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锂离子电池规格书

Specification

For

Lithium Ion Rechargeable Battery

电池型号: ICR14430

Battery Type: ICR14430

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1. 范围 AND APPLICATION

本标准规定了锂离子电池的定义、技术要求、测试方法及注意事项。本标准适用于深圳市佳登莱科技有限公司生产的 ICR14430 锂离子电池。

This specification describes the definition, technical requirement, testing method, warning and caution of the lithium ion rechargeable battery. The specification only applies to battery ICR-14430 supplied by Shenzhen Goldenli Technology

Co.ltd.

2.定义 DEFINITION

- 2.1 额定容量: 指在 $20\pm 5^{\circ}\text{C}$, $65\pm 5\%\text{RH}$ 环境下, 以 5 小时率放电至终止电压时的容量, 以 C_5 表示, 单位毫安时 (mAh)。对于 ICR14430, $C_5=650\text{mAh}$
- Rated Capacity: Under $20\pm 5^{\circ}\text{C}$, $65\pm 5\%\text{RH}$, its means the capacity value of charging to End Voltage. The capacity value can be expressed with code C_5 . Its unit is mAh. For battery ICR14430, $C_5=650\text{mAh}$,
- 2.2 终止电压: 放电终止时的规定电压, 为 2.75V。
- End Voltage: The end voltage of discharge is 2.75V, which is defined specially.
- 2.3 标准充电: 指在 $20\pm 5^{\circ}\text{C}$, $65\pm 5\%\text{RH}$ 环境下, 以 $0.2 C_5\text{mA}$ 电流恒流充电至单体电池电压 4.2V 后, 转为恒压 4.2V 充电, 至充电电流小于 $0.01 C_5\text{mA}$, 停止充电。
- Standard Charge: Under $20\pm 5^{\circ}\text{C}$, $65\pm 5\%\text{RH}$, it can be charged to 4.2V with constant current of $0.2 C_5\text{mA}$, and then, charged continuously with constant voltage of 4.2V until the charged current is less than $0.01 C_5\text{mA}$.
- 2.4 快速充电: 指在 $20\pm 5^{\circ}\text{C}$, $65\pm 5\%\text{RH}$ 环境下, 以 $1 C_5\text{mA}$ 电流恒流充电至单体电池电压 4.2V 后, 转为恒压 4.2V 充电, 至充电电流小于 $0.01 C_5\text{mA}$, 停止充电。
- Quick Charge: Under $20\pm 5^{\circ}\text{C}$, $65\pm 5\%\text{RH}$, it can be charged to 4.2V with constant current of $1 C_5\text{mA}$, and then, charged continuously with constant voltage of 4.2V until the charged current is less than $0.01 C_5\text{mA}$.
- 2.5 标准放电: 指在 $20\pm 5^{\circ}\text{C}$, $65\pm 5\%\text{RH}$ 环境下, 以 $0.2 C_5\text{mA}$ 电流恒流放电至单体电池电压 2.75V。
- Standard Discharge: Under $20\pm 5^{\circ}\text{C}$, $65\pm 5\%\text{RH}$, it can be discharged to the voltage of 2.75V with constant current $0.2 C_5\text{mA}$.
- 2.6 快速放电: 指在 $20\pm 5^{\circ}\text{C}$, $65\pm 5\%\text{RH}$ 环境下, 以 $1 C_5\text{mA}$ 电流恒流放电至单体电池电压 2.75V。
- Quick Discharge: Under $20\pm 5^{\circ}\text{C}$, $65\pm 5\%\text{RH}$, it can be discharged to the voltage of 2.75V with constant current $1 C_5\text{mA}$.

3.产品命名 NAMING INSTRUCTION

3.1 产品的命名(见图 1)

Naming instruction of product is shown as Fig. 1

ICR 14.5 43.0
电池尺寸: 直径、 高度、
Physical Dimension: Diameter Height

图 1 命名说明

Fig. 1 Naming Instruction for Product

3.2 外形尺寸

Shape and Physical Dimension

参见付图

In accordance to the attached drawing.

