LYOUNG ENERGY 远阳®

产 品 规 格 确 认 书

Specification for Lithium-ion Rechargeable Cell

客户名称:

Customer Name _____

产品名称:

Model Name 磷酸铁锂电池 LiFePO4 battery

规格型号:

Product model FLY.32700.6500.3.2V

送样日期:

Date: _____

◆ **出厂签章:**

工程部 PIE	品质部 QA	业务部 B&D	批准 Approved
黄烈清	王仁树	王培	陈远洪
送样数量 sample quantity:		确认书份数 Copy:	

◆ **客户确认签章:**

审 核 Checked	批 准 Approved	确认签章 Company Stamp

效 率 服 务 创 造 品 牌　　诚 信 品 质 铸 就 未 来

电话:0769-83269986 地址：东莞市寮步镇松湖智谷研发中心 A4 栋 4F

规格书修订记录 Revision history

更改日期 Date	更改内容 Event	版本号 Version
2022 年 06 月 07 日 June 7th, 2022	首次发行 First issue	A/0

目 录 Content

1. 适用范围 Scope 4
2. 电池主要物料 Battery main materials 4
3. 电池尺寸及显示信息 Battery size and display information 4
4. 电池规格 Specifications of cell 5
5. 外观检查 Visual inspection 6
6. 测试条件 Test Conditions 6
6.1 标准测试条件 Standard Test Conditions 6
6.2 标准充电方式 Standard Charge Method 6
6.3 标准放电方式 Standard discharge method 6
7. 性能检查及测试 Performance Criteria 6
7.1 电性能 Electrical characteristics 6
7.2 安全测试 Safety test 7
8. 储存及运输 Storage and Transportation 9
8.1 储存 Storage: 9
8.2 运输 Transportation: 9
9. 使用注意事项 Use Attentions: 10
9.1 警告 Warnings : 10
9.2 充电 Charge: 10
9.3 放电 Discharge : 10
9.4 电池操作注意事项 Handling of Cells 11
9.5 处理措施 Disposal : 11
10. 质保期限 Warranty 11

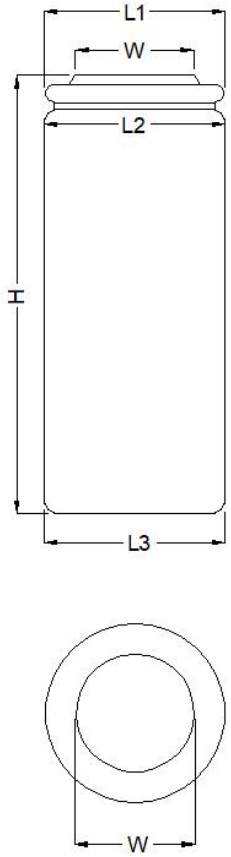
1. 适用范围 Scope

本规格书描述了远阳公司生产的可充电聚合物锂离子电池的产品性能指标。
This specification describes the performance of rechargeable polymer lithium ion batteries manufactured by FLYOUNG Company

2. 电池主要物料 Battery main materials

序号 NO.	物料名称 Material name	规格型号 Specifications	数量 Qty	备注 Remark
1.	电芯/Cell	FLY 32700-6500mAh 3.2V	1	32.5*70.6mm
2.	保护板/PCM			
3.	导线/Wire			
4.	标签/Label			
5.	热缩套管/PVC	PVC	1	蓝色
6.	连接器端子 Connector terminal			

3. 电池尺寸及显示信息 Battery size and display information



项目 Item	规格参数 Specification
W	Max 10.75±0.2mm
H	Max 70.6±0.3mm
L1	Max 32.15±0.1mm
L2	Max 32.5±0.2mm
L3	Max 32.4±0.1mm

