TECHNICAL SPECIFICATION

Lithium Thionyl Chloride Battery

Model：ER14505S

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Version Record

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0	Liu Shaoping	2024.07.01	A0	all	Release

1.Scope

The document applies to ER14505S (Li/$SOCl_2$) battery pack supplied by FANSO TECHNOLOGY CO.,LTD. Specify quality, test method, performance, quality assurance and matters need attention etc..

2. Battery type

Lithium Thionyl Chloride

3. Battery system characteristics

Table 1 General characteristics

No.	Item	Characteristic	Remarks
1	Nominal Voltage	3.6V	
2	Nominal Capacity	1600mAh	at 20mA +150℃ 2.0V cut-off
3	Max. constant current	50mA	at +150℃
4	Max. pulse discharge current	100mA	100mA/0.1s pulses, drained every 2 minutes at 150℃ from 20mA mid-discharged cells with 20μA base current, yield voltage readings above 2.7V. The readings may vary according to the pulse characteristics, thetemperature, and the cell’s previous history
5	Operate temperature	-20~150℃	
6	Dimension	Φ14.65mm*H50.5mm	The battery combination with accessories is shown in the relevant product diagram .
7	Weight	About 20g	The weight of different battery accessories is different

Table 2 Typical electrical performances

No.	Item	Characteristic	Remarks
1	Open Circuit Voltage	⩾3.64V	23±3℃,by three and half digital meter
2	Load voltage	⩾3.20V	23±3℃,680Ω,discharge 10s,by three and half digital meter
3	Capacity	1600mAh	+150℃,20mA,2.0V cut off, cathode up-right

4. Appearance and structure

4.1 Appearance

ER14505S Cell appearance, no scratch, swelling, deformation, corrosion, electrolyte leakage and other defects.

4.2 Structure

ER14505S is “bobbin design” cell, whose cathode is cylindrical in shape.

Hermetic is ensured by a glass-to-metal sealing technology.(under a standard helium pressure, leakage rate ⩽10^{-8}Pa·m^3/sec).

5.2 Product mark

5.2.1 Battery’s label specification

① type ② nominal voltage ③ positive and negative electrode mark

④ date code ⑤ safety warning

5.2.2 Date code:

Date code will be marked on the sleeve of battery.

Method：MM YY “MM” stand for：month; “YY” stand for：year

5. Incoming inspection

As for the customer's incoming inspection, FANSO recommended sampling according to GB2828.1-2012 standard.

Table 3 Acceptability quality level

No	Item	Check level	AQL
1	Dimension	S-2	0.65
2	Appearance	II	1.0
3	Open circuit voltage	II	0.4
4	Load voltage	II	0.4

Table 4 Sampling amount

Lot size	Sampling amount
≤3200	32
3200~10000	50
＞10000	80

Note:Unless other specified, the above items should be tested within 45 days since receipt of the battery.

6. Capacity judgment

6.1 If the average capacity is not less than the standard value specified in Table 2, and no battery below 90% of the value, the battery capacity is qualified.

6.2 If the average capacity is lower than the standard value specified in Table 2, and some battery below 90% of the value, do re-sample test, If the average capacity is not less than the standard value specified in Table 2, and no battery below 90% of the value, the battery capacity is qualified.

6.3 if the average capacity is lower than the standard value specified in Table 2 and some battery below 90% of the value during the second test, the battery capacity is unqualified.

7. Safety and environmental performance

7.1 Environmental performance

7.1.1 Altitude Simulation

A test battery shall be stored for 6h at an absolute pressure of 11.6KPa(1.68psi) and a temperature of 20±3℃（68±5°F）

Pass/Fail criteria: there shall be no leakage,no venting, no short-circuit, no rupture, no explosion and no fire during this test.

7.1.2 Thermal Cycling

A test battery shall be stored for at least 6h at test temperature of 72℃, followed by storage for at least 6h at temperature of -40℃. The maximum time for transfer to each temperature shall be 30 min. Each test and battery shall undergo this procedure 10 times. This is then followed by storage of at least 24h at ambient temperature.

Pass/Fail criteria: there shall be no leakage,no venting, no short-circuit, no rupture, no explosion and no fire during this test.

7.1.3 Free fall

A test batteries shall be dropped from 1.0m height onto a concrete surface. Each test battery shall be dropped six times, a prismatic battery once form each of its six faces.

Pass/Fail criteria: there shall be no venting, no explosion and no fire during this test and within the 1h of observation.

7.1.4 Vibration test

Test batteries shall be firmly secured to the platform of vibration machine without distorting them and in such a manner as to faithfully transmit the vibration. Battery vibration frequency is to be varied at the rate of 1 hertz per minute between 10 and 55 hertz, and return in not less than 90 or more than 100 minutes. The battery is to be tested in three mutually perpendicular directions

Pass/Fail criteria: there shall be no leakage,no venting, no short-circuit, no rupture, no explosion and no fire during this test.

Warning:

The description of the following abuse tests is for demonstration purposes only. During handling and application of lithium batteries, abusive conditions must be avoided. Any application or test requiring performance beyond the limits given hereby must be approved by Fanso.

7.2 Safety test

7.2.1Thermal abuse

A test battery shall be placed in an oven and the temperature raised at a rate of 5℃/min to a temperature of 130℃ at which the battery shall remain for 10 min.

Pass/Fail criteria: there shall be no explosion and no fire during this test.