4.结构 STRUCTURE

电池由正极、负极、隔膜、电解液及外壳组成。

The battery consists of the positive electrode plate, negative electrode plate, separator, electrolyte and case.

5.技术要求 TECHNICAL REQUIREMENT

5.1 使用环境 Usage Conditions

充电温度 Charging Temperature: $0\sim 45^{\circ}\text{C}$

放电温度 Discharging Temperature: -20~65℃

相对湿度 Related Humidity: <93%

大气压力 Atmospheric Pressure: 86~106Kpa

5.2 外观：无破裂、划痕、变形、污迹、电解液泄露。

Appearance: without break, scratch, distortion, contamination and leakage.

5.3 额定容量 Rated Capacity: 650mA

5.4 内阻 Internal resistance: 小于 80mΩ

5.5 开路电压 Open Voltage: 3.6V

5.6 重量 Weight: About 16.8g

5.7 放电性能 Discharging Characteristic

标准放电时间不少于 5 小时

Time of Standard Discharge should be more than 5hrs.

快速放电时间不少于 0.9 小时

Time of Quick Discharge should be more than 0.9hrs.

5.8 荷电保持能力 放电时间不少于 4.25 小时

Charge Retention: more than 4.25hrs. discharge

5.9 循环寿命 大于 300 次

Cycle Life: more than 300 cycles

5.10 环境性能 Environmental Characteristic

5.10.1 高温性能：测试后放电时间符合 5.7，并且外观符合 5.2 的要求。

Hi-temperature testing: discharging time can meet item 5.7 and Visual inspection can meet item 5.2 after testing.

5.10.2 低温性能：测试后放电时间符合 5.7，并且外观符合 5.2 的要求。

Low-temperature testing: discharging time can meet item 5.7 and Visual inspection can meet item 5.2 after testing.

5.10.3 恒定湿热性能：测试后放电时间符合 5.7，并且外观符合 5.2 的要求。

Constant temperature and humidity testing: discharging time can meet item 5.7 and Visual inspection can meet item 5.2 after testing.

5.10.4 振动：测试后放电时间符合 5.7，并且外观符合 5.2 的要求。

Vibration: discharging time can meet item 5.7 and Visual inspection can meet item 5.2 after testing.

5.10.5 碰撞实验：测试后放电时间符合 5.7，并且外观符合 5.2 的要求。

Impacting testing: discharging time can meet item 5.7 and Visual inspection can meet item 5.2 after testing.

5.10.6 自由跌落：测试后放电时间符合 5.7，并且外观符合 5.2 的要求。

Free fall: discharging time can meet item 5.7 and Visual inspection can meet item 5.2 after testing.

5.11 安全性能 Safe Characteristic

5.11.1 过充测试：无破裂、无泄露现象，测试后快速放电时间符合 5.7。

Over charge testing: without break, leakage and the time of quick discharge meet item 5.7 after testing.

5.11.2 过放测试：无破裂、无泄露现象，测试后快速放电时间符合 5.7。

Over discharge testing: without break, leakage and the time of quick discharge meet item 5.7 after testing.

6. 试验方法 TESTING METHODS

6.1 试验环境 Testing conditions

温度 Temperature: 15-35℃

相对湿度 Relative Humidity: 45-75%

大气压力 Atmospheric pressure: 86-106Kpa

6.2 测量仪表要求 Requirement of the Testing Equipment

电压仪表要求：测量电压的仪表准确度应不低于 0.5 级，内阻不小于 $10K \Omega/V$ 。

Voltage tester: the precision of voltage tester is no less than grade 0.5 , the internal resistance is no less than $10K \Omega/V$.

电流仪表要求：测量电流的仪表的准确度应不低于 0.5 级。

Current tester: the precision is no less than grade 0.5.

时间仪表要求：测量时间的仪表的准确度不低于 0.1%。

Stopwatch: the precision is no more than 0.1%.

