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客 户 Customer

产品规格书

Specification for products

电池类型：圆柱型锂离子电池

Cell model: Cylindrical LiFeP04 Battery

电池型号：IFR18650-2000mAh

Cell type: IFR18650-2000mAh

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1 前言 Preface

1.1. 本规格书描述了我司圆柱型锂离子电芯的外型尺寸、特性、技术要求及注意事项。本标准适用于江西省汇亿新能源有限公司生产的圆柱型 IFR18650-2000mAh 锂离子电芯。

This specification describes the type and dimensions, performance, technical characteristics, warning and attention of the lithium LiFePO4 cell for our company. The specification only applies to IFR18650-2000mAh cell supplied by Hvvea Amperex Co., Ltd.

2 定义 Definition

2.1 标准充电方式: Standard charge method

指在 $25.0 \pm 2^\circ\text{C}$ 环境下, 以 0.5C 的电流恒流充电至单体电芯电压 $3.65 \pm 0.05\text{V}$ 后, 转为恒压 $3.65 \pm 0.05\text{V}$ 充电, 至充电电流小于 0.01C 时, 停止充电。Under $25 \pm 2^\circ\text{C}$, it can be charged to $3.65 \pm 0.05\text{V}$ with constant current of 0.5C, and then, charged continuously with constant voltage of $3.65 \pm 0.05\text{V}$ until the charged current is 0.01C.

2.2 标准放电方式: Standard discharge method

指在 $25.0 \pm 2^\circ\text{C}$ 环境下, 以 0.5C 的电流恒流放电至单体电芯电压 2.0 V。Under $25 \pm 2^\circ\text{C}$, it can be discharged to the voltage of 2.0V with constant current of 0.5C.

2.3 标称容量: Rated capacity

指在 $25.0 \pm 2^\circ\text{C}$ 环境下, 以 0.5C 的电流恒流充电至单体电芯电压 $3.65 \pm 0.05\text{V}$ 后转为恒压 $3.65 \pm 0.05\text{V}$ 充电, 0.5C 放电至终止电压 2.0V 时的容量, 以 Cap 表示, 单位为毫安时 (mAh)。Rated capacity refers to under $25 \pm 2^\circ\text{C}$, charge at 0.5C to end voltage $3.65 \pm 0.05\text{V}$, then discharge at 0.5C to the end voltage 2.0V, which is signed Cap, the unit is mAh.

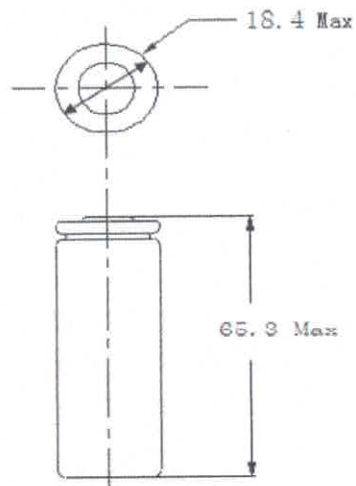
3 电芯型号、尺寸 Cell type and dimensions

3.1 电芯型号 Cell type

电芯说明 Description: 圆柱锂离子二次电芯 Cylindrical LiFePO4 rechargeable cell 型号 Model: IFR18650-2000mAh

3.2 电芯尺寸 cell dimensions

电芯尺寸示意图如图所示 (单位: mm)。Cell physical dimensions listed in Figure 3(unit: mm).





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4 电芯特性 Cell specification

项目 ITEM	特征 specification
标称容量 Normal capacity	2000mAh discharge to 2.0V with 0.5C
最小容量 Minimum capacity	1980mAh discharge to 2.0V with 0.5C
标称电压 Normal voltage	3.2V
最大充电电压 Max charging voltage	3.65±0.05V
放电终止电压 Discharge ending voltage	2.0V
标准充电电流 Standard charging current	0.5C
持续充电电流 Continue charging current	0.5C
最大充电电流 Max charging current	1C (1C Not for cycle life)
标准放电电流 Standard discharging current	0.5C
持续放电电流 Continue discharging current	1C
最大持续放电电流 Max continue discharging current	3C
最大瞬间放电电流 Max Pulse discharging current	5C (The cycle repeat twice for 5S)
内阻 (不带 PTC) Internal resistance (with out PTC)	IR≤22mΩ
电芯尺寸 (含膜) Cell dimensions (diaphrag)	最大高度 Max Height: 65.3 mm 最大直径 Max diameter : 18.4 mm
单颗电池重量 single cell Weight	≤ 45g