4. 电池规格 Specifications of cell

序号 NO.	项目 Items	规格参数 Specifications		
1.	标称电压 Nominal voltage	3.2V		
2.	标称容量 Nominal capacity	6500mAh 1.0C 放电(1.0C Discharge)		
3.	最小容量 Min capacity	6450mAh 1.0C 放电(1.0C Discharge)		
4.	充电电流 Charge current	标准充电： 1.0C Standard Charging:： 1.0C 快速充电： 3.0C Rapid charge： 3.0C		
5.	标准充电方法 Standard Charging method	1.0C CC(恒流)充电至 3.65V,再 CV(恒压 3.65V)充电直至充电电流≤0.02C 1.0C CC（constant current）charge to 3.65V,then CV(constant voltage 3.65V)charge till charge current decline to ≤0.02C		
6.	充电时间 Charging time	标准充电： 2.5 小时（参考值）Standard Charging： 2.5hours(Ref.) 快速充电： 1.0 小时（参考值） Rapid charge： 1.0hours(Ref.)		
7.	最大充电电流 Max.charge current	3.0C (18A)	最大瞬间充电电流 Max instantaneous charging current	5.0C (30A)
8.	最大放电电流 Max.discharge current	3.0C (18A)	最大瞬间放电电流 Max instantaneous discharge current	5.0C (30A)
9.	充电电压 Charge voltage	3.65V		
10.	放电截止电压 Discharge cut-off voltage	2.0V		
11.	工作温度 Operating temperature (不可在极限温度长时间持续充放电) Do not charge and discharge at the limit temperature for a long time	充电/ Charging：	0℃~60℃	
		放电/ Discharging：	-20℃~60℃	
12.	储存温度 Storage temperature	1 个月内:0℃~ +45℃ Within 1 months： 0℃~ +45℃	3 个月内:0℃~ +40℃ Within 3 months： 0℃~ +40℃	6 个月内:0℃~ +35℃ Within 6 months： 0℃~ +35℃
13.	电芯内阻 Resistance	≤10mΩ （AC 1000Hz）		
14.	压降 pressure drop	≤1.5mv/天（2%-5%SOC，25±2℃）		
15.	自耗电 Power consumption	≤1%额定容量/月（1%-98%SOC，25±2℃）		
16.	重量 Weight	≈ 143.3g		

5. 外观检查 Visual inspection

不允许有任何影响电芯性能的外观缺陷，如漏液、生锈、变形、严重炸火等。
There should not be any appearance defect such as leakage, rust, deformation, severe blow fire effect on cell performance.

6. 测试条件 Test Conditions

6.1 标准测试条件 Standard Test Conditions

除非特别说明，本标准书中所有测试均在以下环境条件下进行：
温度：25±2℃ 湿度：≤65%RH
Unless otherwise specified, all tests stated in this Product Specification are conducted at below condition:
Temperature：25±2℃ Humidity：≤65%RH

6.2 标准充电方式 Standard Charge Method

“标准充电”即在环境温度为 25°C±2°C 的条件下，先以恒定电流（1.0C）充电至 3.65V，再以 3.65V 的恒压充电至电流小于（0.02C）。
The "Standard Charge" means charging the cell at a constant current of （1.0C）until the voltage is 3.65V, and then charged at a constant voltage of 3.65V until its current is less than （0.02C）mA. For test purpose, charging shall be performed at 25°C±2°C.

6.3 标准放电方式 Standard discharge method

“标准放电”即在环境温度为 25°C±2°C 的条件下，以恒定电流（1.0C）放电到 2.0V。
The "Standard Discharge" means discharging the cell at a constant current of（1.0C）until the voltage is 2.0V. For test purpose, discharging shall be performed at 25°C±2°C.

7. 性能检查及测试 Performance Criteria

7.1 电性能 Electrical characteristics

序号 NO.	项目 Items	测试方法 Test Method	标准 Criteria
1.	初始容量 Rated Capacity	该容量是指标准充电后，1.0C 放电至 2.0V 截止电压所放出的容量。The capacity means the discharge capacity of the cell, which is measured with discharge current of 1.0C with 2.0V cut-off voltage after standard charge.	≥6500mAh
2.	循环寿命 Cycle Life	测试条件：先用 6.2 方法将电池充电，再以 1.0C 放电至 2.0V 截止，每个步骤中间间隔 30 分钟，当放电容量降至初始容量的 80%时，所完成的循环次数定义为该电池的循环寿命。Test conditions: first charge the battery by method 6.2, and then discharge the battery at 1.0C to 2.0V, with an interval of 30 minutes between each step. When the discharge capacity drops to 80% of the initial capacity, the cycle life of the battery is defined as the number of completed cycles.	≥2000 次 ≥2000Times
3.	自放电 Self-discharge	标准充电后，在 No.6.1 条件下贮存 28 天，再以 1.0C 放电至 2.0V 所放电的容量。After the standard charging, storied the cells under the condition as No.6.1 for28 days, then measured the capacity with 1.0C till 2.0V	余容量>90% Residual capacity >90%

