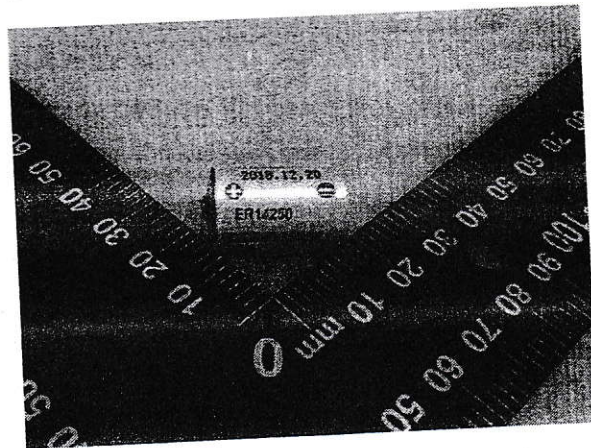
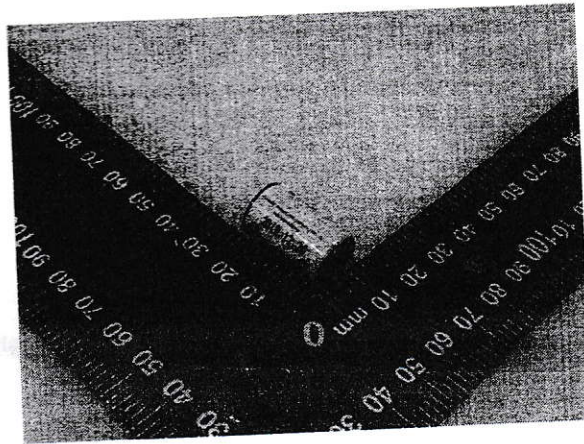
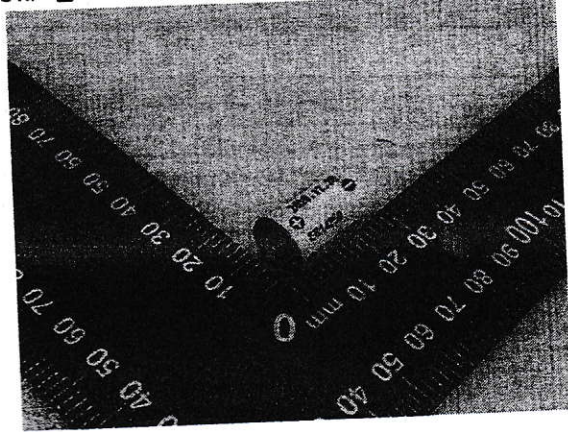


Photos of Samples and Labels/样品照片及标识

Cell/电芯 (ER14250 3,6V 1200mAh)



File NO. : S/VG.01.022—2014

Version No. : B



Wuhan Voltec Energy Sources Co., Ltd.

Lithium Thionyl Chloride Battery

Specification

Model No. : ER14250CT/1.001

Effective date: 2017.11.24

Editor:

Date:

Checker:

Date:

Approver:

Date:

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1 Content

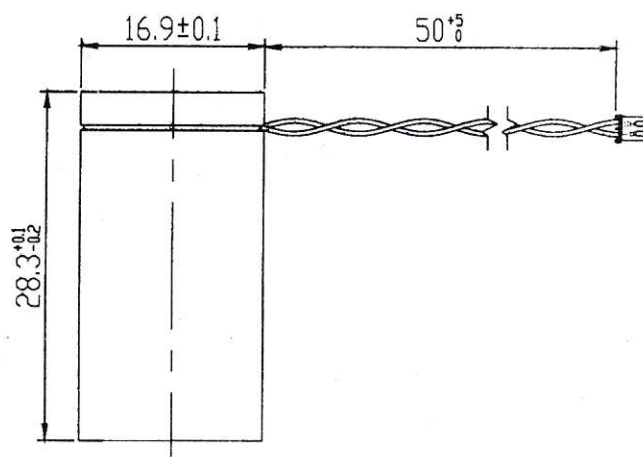
This product specification is applicable for the ER14250CT/1.001 battery produced by Wuhan Voltec Energy Sources Co., Ltd., specifying the product performance index, test methods and safety cautions