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5 技术要求Technical requirements

5.1 电芯使用环境 Cell usage conditions

Charge temperature 充电温度: 0 ~ 55 °C

Discharge temperature 放电温度: -20 ~ 60 °C

5.2 电芯试验环境 Cellexperimental environmet

Unless otherwise specified, all tests stated should be done at 25±2°C.

除非有特殊说明, 所有测试须在 25±2°C下完成。

5.3 电性能 Electronic performance

序 号 NO.	测试项目 Item	性能标准 Performance standardS	测试条件与方法 Test conditions and methods
5.3.1	倍率放电 Rate discharge	放电容量/标称容量×100% Discharge capacity / Nominal capacity *100% A) 0.5C ≥100% B) 1C ≥97% C) 2C ≥95% D) 3C ≥90%	电池标准充电至满电后, 搁置 15min, 分别以 0.5C、1C、2C \3C 进行放电至下限电压 2.0V, 循环三次, 当有一次达到标准, 即达到标准要求 After standard charge, rest for 15min and then discharge at 0.0.5C, 1C 2C and 3C to discharge cut-offvoltage2.0V respectively. Charge/discharge cycle can be conducted for 3 times before meeting the Standards.
5.3.2	1C 循环寿命 Cycle Life	容量(1500 周) ≥80% Capacity(1500th) cycle ≥80%	电芯按 0.5C CC/CV 充电至 3.65V, 搁置 10 分钟, 然后以 1C 恒流放电至 2.2V 结束, 再进行下一个循环 The cell will be charged at 0.5C to Voltage 3.65V, set aside for 10 minutes, and then discharge to 2.2V with 1C, finally proceed to the next cycle, 1500th cycle to measure the final condition of the cell.

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5.3.3	3C 循环寿命 Cycle Life	容量(800 周) $\geq 80\%$ Capacity(800th) cycle $\geq 80\%$	电芯按 0.5C CC/CV 充电至 3.65V, 搁置 10 分钟, 然后以 3C 恒流放电至 2.2V 结束, 再进行下一个循环 The cell will be charged at 0.5C to Voltage 3.65V, set aside for 10 minutes, and then discharge to 2.2V with 3C, finally proceed to the next cycle, 800th cycle to measure the final condition of the cell.
5.3.4	高温性能 Hightemperatue discharging performance	容量 Capicity $60^{\circ}\text{C} \geq 95\%$	测量电池的初始容量和初始状态, 电池标准充电后, 在 $60 \pm 2^{\circ}\text{C}$ 条件下恒温搁置 2h、以 0.2C 放电至 2.0V Measure the initial condition and initial capacity of the cell, keep the cell for 2h in $60 \pm 2^{\circ}\text{C}$, then discharge at 0.2C to 2.0V
5.3.5	低温性能 LowTemperature Performance	容量 $-10^{\circ}\text{C} \geq 60\%$ Capicity $-10^{\circ}\text{C} \geq 60\%$	测量电池的初始容量和初始状态, 电池标准充电后, 在 $-10 \pm 2^{\circ}\text{C}$ 的恒温条件下搁置 4h, 以 0.2C 放电至 2.0V Measure the cell initial capacity and intial state, after the stangard charge, keep the cell for 4h in -10°C , then discharge at 0.2C to 2.0V

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5.3.6	常温荷电保持能力 Normal Storage	剩余容量 $\geq$ 标称容量*90% 恢复容量 $\geq$ 标称容量*95% Residual capacity $\geq$ Nominal capacity *90% Recovery capacity $\geq$ Nominal capacity *95%	测量电池的初始状态和初始容量，电池标准充电后，开路放置 30 天，测量电池最终状态；以 0.5C 放电至 2.0V，测量电池的剩余容量； 0.5C/0.5C 测量电池的恢复容量。可循环三次，当有一次达到标准，即达到标准要求。 Tested the initial condition and initial capacity of battery. Store for 28 days after standard charged, tested the final condition of battery. Then discharge at 0.5C to the discharge cut-off voltage 2.0V, tested the residual capacity of battery. 0.5C /0.5C tested the recovery capacity of battery. Charge/discharge cycle can be conducted for 3 times before meeting the Standards.
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5.4 安全性能 Safty performan