4.	温度特性 Temperature Characteristics	1.在 25±2℃条件下，用 6.2 方法将电池充电。 2.在不同温度条件下，用 1.0C 的电流恒流放电至截止电压 2.0V。以 25℃时放电容量为基准计算百分比。 1. According to item 6.2, at 25±2℃. 2. Capacity comparison at each temperature, measured with constant discharge current 1.0C with 2.0V cut-off. Percentage as an index of the capacity compared with 100% at 25℃	-20℃: ≥50% 0℃: ≥70% 25℃: 100% 60℃: ≥95%
5.	倍率性能 Rate Capacity	1. 在充饱电后 1 小时内，在 25±2℃环境下，以 0.5C 电流连续放电至 2.0V 终止电压。 Under the temperature of 25±2℃ , the discharge capacity is measured with 0.5 C discharge current and 2.0V cut-off voltage after full charged.	≥100%标称容量 ≥100%Nominal Capacity
		2. 在充饱电后 1 小时内，在 25±2℃环境下，以 1C 电流连续放电至 2.0V 终 止电压。 Under the temperature of 25±2℃ , the discharge capacity is measured with 1 C discharge current and 2.0V cut-off voltage after full charged.	≥100%标称容量 ≥100%Nominal Capacity
		3. 在充饱电后 1 小时内，在 25±2℃环境下，以 3C 电流连续放电至 2.0V 终止电压。 Under the temperature of 25±2℃ , the discharge capacity is measured with 3 C discharge current and 2.0V cut-off voltage after full charged.	≥95%标称容量 ≥95%Nominal Capacity
6.	内阻 Resistance	环境温度（25±2）℃，电池荷电 50%状态时以 1KHz 交流电测得的内部阻抗。 Ambient temperature (25± 2) When ℃, 50% of the battery charge status to 1KHz AC measured internal impedance	≤10mΩ

7.2 安全测试 Safety test

序号 NO.	项目 Items	测试方法 Test Method	标准 Criteria
1.	跌落测试 Drop Test	将满充电的电芯重复 3 次由高度为 1500mm（电芯最低点）的位置自由跌落 到水泥地板上；在跌落时应在随机的方向都有一个冲击力，测试完成后电芯 放置 1h ，然后目视检查； (The fully charged cell is dropped three times from a height of 1500 mm (the lowest point of the cell) onto a concrete floor. The cells or batteries are dropped so as to obtain impacts in random orientations. After the test, the cell shall be put on rest for a minimum of one hour and then a visual inspection shall be performed.)	不爆炸、不起火 No explosion, no fire
2.	振动测试 Vibration Test	将满充电后的电芯固定在振动台上，沿 X、Y 、Z 三个方向各振动 90~ 100 分钟，振幅 0.8mm ，振动频率为 10Hz~55Hz ，每分钟变化 1Hz ，在测试完 成后电芯回复到原位。样品在测试结束后观察 6 小时，并检查测试前后电 芯的重量变化。 (A full-charged cell is to be subjected to simple harmonic motion with amplitude of 0.8mm total maximum excursion. The frequency is to be varied at the rate of 1 hertz per minute between 10 and 55 hertz.	不爆炸、不起火、不冒烟、 不泄漏，重量损失 ≤0. 1% (Not explosion, No fire, No leakage, Mass