6.3 外观结构检查 Visual inspection

用目测法检查被测电池的微观、结构及标志，应符合 5.2 的规定。

Eyeballing will be used to inspect the appearance, construction and marking of the battery. And also its result can meet Item 5.2.

6.4 额定容量试验 Standard Capacity testing

在平均环境温度 $20 \pm 5^\circ\text{C}$ 条件下，按标准充电的要求进行充电，充电结束后放置 1~12 小时，再按标准

放电的要求进行放电，放电时间应符合 5.7 的要求。

after keeping the battery for 1~12hrs., The battery will be discharged until the voltage reaches end voltage according to the requirement of standard discharge.

6.5 荷电保持能力试验 Charge Retention Testing

经 6.4 试验合格后，在平均环境温度为 $20 \pm 5^\circ\text{C}$ 条件下，按标准充电的要求进行充电，充电结束后放置 28 天，再按标准放电的要求放电到终止电压。放电时间应符合 5.7 的要求。

At average temperature $20 \pm 5^\circ\text{C}$, the battery will be charged according to the requirement of standard charge after passing item 6.4, and to keep the battery open-circuit 28 days , then the battery will be discharged according to the requirement of standard discharge . The discharging time can meet the requirement of item 5.7.

6.6 循环寿命试验 Cycle life testing

试验前，按标准放电的要求对电池进行放电。在平均环境温度为 $20 \pm 5^\circ\text{C}$ 条件下，按快速充电要求充电 2.5 小时后，以 $0.5C_3\text{mA}$ 的电流进行放电，至电池端电压达到终止电压，完成一次循环。重复以上循环，当连续三次循环的放电时间小于 96 分钟，寿命终止。

The battery will be discharged according to the requirement of standard discharge before cycle life testing. At average temperature $20 \pm 5^\circ\text{C}$, the battery will be charged for 2.5hrs. according to the requirement of quick charge, then it will be discharged with current $0.5C_3\text{mA}$ until the voltage reaches the end voltage. So continuous three cycle will be finished. To do the cycle continuously, once the discharge time of any cycles is less than 96min., the cycle life testing will be stopped.

6.7 环境性能 Environmental Characteristic

6.7.1 高温性能试验 Hi-temperature testing

- a) 室温 ($20 \pm 5^\circ\text{C}$)，正常大气条件下，对电池进行外观目测检查，并按标准充电的要求对电池进行充电。

At room temperature ($20 \pm 5^\circ\text{C}$) and normal atmospheric pressure , to inspect the sample battery visually ,then the battery will be charged according to standard charge.

- b) 试验前，按标准放电的要求对电池进行充电，试验温度 $65 \pm 5^\circ\text{C}$ ，持续时间 2 小时，然后按快速放电要求放电，放电时间应符合 5.7 的要求。

The battery will be charged according to the requirement of standard discharge before testing , keep the battery at $65 \pm 5^\circ\text{C}$ for 2hrs. , then the battery will be discharged according to the requirement of quick discharge, the discharging time can meet the requirement of item 5.7.

- c) 试验结束后，将电池取出，在正常大气条件， $20 \pm 5^\circ\text{C}$ 下搁置 1~2 小时，对电池进行外观目测检查，应符合 5.2 的要求。

After above testing, to keep the battery at $20 \pm 5^\circ\text{C}$ and the environment of normal atmospheric pressure for 1~2hrs. , the result of visual inspection can meet item 5.2.

6.7.2 低温性能 Low temperature testing

- a) 室温 ($20\pm 5^{\circ}\text{C}$), 正常大气条件下, 对电池进行外观目测检查, 并按标准充电的要求对电池进行充电。

At room temperature ($20\pm 5^{\circ}\text{C}$) and normal atmospheric pressure, to inspect the sample battery visually, then the battery will be charged according to standard charge.

