TEST REPORT

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

Report Reference No.....:	PNS21075216 01001
Date of issue .....:	2021-09-10
Total number of pages.....:	11
Testing Laboratory.....:	**GUANGDONG UTL CO., LTD.**
Address.....:	Lianding Testing Building, No.18 Center Road of Yayuan Industrial Zone, Nancheng District, Dongguan, Guangdong, China
Tested by (name + signature).....:	Jill Wen
Reviewed by (name + signature)....:	Sophie Wu
Approved by (name + signature).....:	Free Zhao
Applicant's name .....:	Shenzhen Wecodo Technology Co., Ltd.
Address.....:	Room 1509, West Tower, Nanshan Digital Tech & Cult Industry Park, Nanshan District, Shenzhen, China
Manufacturer's name.....:	Shenzhen Wecodo Technology Co., Ltd.
Address.....:	Room 1509, West Tower, Nanshan Digital Tech & Cult Industry Park, Nanshan District, Shenzhen, China
Factory's name.....:	Shenzhen Wecodo Technology Co., Ltd.
Address.....:	Room 1509, West Tower, Nanshan Digital Tech & Cult Industry Park, Nanshan District, Shenzhen, China
Test specification:	
Standard .....:	IEC 60086-4: 2019
Test procedure .....:	N/A
Non-standard test method.....:	N/A

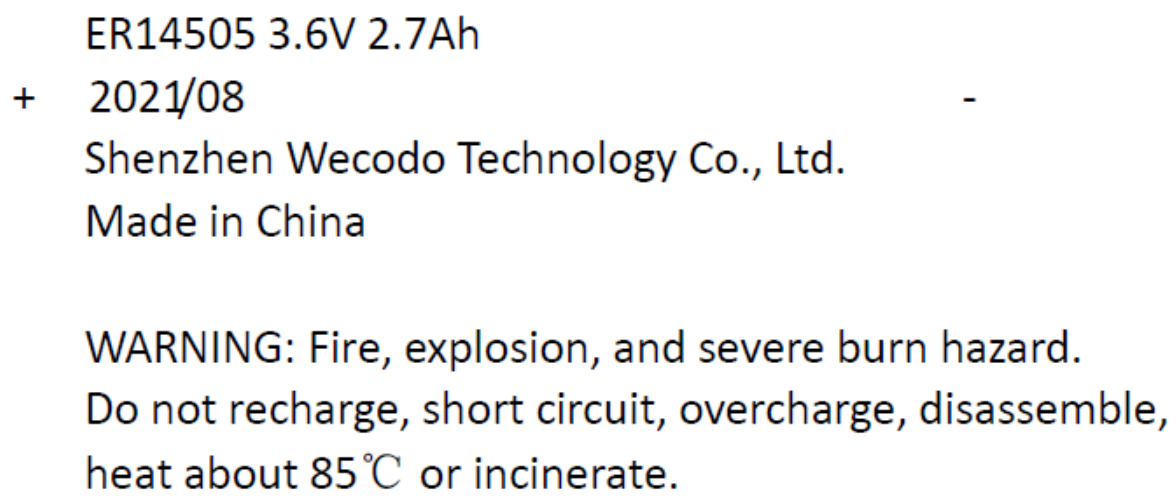
Test item description .....:	Primary Lithium Battery
Trade Mark.....:	N/A
Model/Type reference.....:	ER14505
Ratings.....:	3.6V, 2.7Ah

List of Attachments (including a total number of pages in each attachment):
- Photos documentation (1 page)

Summary of testing:	
Tests performed (name of test and test clause): <u>Test items:</u> cl.6.4.1 Test A: Altitude cl.6.4.2 Test B: Thermal cycling cl.6.4.3 Test C: Vibration cl.6.4.4 Test D: Shock cl.6.5.1 Test E: External short-circuit cl.6.5.3 Test G: Crush cl.6.5.4 Test H: Forced discharge cl.6.5.5 Test I: Abnormal charging cl.6.5.6 Test J: Free fall cl.6.5.7 Test K: Thermal abuse Tests are made with the number of cells specified in IEC 60086-4:2019 Table 1.	**Testing location:** All tests as described in Test Case and Measurement Sections were performed at the laboratory described on page 1.
Summary of compliance with National Differences: List of countries addressed: N/A ☒ The product fulfils the requirements of EN IEC 60086-4: 2019.	