2 Common Performance of the products

- 2.1 Rated Voltage: 3.60V
- 2.2 Rated Capacity: 1.2Ah (At 23°C ± 2°C, discharge at 0.5mA until the voltage drop at 2.0V)
- 2.3 Work Temperature: -55°C to +85°C
- 2.4 Weight: About 12g
- 2.5 Max. Continuous discharge current: 25mA
- 2.6 Max. pulse current: 50mA
- 2.7 Model No. of the plug: Molex5264-2p, Black1, Red2.
- 2.8 Wire specification: UL1571 26AWG (0.16*7)

3 Outside drawing & The material of the battery shell

3.1 Outside drawing



3.2 The material of the battery shell

- 3.2.1 Material: Poly-carbon alloy PC/ABS
- 3.2.2 Manufacturer: Wuhan Poly-plastic New Material Co., Ltd. (网站:www.hjuchem.com)
- 3.2.3 Color No.: CA24H, nature color
- 3.2.4 Density: 1.10g/cm³ (Test according to ASTM D 792)
- 3.2.5 Shrinkage: 0.3~0.6% (Test according to ASTM D 955)
- 3.2.6 Tensile strength: 58.3Mpa (Test according to ASTM D 638)
- 3.2.7 Bend strength: 86.9Mpa (Test according to ASTM D 790)
- 3.2.8 Bend modulus: 2460Mpa (Test according to ASTM D 790)
- 3.2.9 Shock strength: 630J/M (Test according to ASTM D 256)

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4 Outside Appearance

In visual test for the battery they should be clean and clear, no wound, no distort and no leakage.

5 The battery performance and test methods

5.1 Electrical performance

Table 1

Test Item	Test methods	Test standard			
Open Voltage	Measure with the three-and a half digital voltage meter	3.65~3.70V (23°C±2°C)	The voltage value measured in the test are typical		
		3.65~3.74V (-40°C±2°C)			
		3.63~3.70V (85°C±2°C)			
Load Voltage	Measure with the three-and a half digital voltage meter loaded with 330 Ω resistance, and the test time should be less than or equal to 10s	≥3.30V (23°C±2°C)			
		Work Voltage		Discharge with 3.6k Ω resistance For 60 min., then get the voltage value	≥3.40V (23°C±2°C)
					≥3.0V (-40°C±2°C)
≥3.40V (85°C±2°C)					
Normal Voltage	Discharge continuously with 7.2k Ω resistance at 23°C±2°C until the load voltage to be 2.0V	≥1.2Ah			
Common Voltage	Discharge continuously with 820 Ω resistance at 23°C±2°C until the load voltage to be 2.0V	≥170h			

5.2 adapting environment

Table 2

Test Item	Test methods	Judging standard
Temp. Test	a) Put the batteries in the test chamber, then condition the temperature in the chamber at -40°C±3°C, and keep on at least for 4h. b) Remove the batteries to the test chamber which has the temperature of 70°C±3°C within 5min.; c) Keep the batteries at least for 4h at 70°C±3°C d) Remove again the batteries to the test chamber which has the temperature of -40°C±3°C within 5min. e) Keep the batteries at least for 4h at -40°C±3°C f) Repeat the above from the second step to the fifth step for three times g) Remove the batteries to the test chamber which has the temperature of 70°C±3°C within 5min; h) Keep the batteries at least for 4h at 70°C±3°C i) Lay the battery at least for 4h under the condition of item 6.2	The open voltage should conform to table 1, and there is no explosion, fire or leakage

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续表 2

Test item	Test method	Requirement
Vibration Test	A battery is to be subjected to simple harmonic motion with an amplitude of 0.8mm(1.6mm total maximum excursion).The frequency is to be varied at the rate of 1 Hz/min between 10 and 55Hz,and return in 95min±5min.The battery is to be tested in axial and radial direction.Remove the battery after the end of each vibration, and measure the open circuit voltage of the battery within three minutes.	OCV should accord with table1.The samples shall not explode or catch fire or vent or leak.
Drop test	The test batteries shall be dropped from a height of 76cm onto a concrete surface. Each teat battery shall be dropped six times.	OCV should accord with table1.The samples shall not explode or catch fire or vent or leak.
Low Pressure Test	Sample batteries are to be stored for 6 hours at an absolute pressure of 11.6kPa and temperature of 25±2℃.	OCV should accord with fig.1.The samples shall not explode or catch fire or vent or leak.
Shock Test	A battery is to be secured to the testing machine,the battery should be conducted once each impact test amplitude in both the axial and radial directions. For each shock the battery is to be accelerated in such a manner that during the initial 3 milliseconds the minimum average acceleration is 735 m/s ² .The peak acceleration shall be between 1225 m/s ² ~1715 m/s ² . Measure the open circuit voltage after the test.	OCV should accord with fig.1.The samples shall not explode or catch fire or vent or leak.