- b) 试验温度 $-20\pm 2^{\circ}\text{C}$, 持续 2 小时, 然后按标准放电要求放电, 放电时间不少于 3.5 小时。试验结束后, 将电池取出, $20\pm 5^{\circ}\text{C}$ 下搁置 1~2 小时, 目测电池外观, 应符合 5.2 的要求。

To keep the battery at the temperature of $-20\pm 2^{\circ}\text{C}$ for 2 hrs., Then the battery will be discharged according to standard discharge, and the time of Standard Discharge should be more than 3.5hrs. After above testing, to keep the battery at $20\pm 5^{\circ}\text{C}$ and the environment of normal atmospheric pressure for 1~2hrs. The result of visual inspection can meet item 5.2

- c) 按快速放电的要求进行放电, 放电时间应符合 5.7 的要求。

According to the requirement of quick discharge, the battery will be discharged and the time can meet item 5.7

6.7.3 恒定湿热试验 Constant temperature and humidity testing

- a) 室温 ($20\pm 5^{\circ}\text{C}$), 正常大气条件下, 对电池进行外观目测检查, 并按标准充电的要求对电池进行充电。

At room temperature ($20\pm 5^{\circ}\text{C}$) and normal atmospheric pressure, to inspect the sample battery visually, then the battery will be charged according to standard charge.

- b) 试验温度 $40\pm 2^{\circ}\text{C}$, 相对湿度 90~95%, 持续 48 小时。试验结束后, 将电池取出, $20\pm 5^{\circ}\text{C}$ 下搁置 1~2 小时, 目测电池外观, 应符合 5.2 的要求。

To keep the battery at the temperature of $40\pm 2^{\circ}\text{C}$, and the relative humidity of 90~95% for 48hrs. After above testing, to keep the battery at $20\pm 5^{\circ}\text{C}$ and the environment of normal atmospheric pressure for 1~2hrs. The result of visual inspection can meet item 5.2.

- c) 将电池按快速放电要求放电后, 再按快速充电和快速放电的要求进行不多于 3 次的充、放电的循环, 至达到 5.7 的要求即可终止循环。

According to the requirement of quick charge and quick discharge, the battery will be discharged and the time can meet item 5.7 no more than 3 cycles.

6.7.4 振动试验 Vibration testing

- a) 室温 ($20\pm 5^{\circ}\text{C}$), 正常大气条件下, 对电池进行外观目测检查, 并按标准充电的要求对电池进行充电。

At room temperature ($20\pm 5^{\circ}\text{C}$) and normal atmospheric pressure, to inspect the sample battery visually, then the battery will be charged according to standard charge.

- b) 试验条件: 频率 10~55HZ, 位移振幅为 0.35mm, X、Y、Z 每个方向扫频循环次数为 10 次, 扫频速率为每分钟一个倍频。

The battery will be vibrated 10 times in each direction of X, Y, Z with changing frequency of 10~55HZ and amplitude of 0.35 mm. The rate of scan frequency is from 10~55HZ per min.

- c) 试验结束后, 将电池取出, 在正常大气条件, $20\pm 5^{\circ}\text{C}$ 下搁置 1~2 小时, 对电池进行外观目测检查, 应符合 5.2 的要求。

After above testing, to keep the battery at $20\pm 5^{\circ}\text{C}$ and the environment of normal atmospheric pressure for 1~2hrs., The result of visual inspection can meet item 5.2.

- d) 按快速放电的要求进行放电, 放电时间应符合 5.7 的要求。

According to the requirement of quick discharge, the battery will be discharged and the time can meet item 5.7

6.7.5 碰撞实验 Impact Testing

- a) 室温 ($20\pm 5^{\circ}\text{C}$), 正常大气条件下对电池进行外观目测检查, 并按标准充电的要对电池进行充电。

At the temperature of ($20\pm 5^{\circ}\text{C}$) and the normal atmospheric pressure, to inspect the sample battery visually. And the battery will be charged according to the requirement of standard

charge.