		After the test is completed, And the cell returned to the starting position. The cell shall be vibrated for 90~ 100minutes per axis of XYZ axes. The samples should be observed for 6 hours after the test ，and also check the weight loss of cells before and after the test.)	loss ≤ 0. 1%)
3.	挤压测试 Crush Test	电池标准充电后，将电池放置在挤压设备的平面之上，从最初接触点开始， 使用半径为 75mm 的曲面，以约 1.5cm/s 的速度持续进行挤压，逐渐增加压 力至 13KN，一旦获得最大压力或者电池变形 30%就停止测试。 圆柱形或方 形电池在接受挤压时，其纵轴要平行于挤压平面，垂直于挤压方向。方形电 池最大面垂直于挤压方向。 After standard charging of the battery, place the battery on the planes of the extrusion device. From the initial contact point, Use a surface with a diameter of 75mm ，continue extrusion at a speed of about 1.5cm/s, and gradually increase the pressure to 13KN or Degenerate by 30% .Stop the test when the maximum pressure is obtained. When a cylindrical or square battery is squeezed, its longitudinal axis should be parallel to the extrusion plane and perpendicular to the extrusion direction. The largest surface of the square battery is perpendicular to the extrusion direction.	不爆炸、不起火 No explosion, No fire
4.	低气压测试 low pressure	将充满电的电芯放入真空箱中，逐渐抽真空至气压小于或等于 11.6KPa，并在此气压下保存 6H，测试温度为 20±3℃。 (The full-charged cells are to be stored for 6 hours at an absolute pressure of 11.6 KPa and a temperature of 20±3 .)	不爆炸、不起火 No explosion, no fire
5.	外部短路 Short Circuit	分别在 25-27℃和 55±5℃的环境温度下依次用内阻为 80±20mΩ 的铜线 连接电芯的正负极持续放电直至发生爆炸、起火或至电压小于 0.2V，电芯表 面温度回复到环境温度±10℃以内。电芯要求：充满电的新电芯。 Each test sample cell is to be short-circuited by connecting the positive and negative terminals of the cell with a Cu wire having a maximum resistance load of 80±20mΩ . The sample is to discharge until a fire or exposition is obtained, or until it has reached a completely discharge state of less than 0.2V and the sample case temperature has returned to ± 10 of the ambient temperature. Tests are to ℃ be conducted at 25-27 ℃ and 55 ± 5 ℃ . Cell Condition: Fresh, Fully charged cell.	不爆炸、不起火 No explosion, no fire
6.	过充电 Over-charge Characteristics	充饱电后的电池，用 1C 电流继续持续充电一小时、或充到额定终止电压的 1.5 倍。 After being fully charged, the battery shall be continuously charged with 1C current for one hour or charged to 1.5 times of the rated termination voltage.	电池应不起火、不爆炸；温 度＜150℃。 No fire，No explosion； Max.Temp.of battery surface should not exceed 150℃ .

7.	过放电 Over Discharge	标准充电后，电芯以 0.5C 恒电流放电至 2.0V，用一根内阻小于 30Ω 的导线连接电芯正负极 24 小时。 After standard charge.Cells are discharged at constant Current of 0.2C to 2.0V, and the positive and negative terminal is connected by a 30Ω wire for 24 hours. Cell Condition: Fresh, Fully charged cell.	不爆炸、不起火 No explosion, no fire
8.	热冲击 Hot oven Characteristics	将电池充饱电后，放置于热箱中，温度以（5℃±2℃) /min 的速率升至 130℃±2℃并保温 30min。 The fully charged battery is placed the battery in the hot box ，then rose to 130℃±2℃ in the temperature to 5℃±2℃/min rate , insulation 30min.	不爆炸、不起火 No explosion, no fire
9.	冷热循环性能测试 Thermal-cold Cycling Performance Test	电芯在标准充电后，在环境温度 75±2℃条件下开路放置 6 小时,然后 -40℃ 条件下开路放置 6 小时，温度转换时间小于 30 分钟，温度循环 10 次，最后室温条件下放置 24h，观察电芯外观变化。 The full-charged cell is placed in 75±2℃ for 6h, and then put the Cell in -40℃ for 6h; change temperature time <30min, then repeat it for 10 cycles. Finally the cell is placed in room temperature for 24h. Watch the appearance of cell.	不起火、不爆炸、不冒烟，试验后开路电压应不低于试验前的 90％,质量损失≤0. 1% No explosion, No fire, No smoke,Open circuit voltage changed not less than 90%, mass loss limit: ≤0. 1%

8. 储存及运输 Storage and Transportation

8.1 储存 Storage:

8.1.1 锂电池需保存在阴凉，干燥，通风的环境中，避免接触火源与热源。

The Li-ion battery pack should be stored in a cool, dry and well-ventilated area, and should be far from the fire and the high temperature.

8.1.2 电池需按规格书规定温度范围进行储存，最佳储存温度为 0 到 35℃，最佳湿度为 65±25%。

The battery should store in the product specification book stipulation temperature range, the best storage temp. is 0 to 35℃. The best humidity is 65±25%.