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.



Date Code: YYYY/MM

YYYY for Year; MM for Month.

Test item particulars.....:	
Classification of installation and use .....:	To be defined in final product
Supply connection.....:	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 ..... :	2021-08-10
Date(s) of performance of test..... :	2021-08-10 to 2021-09-02

General remarks

"(See Enclosure #)" refers to additional information appended to the report.
"(See appended table)" refers to a table appended to the report.

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.
Throughout this report a point (~~comma~~) is used as the decimal separator.

General product information and other remarks:

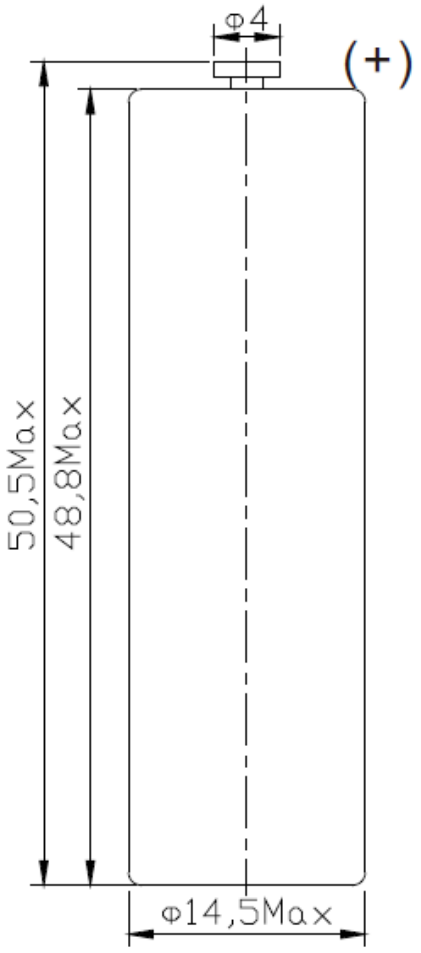
The product is a Lithium-thionyl Chloride cell (Li-$SOCl_2$, Bobbin Type) without any protective circuit.

The main features of the cell are shown as below:

Model	Nominal Capacity	Nominal Voltage	Maximum Discharge Current	Cut-Off Voltage	Abnormal Charge Current
ER14505	2.7Ah	3.6V	100mA	2.0V	50mA

Construction:

Cell dimension:



Φ (max.): H(max.) = 14.5mm: 50.5mm

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	Venting mechanism exists.	P
4.2	**Quality plan**		
	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	Complied. Quality plan provided.	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 ……..:	Cell only	P
	m: multi cell battery ……..:		N/A
6.1.3	Ambient temperature (°C).....:	20±5°C	P
6.1.4	Parameter measurement tolerances		P
6.1.5	Predischarge	Predischarged samples provided by manufacturer	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

IEC 60086-4			
Clause	Requirement + Test	Result - Remark	Verdict
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)	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) Predischarge current or resistive load and end-point voltage specified by the manufacturer……..:	1mA, 2.0V	P
	b) Method to measure the energy of an explosion, if any ……..……..:		N/A
	c) Shape: prismatic, flexible, coin or cylindrical Diameter: less than 18 mm or not less than 18 mm …..……..……..……..……..:	Cylindrical cell. Diameter: less than 18 mm	P
	d) Maximum continuous discharge current specified by the manufacturer for test H.……..:	100mA as specified by manufacturer applied.	P
	e) Rated capacity specified by the manufacturer for test H.……..:	2.7Ah	P
	f) Abnormal charging current declared by the manufacturer for test I …..……..……..:	50mA as specified by manufacturer applied.	P
	g) Normal reverse current declared by the manufacturer which applied to the battery during its operating life.……..……..:	Not applicable declared by manufacturer, reverse current is not allowed for the battery.	N/A
7	**INFORMATION FOR SAFETY**		P
7.1	**Safety precautions during design of equipment**		P
7.1.1	General		P
7.1.2	Charge protection		P
7.1.3	Parallel connection		P
7.2	**Precautions during handling of batteries**		P
7.3	**Packaging**		P