序 号 NO	测试项目 Item	性能标准 Performance standards	测试条件与方法 Test conditions and methods
5.4.1	振动性能 Vibration	不漏液、不起火、不爆炸，电芯电压不低于 3.2V No leakage , No fire, No explosion,voltage is no less than3.2V.	电池标准充电充满后，测量电池初始状态，安装在振动台面上，按下面的振动频率和对应的振幅调整好试验设备,X、Y、Z 三个方向每个方向上从 7Hz~200Hz 循环扫频振动 3h .After standard charge. Measure the cell intial state.Equip it to the vibration platform, adjust and prepare the test equipment according to following vibration frequency and relevant swing, doing frequency sweeping from X, Y, Z three directions, each from 7Hz to 200Hz for 3 hours of recycling.



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5.4.2	过充性能 Overcharge test	不起火、不爆炸 No fire, No explosion	电芯按照标准放电至终止电压，然后将电芯置于通风橱中，连接电芯正负极与电源，调节电流至 3C，电芯充电电压为 4.6V。监视电芯温度变化，当电芯温度下降到比峰值低约 10℃，结束试验。Standard discharge to the ending voltage. Then place the cell in the fume cupoard, connect the positive and negative power supply, adjust current to 3C, change to 4.6V. Observe the variation of the cell's temperature. Finish the test when the cell drops to 10℃
5.4.3	强制放电 Forced discharge	电芯不起火、不爆炸 No fire, No explosion	电芯以 0.2C 的电流恒流放电至单体电芯电压 2.0V，然后以 1ItA 的电流对电芯进行反向充电，要求充电时间不低于 90min。Discharge at 0.2C to 2.0V, and then reverse charge the cell at 1 ITA for 90min
5.4.4	130℃热冲击 Hot oven	电芯不起火、不爆炸 No fire, No explosion	电芯按照标准充电方式充满电后，将电芯放进热箱里，然后将热箱按 5℃/min 升温到 130℃，电芯在热箱 130℃环境下保持 30 分钟，记录电芯温度升至 130℃起的时间。Standard charge. Keep the cell connected with a thermocouple and put it into a gravity convection or circulating air oven. Temperature is raised at a rate of 5℃per minute to a temperature of 130℃and remained for 30min at this temperature. Observe the variation of the cell's appearance.
5.5.5	短路测试 Shortcircuit test	不起火、不爆炸、温度 <150℃ No fire, No explosion <150℃	电芯按照标准充电方式充满电后，将接有热电偶的电芯置于通风橱中，用铜线短路其正负极（线路总电阻不大于 50 毫欧），实验过程中监视电芯温度变化，当电芯温度下降到比峰值低 10℃时，结束实验。Standard charge. Keep the battery into a ventilation cabinet and short-circuit the positive and negative terminals directly. Stop the test when the temperature falls to 10℃ lower than the peak value. Observe the variation of the battery's appearance and temperature.

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5.5.6	重物冲击测试 Impact test	不起火、不爆炸 No fire, No explosio	电芯按照标准充电方式充满电后，水平放置于一个与电芯纵轴平行的平板。将一直径Φ7.9mm的棒放在样品中心，让重量9.1±0.1kg的重物从610±25mm的高度落到实验电芯上方的钢柱上，测试完毕观察6h。 Standard charge. Placed the battery in a plane, and connected with the thermocouple. Take a diameter of 7.9 mm steel column(9.1kg) in the 610 mm height and middle of battery. Let it freedom to impact the battery. Observe the variation of the battery' s appearance and temperature for6 h.
5.5.7	挤压测试 Crush test	不起火、不爆炸 No fire, No explosio	电芯按照标准充电方式充满电后，放在两个平整的表面进行挤压测试，压力器必须施加一个与圆柱电芯轴向垂直的力，平压于电芯。所用压力为13 KN，一旦达到最大压力值，即释放压力。 After charging a cell following the standard charge method, the cell shall be crushed between two flat surfaces. The direction of the crushing force shall be vertical to axis of the cylinder. The crushing force is to be Crushing force is approximately 13 KN. Once the maximum pressure has been obtained it is to be released.