- b) 碰撞脉冲峰值加速度为 100m/s^2 ，脉冲持续时间为 16ms，碰撞次数为 1000 ± 10 次。

The battery will be impacted 1000 ± 10 times with the acceleration of 100m/s^2 and pulse lasting time 16ms.

- c) 实验结束后，将电池取出，在正常大气条件下， $(20 \pm 5)^\circ\text{C}$ 下搁置 1-2h，对电池进行外观目测检查，应符合 5.2 的规定。

After above testing, to keep the battery at $(20 \pm 5)^\circ\text{C}$ and the environment of normal atmospheric pressure for 1-2hrs. The result of visual inspection can meet item 5.2.

- d) 按标准放电的要求进行放电，放电时间应符合 5.7 的规定。

According to the requirement of standard discharge, the battery will discharged and the time can meet item 5.7.

6.7.6 自由跌落试验 Free fall testing

- a) 室温 $(20 \pm 5)^\circ\text{C}$ ，正常大气条件下对电池进行外观目测检查，并按标准充电的要求对电池进行充电。

At the temperature of $(20 \pm 5)^\circ\text{C}$ and the normal atmospheric pressure, to inspect the sample battery visually. And the battery will be charged according to the requirement of standard charge.

- b) 高度为 700mm，试验台面厚度为 20mm 硬木板，X,Y,Z 每个方向试验次数 5 次。

The battery will be dropped free five times in each direction of X, Y, Z from the height of 700mm onto the hard board with the thickness of 20mm.

- c) 试验结束后，将电池取出，在正常大气条件下，下搁置，对电池进行外观目测检查，应符合 5.2 条的规定。

After above testing, to keep the battery at $(20 \pm 5)^\circ\text{C}$ and the environment of normal atmospheric pressure for 1-2hrs. The result of visual inspection can meet item 5.2.

- d) 按标准放电的要求进行放电，放电时间应符合 5.7 的规定。

According to the requirement of standard discharge, the battery will discharged and the time can meet item.

6.8 安全性能 Safe Characteristic

6.8.1 过充电性能 Over charge Testing

- a) 室温 $(20 \pm 5)^\circ\text{C}$ ，正常条件下对电池进行外观目测检查，并按标准充电的要求对电池进行充电。

At the temperature of $(20 \pm 5)^\circ\text{C}$ and the normal atmospheric pressure, to inspect the sample battery visually. And the battery will be charged according to the requirement of standard charge.

- b) 电池充满电后，按 1C 电流充电至电压 4.8V，电池不应冒烟，爆裂，着火。

The battery charged completely will be charged continuously at 1C current with a voltage limit of 4.8V.

- c) 按标准放电的要求放电到终止电压后，按标准充电的要求进行充电，再按快速放电的要求进行放电。放电时间应符合 5.7 的规定。

- d) 按标准放电的要求放电到终止电压后，按标准充电的要求进行充电，再按快速放电的要求进行放电。放电时间应符合 5.7 的规定。

causing hidden trouble of safety.

- ◆ 如果电池发生泄漏，电解液进入眼睛，请不要揉擦，应用清水冲洗眼睛，并立即送医治疗，否则会伤害眼睛。

If the battery leaks, and the electrolyte get into the eyes. Do not rub eyes, instead, rinse the eyes, with clean running water, and immediately seek medical attention. Otherwise, eye injury can result.

- ◆ 如果电池发出异味，发热，变色，变形或使用，贮存，充电过程中出现任何异常现象，立即将电池从装置或充电器中移离并停用。

If the battery gives off an odor, generates heat, becomes discolored or deformed, or in any way appear abnormal during use, recharging or storage, immediately remove it from the device or battery charge and stop using it.

◆ 如果电池弄脏，使用前应用干布抹净，否则可能会导致接触不良功能失效。

In case the battery terminals are dirt, clean the terminals with a dry cloth before use. Otherwise power failure or charge failure may occur due to the poor connection with the instrument.

◆ 废弃之电池应用绝缘纸包住电极，以防起火，爆炸。

Be aware discharged batteries may cause fire; tape the terminals to insulate them.