7.2.2 Impact

A test battery is placed on a smooth flat surface. A 5/8 in. (15.8 mm) diameter steel bar was placed across the center of the sample. The length of the bar should be at least as long as the width of the

sample. A 20 pound(9.1±0.1 kg) weight is dropped from a height of 24 ± 1 in. (610 ± 25 mm) on to the sample.

Pass/Fail criteria: there shall be no excessive temperature rise,no explosion and no fire during this test and within the 6h of observation.

7.2.3 Crush test

A test battery is crushed between two flat hard surfaces (i.e. steel). The crushing was continued until a force of 3000 pounds (13kN±0.78kN) was applied by hydraulic piston with a diameter of 32mm. press continue until pressure reach up to 17.2Mpa. Once the maximum pressure was obtained, it was released.

Pass/Fail criteria: there shall be no excessive temperature rise,no explosion and no fire during this test and within the 6h of observation.

7.2.4 Forced discharge

Each battery shall be force discharged at ambient temperature by connecting it in series with at 12V DC power supply at an initial current equal to the maximum continuous discharge current specified by the manufacture. The specified discharge current is obtained by connecting a resistive load of appropriate size and rating in series with the test cell and the direct current power supply.Each battery shall be forced discharged for a time interval equal to its rated capacity divided by the initial test current.

Pass/Fail criteria: there shall be no explosion and no fire during this test and within the 7 days after the test.

7.2.5 External Short-circuit

The test battery shall be stabilized at an external case temperature of 55℃ and then subjected to a

short-circuit condition with a total external resistance of less than 0.1Ω at 55℃. This short-circuit condition is continued for at least 1h after the battery external case temperature has returned to 55℃.The test sample shall be observed for a further 6h.

Pass/Fail criteria: there shall be no excessive temperature rise,no rupture,no explosion and no fire during this test and within the 6h of observation.

7.2.6 Abnormal recharging

The test battery shall be subjected to a charging current of three times the current Ic, specified by the manufacturer by connecting it in opposition to a dc-power supply. The specified charging current is to be obtained by connecting a resistor of the specified size and rating in series with the battery.

The test time is calculated from the formula:

$$Tc=2.5*C/(3*Ic)$$

In which:

Tc——charge time, hour, Tc≥7Hour;

C——Nominal capacity, Ah;

Ic——Max. charging current, mA. ER14505S maximum charge current is 0.005A.

Pass/Fail criteria: The samples shall be no explosion or catch fire.

8. Safety terms

8.1 Before use, do not remove the battery from the original packaging.

8.2 Do not scattered placed the battery together in order to avoid accidental short circuit.

8.3 Do not heat the battery above 155 ℃ or incinerated.

8.4 Do not recharge the battery.

8.5 Do not mixed with different brand, model or type batteries.

8.6 Do not mix the new and used batteries.

8.7 Do not disassembly or open battery.

8.8 Do not short circuit the battery or reversely contact the positive and negative terminals.

8.9 Do not solder on the battery surface.

8.10 Do not test environment and safety under extrusion without any protection.

8.11 Do not use or store batteries under wet conditions without protection.

8.12 Batteries are not allowed to be used excessively in the equipment without setting the cut-off voltage. After reaching the cut-off voltage, it should be removed from the equipment immediately to stop working.

8.13 Stop using if the battery is found to have heat, odor, discoloration, deformation, or other abnormalities during using or storage.

8.14 Batteries used should be handled in accordance with local environmental regulations and buried deep underground or into brine.

8.15 If the liquid is splashed on the skin, eyes and clothes, rinse immediately with plenty of water, and then seek medical care immediately.

9. Storage

9.1 Batteries should be used and stored away from static electricity

9.2 Batteries shall be stored not exceeding 30 DEG C and relative humidity of 45% - 75%.

9.3 Keep the battery away from the heat source, away from corrosive gas, avoid direct sunlight, and make sure the storage area is clean, cool, dry and ventilated.

9.4 The battery packing carton height shall not exceed 1.5 meters, and the wooden box shall not exceed 3 meters.

9.5 Batteries should keep the original storage state when not using, after removing the packaging, the battery should not be piled up irregularly.

10. Transportation

10.1 Battery meets the tests and criteria requirements of UN Manual, Part III, subsection 38.3.

10.2 Batteries should be protected against sunlight, fire, rain, immersion, and corrosive substances in transportation.

10.3 Handling and loading should be with care.

10.4 For long transportation, such as shipping, should be kept away from the engine. And in summer should not be prolonged in an airless environment.

11. Effective

11.1 The batteries are warranted to conform to the description contained in this specification for a period of twelve [12] months from the ex-factory date without use (after 6 months storage, FANSO recommend to active the battery, more details please consult FANSO), any claim by customer (apparatus manufacturer or distributor) must be pointed out within such period. During that warranty period, if the batteries are proved to become defective under proper stored and handled, FANSO will replace the batteries for free.

11.2 In practical applications, customer should be responsible for the compatibility and reliability of the battery and the device.

11.3 In any of the following circumstances, FANSO will not take any responsibility: the client’ s fails of appropriate treatment, operation, installation, testing, maintenance and inspection of the battery, or do not follow the instructions provided in the specification, notes, terms, and other FANSO instructions.

11.4 This specification is accepted after 6 months from the date of issues if not be refunded.

12. Statement

If you have any questions on the product specifications, please contact with Wuhan Fanso Technology Co. ltd. Fanso reserves the right to amend the product specification.

13. Battery dimension