6
 包装图片Package picture



(200pcs battery in a small box, 2 small boxes in a big box)

Note: According to customer requirements, the color of PET film will be different.

7
 出货 Shipment

单体电芯按≥ 3.0V 的充电电压或客户要求出货，电芯出货后充电前的剩余容量取决于储存时间和条件。

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The Cell shall be shipped in voltage range of **Greater than or equal to 3.0V** or in accordance with customers' requirement.

The remaining capacity before charging shall be changed depending on the storage time and conditions.

8 质量保证 Warranty

8.1. 客户在收到我司产品时应该在 7 个工作日内完成进料检验，部分检验周期久的项目可适当延期至一个月，批次验收被判定不合格品经我司确认后给予换货处理；超过 7 个工作日没有进行来料确认的电芯在没有产品可靠度隐患时我司将不接受批量退换货。

The customer shall complete the incoming material inspection within 7 working days upon receipt of our products, and part of the projects with a long inspection cycle can be properly delayed to 1month. The batch acceptance is determined to be non-conforming products upon our confirmation, and the replacement shall be conducted; Our company will not accept bulk return and exchange of batterys that have not been confirmed with incoming materials for more than 7 working days.

8.2. 我司产品的质量保质期为：自我司产品出货之日起 12 个月，如果电池的缺陷是在制造过程中形成的而不是由于用户滥用及错误使用造成，本公司负责退换电池。

The quality guarantee period of our products is 12 months from the date of shipment. Great Power guarantees to give a replacement in case of cells with defects proven due to manufacturing process instead of the customer abuse and misuse.

9 存储及运输要求 Storage and shipment requirement

项目 Item	环境 Conditions	允许时间 Permissible time
储存环境 Storage environment	25 ℃~ 45 ℃, 60% RH Max	少于 1 个月 Less than 1 month
	0 ℃~ 25 ℃, 60% RH Max	少于 3 个月 Less than 3 month
	-20 ℃~ 25℃, 60% RH Max	少于 1 年 Less than 1 year

In case of long period storage (more than 3 days), storage the cell at temperature range of -20 ~ +25℃, low humidity, no corrosive gas atmosphere.

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如果要长时间存放(超过 3 个月),电芯存储的较佳温度范围为 - 20~ +25℃,低湿度和不含腐蚀性气体的环境中。

10 电芯使用时警告事项及注意事项 Warning and attention in usage of the lithium-ion cell

10.1 电芯使用警告 Warning in usage

10.1.1 严禁随意拆解电芯。Don' t pull the cell optionally.

10.1.2 严禁将电芯放在热高温源旁,如火,加热器等旁边使用和放置。Don' t use and leave the cell near a heat source such as fire or heater.

10.1.3 严禁将电芯直接插入电源插座。Don' t connect the cell to an electrical outlet directly.

10.1.4 严禁将电芯与金属一起运输或存储。Don' t transport and store the cell together with metal objects

10.1.5 严禁敲击,抛掷或踩踏电芯。Don' t strike, throw or trample the cell.

10.1.6 严禁直接焊接电芯。Don' t solder the cell directly

10.1.7 严禁用利器刺穿电芯。Don' t pierce the cell with sharp object

10.2 电芯使用注意事项 Attention in usage

10.2.1 使用时注意正、负极不能接触,防止电芯短路。Don' t connect the positive and negative directly for avoiding short

10.2.2 电芯在使用前要求表面套绝缘膜,防止电芯短路。The cell is insulated before usage for avoiding short.

11 有害物质控制要求 The control requirements for hazardous substances

本型号锂离子电芯符合本公司“环境物质控制标准”要求! This model of lithium-ion cell is in accordance with our company' s request of "environmental substances control standard"!