5.3 Safety Table 3

Test item	Test method	Requirement
Short-Circuit Test	Each test sample battery, in turn, is to be short-circuit by connecting the positive and negative terminals of the battery with a circuit load having a maximum resistance load of 0.1ohm.The battery is to discharge until a fire or explosion is obtained, or the battery case temperature has returned to ambient temperature.	Vent is allowed, but explodes and catch fire are prohibited.
Charging Test	Sample batteries are to be charged by a DC power in series with a suitable resistor, the charge current is controlled to 0.01A,the charging time should not less than 12 hours.	Vent is allowed, but explodes and catch fire are prohibited.
Heating Test	A battery is to be heated in a circulating air oven, the temperature of the oven is to be raised at a rate of 5℃/min to a temperature of 130℃ and remain for 10 minutes. The sample shall return to room temperature and then be examined.	The samples shall not explode or catch fire or vent or leak.
Forced-Discharge Test	A completely discharged cell is to be force-discharged by connecting it in series with three fully charged batteries of the same kind. The positive and negative terminals of the sample are to be connected with a copper wire with a maximum resistance load of 0.1ohm. The sample is to discharge until a fire or explosion or leak is obtained, or the sample case temperature has returned to ambient temperature.	Vent is allowed, but explode and catch fire are prohibited.

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5.4 Storage performance

Table 4

Test item	Test method	Requirement	
Open-circuit voltage	Measure by volt-meter with precision of 0.01V	3.66~3.70V(23°C±2°C)	Test data are typical values.
		3.65~3.74V (-40°C±2°C)	
		3.63~3.70V(85°C±2°C)	
Operating voltage	Measure by volt-meter with precision of 0.01V, connecting an impedance of 620Ω in series, Reaching the target voltage in 10 seconds.	≥3.0V (23°C±2°C)	
		Measure by volt-meter with precision of 0.01V, connecting an impedance of 1000Ω in series, Reaching the target voltage in 10 seconds.	
Capacity loss per year	7.2kΩ, 23±2°C, Constant discharge to 2.0V.	≤2%	
Failure rate per year	Visual check appearance, then measure OCV by volt-meter with precision of 0.01V	≤0.5‰	

6. Test condition

6.1 The initial test

Unless otherwise request, all test should be made within 45 days after receipt of the batteries.

6.2 Temperature & Humidity

If there is no special request, all tests shall be made at the environment of 20°C±5°C and relative humidity 45%~75%.

6.3 Test equipment

6.3.1 Dimension measuring instrument: Caliper which measurement error is less than ± 0.02mm or has the same accuracy measuring

6.3.2 Voltmeter: accuracy is less than 0.25% and its resistant should be not less than 10MΩ.

6.3.3 Precision resistor: the relative error should be less than 0.5%.

6.3.4 Resistance: the relative error should be less than 0.5%.

6.3.5 Electric oven: the absolute error should be less than ± 2 °C.

7 OQC

OQC is divided into A, B, C, D four groups of testing, when requested, we will arrange the test report delivered together with products.

7.1 Batch

One batch of the products should be produced under the same condition (production cycle, raw material and manufacturing technology) with the same structure, size and pin out.

7.2 Test A

Based on the request of the contract or one batch rule, test A should be done according to the table 5. Then the test B, C will be done only if the batteries passes test A. If the quality of any battery is not up to the standard of table 4, this batch of batteries should not be delivered. If the amount of NG batteries is more than 4% of the whole, this batch of batteries should be rejected.

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Table 5 Test B

No.	Test item	Test method&Requirement
1	Appearance	Section 4&5.1
2	Open-circuit voltage	
3	Operating voltage	

7.3 Test B

Test B should be done according to the table 5, sampling plan and requirement see table 6.

Table 6 Test B

No.	Test item	Test method&Requirement	Sampling plan	
			Test level	AQL
1	Appearance	Section 2&3	S-3	0.65
2	Weight			

7.4 Test C

Test the samples of the batch, number of the samples see table 7. And requirement see table 1.