IEC 60086-4			
Clause	Requirement + Test	Result - Remark	Verdict
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		N/A
7.6	**Display and storage**		P
7.7	**Disposal**		P
8	**INSTRUCTIONS FOR USE**		P
9	**MARKING AND PACKAGING**	Not requested by client.	N/A
9.1	**General**		N/A
9.2	**Swallowable batteries**	Small batteries.	N/A
9.3	**Safety pictograms**		N/A
ANNEX A	**(INFORMATIVE) GUIDELINES FOR THE ACHIEVEMENT OF SAFETY OF LITHIUM BATTERIES**		N/A
ANNEX B	**(INFORMATIVE) GUIDELINES FOR DESIGNERS OF EQUIPMENT USING LITHIUM BATTERIES**		N/A
ANNEX C	**(INFORMATIVE) ADDITIONAL INFORMATION ON DISPLAY AND STORAGE**		N/A
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**	Cylindrical cell.	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**		N/A
F.1	**General**		N/A
F.2	**Safety sign**		N/A
F.3	**Best practices for marking the packaging**		N/A

IEC 60086-4			
Clause	Requirement + Test	Result - Remark	Verdict
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	Shenzhen Wecodo Technology Co., Ltd.	ER14505	3.6V, 2.7Ah	IEC 60086-4: 2019	Tested with appliance
-Positive electrode	Jiaozuo City Hexing Chemical Industry Co., Ltd.	50% compress	Apparent specific volume: 14-17ml/g, Lodine value: ≥90g/kg	--	--
-Negative electrode	Kunming Tianmou Technology Co., Ltd.	Li-3	Density: 0.534 g/cm³, Lithium content more than 99.9%	--	--
-Separator	USA Hollingsworth & Vose	02*600	Thickness: 0.20±0.02mm, Areal density: 39-45g/m^2	--	--
-Electrolyte	German Lanxess (China) Co., Ltd.	SOCL2	Density: 1.64 g/cm³, Boiling point: 78.8°C	--	--
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)				
Tests	**Cell / battery type**	**Discharge state**	**Number of test sample**	**Test result**	**Verdict**
A to E	Cells and single cell batteries	Undischarged	10	NM, NL, NV, NC, NR, NE, NF (for test A to D); NT, NR, NE, NF (for test E)	P
		Fully discharged	10	NM, NL, NV, NC, NR, NE, NF (for test A to D); NT, NR, NE, NF (for test E)	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	NT, NE, NF	P
		Fully discharged	5	NT, 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	NV, NE, NF (for test J); NE, NF (for test I & K)	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

Supplementary information:

NC: No short-circuit

NE: No explosion

NF: No fire

NL: No leakage

NM: No mass loss

NR: No rupture

NT: No excessive temperature rise

NV: No venting

TEST REPORT

Photos

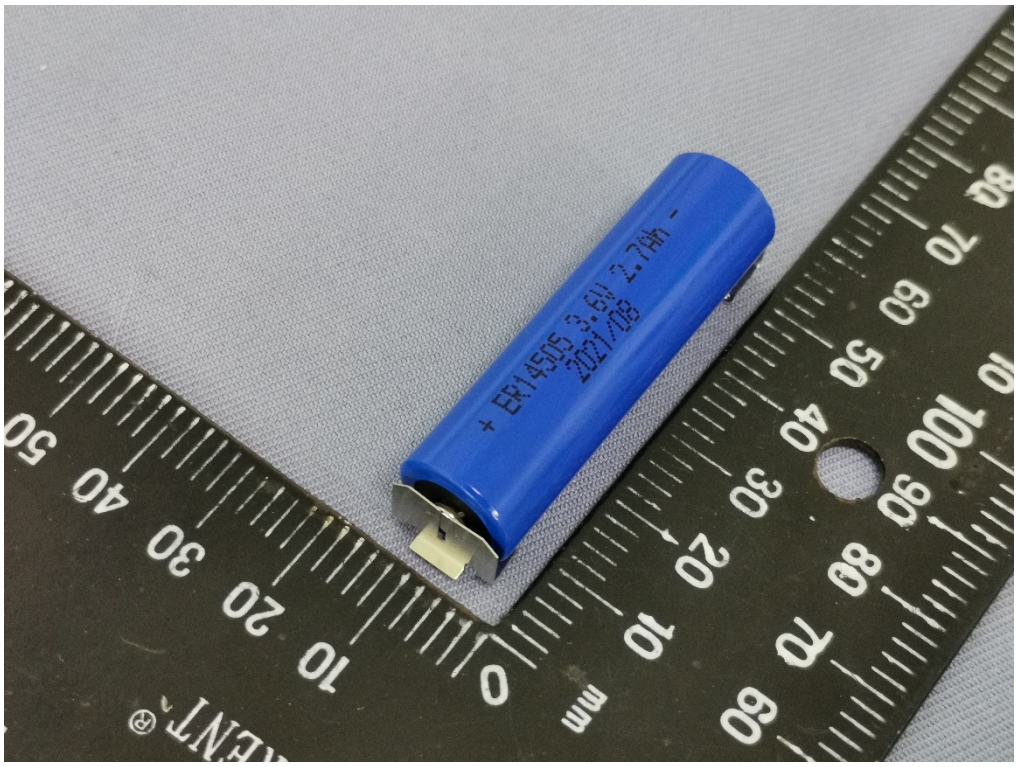


Fig.1 General view I of cell

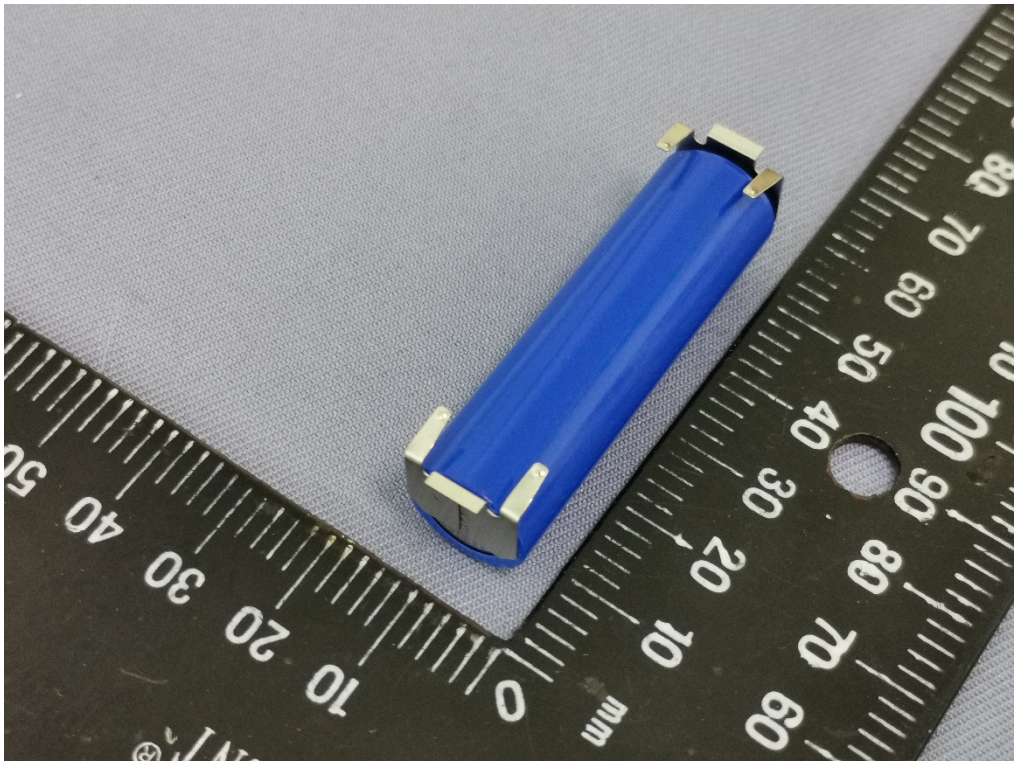


Fig.2 General view II of cell