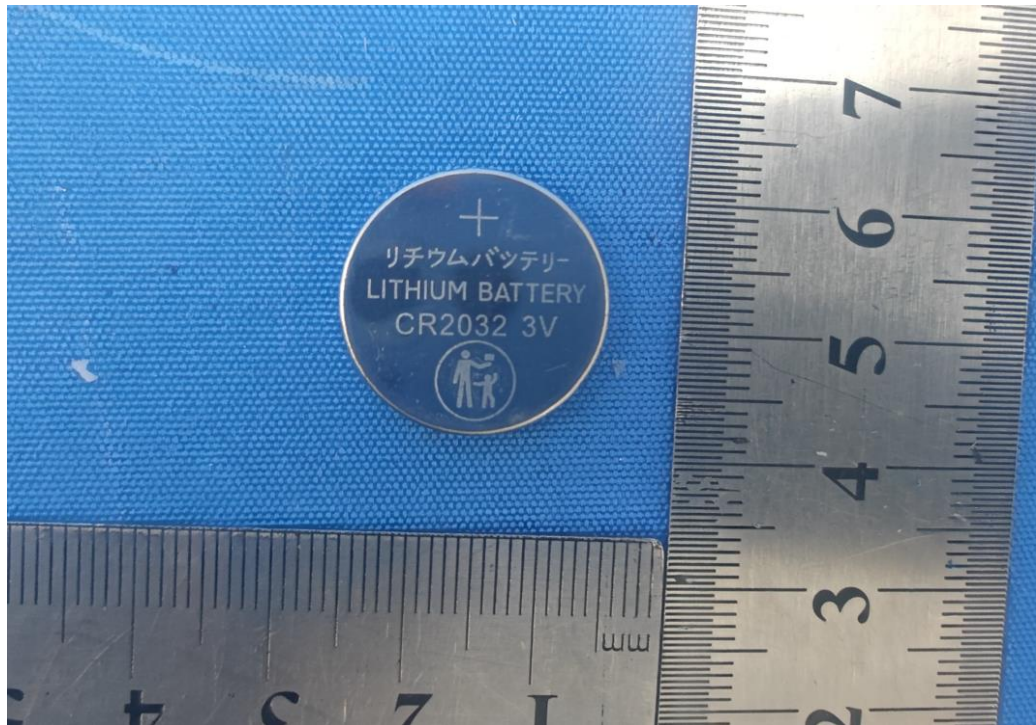
NL: No leakage

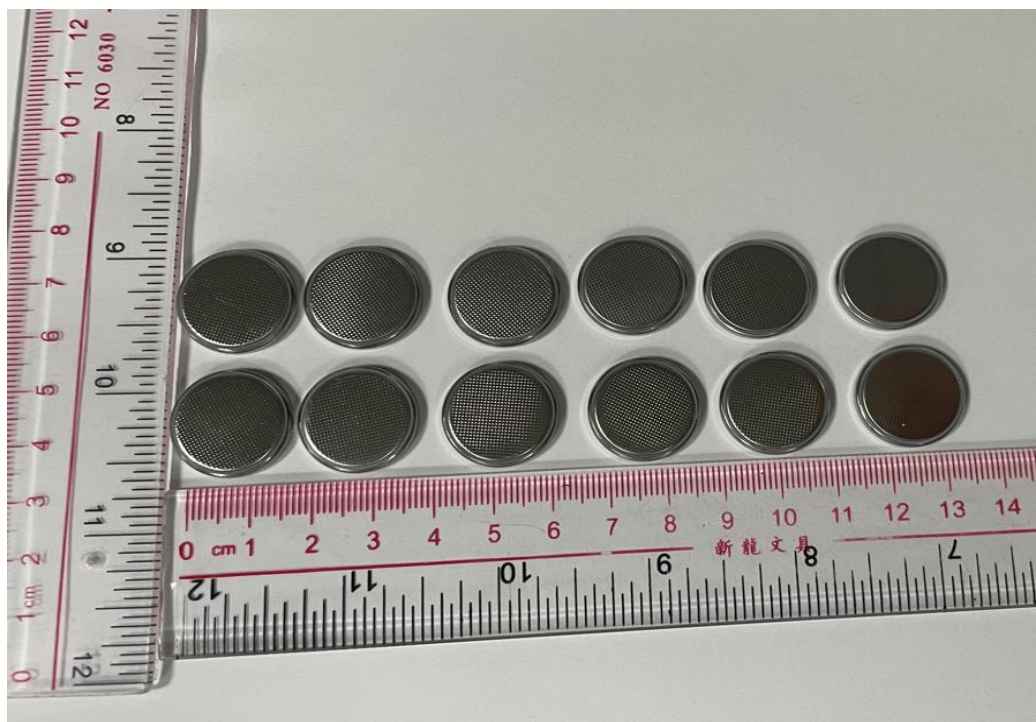
NR: No rupture

NT: No excessive temperature rise

NV: No venting

Attachment 1: Photos





---End of Report---