Table 7 Test 7

Number of batch	Number of samples	Charge method
1~100	6	Table 1 Nominal discharge
100~2000	10	
2000~10000	12	
Above 10000	14	

7.4.1 Test C

7.4.1.1 If the average capacity is more than the standard figure in table 1, and there is no sample's capacity is lower than 90% of standard figure, the batteries pass.

7.4.1.2 If the average capacity is lower than the standard figure, or at least one discharge capacity is lower than 90% standard figure, we need to sample new batteries to test again. If the new average capacity is more than the standard figure, and there is no sample's capacity is lower than 90% of standard figure, the batteries pass.

7.4.1.3 In the second test, if the average capacity is still lower than the standard figure, or at least one discharge capacity is lower than 90% standard figure, the batteries cannot pass.

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7.5 Test D

The samples in Test D is sampled from the qualified product in Test C. stored under the condition requested in section 12, and check the appearance, load voltage and open-circuit voltage every 12 months. Also discharge 9 batteries on 7.2kΩ. The result should be up to the standard in section 4 and 5.4.

8 Packing

The specifications of the packing and weight see table 8.

Table 8

Carton dimension	NW.	GW.	Number of batteries
463×287×330mm	13.5kg	15.5kg	1120pcs/carton

9 Plate and marking

The plate and marking should be clear, solid and no obvious color difference.

9.1 Plate

The plate should including type, rated voltage, date code etc.

9.2 Date code

Date code is represented by 8 digits. The first two digits indicated the year, the middle two indicated the month, and the last two indicated the date.

e.g. "20140220" indicated produced on 20th Feb, 2014.

10 Transportation

—During transportation, the batteries should avoid sun, fire, rain, flooding and corrosive substances

—During transportation and handing should avoid impact and vibration.

—Paper packing stacking height should not exceed 1.5 meters,

—When long-distance transport, such as shipping, the batteries should be placed away from the engine. The batteries should not be stored in airless environment in summer.

11 Caution

Because it may leak even vent if improper operated during transport, storage or using, before using please read the specification carefully and keep for reference.

—Do not force charge or crimp or burn batteries.

—Do not short-circuit or charge batteries.

—Do not dismantle batteries.

—Do not use or heating batteries outside of the allowed temperature.

—Do not weld or sold directly to batteries.

—Do not mix batteries and batteries of different types or brands.

—Do not mix old and new batteries.

—Exhausted batteries should be immediately remove from equipment.

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—Remove batteries from equipment if it is not to be used for an extended period of time and keep in low temperature and humidity environment.
 —If series-parallel connection required, please contact us.
 —Used batteries should be in accordance with local environmental regulations, buried deep underground or into deep water.
 —During the period of use or store in case of fever, smell of a battery, discoloration, deformation or other abnormal, please stop using.

12 Storage

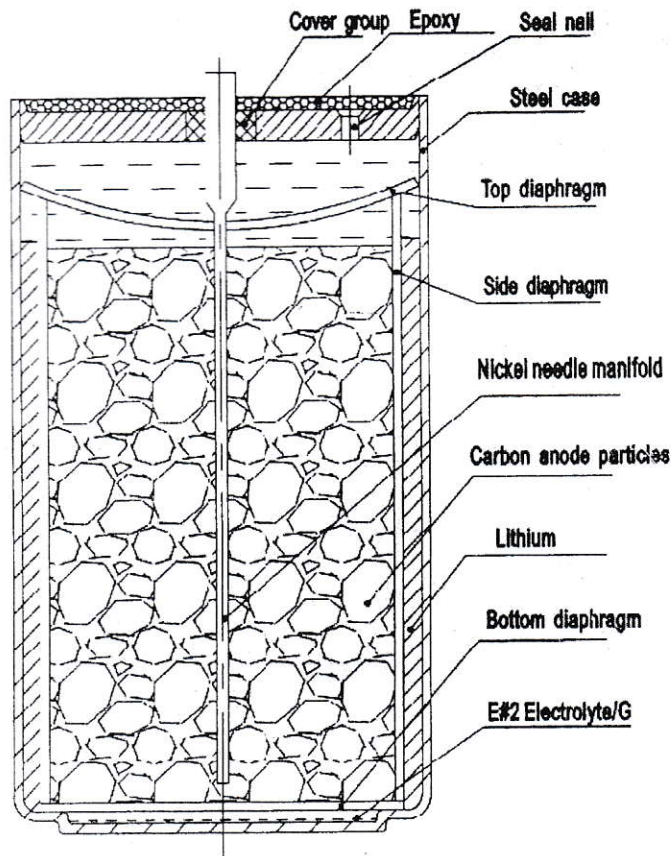
—The batteries should be used and storage in places far from electrostatic.—The battles should be stored under the condition of temperature (lower than 30 °C), relative humidity (45%~75%).
 —Store batteries in well ventilated, dry and cool conditions.—Stack height depends on the strength of packaging, general provisions, paper packing stacking height should not exceed 1.5 meters, wooden cases not more than three meters.—Store or display batteries in their original packaging.

13 Declaration

Any questions, please contact Wuhan Voltec Energy Sources Co.LTD.Wuhan Voltec Energy Sources Co.LTD reverses the right to change the specification.

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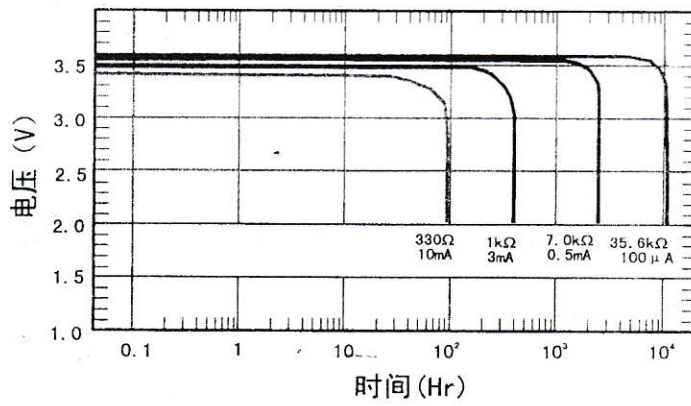
附图 1 锂-亚硫酰氯电池（能量型）结构图



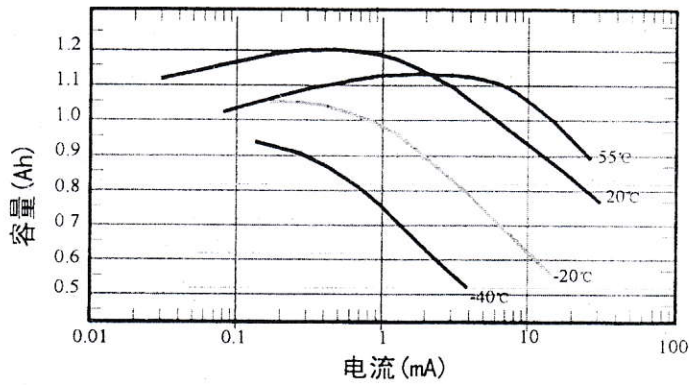
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Diagram 2 The typical curve diagram showing the battery performance

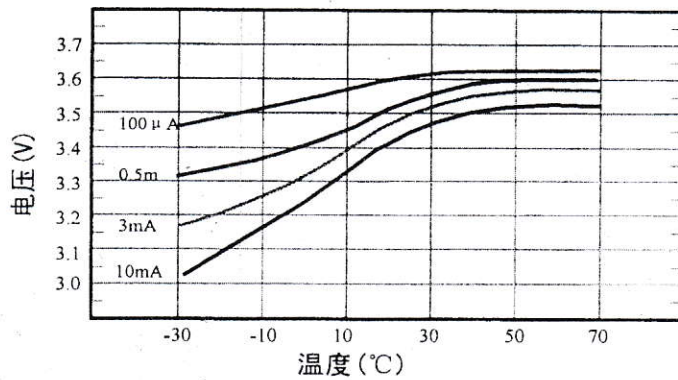
Discharge curve with different loads under room tem.



Different discharge current & Capacity level



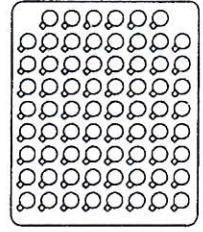
Different Temperature & Voltage level



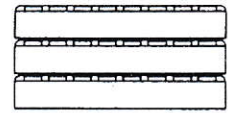
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Figure 3 Packaging

1. 70 pcs/plate



2. 16 plates/carton



3. 1120 pcs/carton, NW.13.5kg, GW. 15.5kg