8.1.3 电池应当在室温下存放，应充到 40%至 60%的电量。为防止电池过放，建议每 3 个月按标准充电方式进行一次充电，如储存时间超过一年，建议每年按标准充放电方式进行一次充、放电循环以激活电池。

The battery should be stored within room temperature, and charged to 40%~60% electric quantity. In order to avoid over-discharge, we suggest charge the batteries every three months. If stored over one year, we suggest activate the battery as per standard charge-discharge method.

8.2 运输 Transportation:

8.2.1 请勿与其他货物混合。

Do not mix the battery products with other cargos.

8.2.2 请勿将电池浸入水中或使其受潮。

Do not immerse the battery products in water or allow it to get wet.

8.2.3 请勿叠放超过 7 层或倒置。

Do not over 7 layers staking and upside-down.

8.2.4 最高运输温度不超过 60℃。

The highest temperature in transportation is lower than 60℃.

8.2.5 出货电池处于 2.8~3.4V 充电状态，由于电池存在自耗，运送到客户端的电池无法完全保证 2.8~3.4V。

The capacity of delivery cell is approximately at 2.8~3.4V of charging. It is not specified more than 2.8~3.4V at customer, because of self-discharge.

9. 使用注意事项 Use Attentions:

为确保电池正确使用，请在使用之前阅读使用说明书。

To ensure proper use of the battery please read the manual carefully before using it.

9.1 警告 Warnings :

9.1.1 不可将电池置于火中。

Do not expose to, dispose of the battery in fire.

9.1.2 不可将电池充电器正负极反接。

Do not put the battery in a charger or equipment with wrong terminals connected.

9.1.3 不可将电池短路。

Avoid shorting the battery.

9.1.4 避免电池过度冲击和震荡。

Avoid excessive physical shock or vibration.

9.1.5 不可拆解或扭曲电池。

Do not disassemble or deform the battery.

9.1.6 不可浸入水中。

Do not immerse in water.

9.1.7 不可将该电池与其他种类和型号的电池混用。

Do not use the battery mixed with other different type or model batteries.

9.1.8 请置于儿童接触不到的地方。

Keep out of the reach of children.

9.2 充电 Charge:

9.2.1 请使用合适的充电器对电池充电。

Battery must be charged in appropriate charger only.

9.2.2 请勿对电池充电 24H 以上。

Do not leave battery in charger over 24 hours.

9.2.3 不可使用超出本规格书最大充电电流对电池进行充电。

Charging current: Can not surpass the biggest charging current which in this specification book stipulated.

9.2.4 充电电压：请不要超出本规格书所规定最高充电电压。

Charging voltage: Does not have to surpass the highest amount which in this specification book stipulated to decide the voltage.

9.2.5 充电温度：电池需在指定温度范围内进行充放电。

Charge temperature: The battery must carry on the charge in the ambient temperature scope which this specification book stipulated.

9.2.6 请使用恒流恒压方式进行充电。请勿反接正负极，以免损坏电池。

Uses constant current and constant voltage way charge. PLS connect the positive and negative terminals in right way, or the battery may be damaged.

9.2.7 电池必须带电储存，并且每三个月进行充放电一次。

The battery must be stored after charged, and should be charged and discharged once every 3 months.

9.3 放电 Discharge :

9.3.1 放电电流不可超过规格书最大额定放电放电电流。大电流会导致电池发热和容量降低。
The discharging current should not surpass the biggest discharging current this specification book stipulation, The large discharge current can cause heat and lower capacity.

9.3.2 放电温度：电池必须在规格书规定温度范围内放电。
Discharge temperature: The battery discharge must carry on in the ambient temperature scope which this specification book stipulated.

9.3.3 过放电: 电池瞬间过放然后立即充电不会损坏电池。但是如果长时间过放，电池将会被损坏。在长期储存中，可能由于电池自放电而导致电池处于过放状态。因此为避免电池过放，必须带电储存。
Over-discharge: After short time over discharge, then charge immediately won't damage the battery. But the battery will be damaged for being long time over discharged. During long-term storage, the battery may be within over-discharging condition for self discharge. To prevent the occurrence of over discharging, the battery should maintain the certain capacity when storage.

9.4 电池操作注意事项 Handling of Cells

1 铝箔软包装 Soft Al foil

●勿用尖锐处撞击电池。
●Don't strike battery with any sharp edge parts.
●剪掉指甲，或者戴手套。
●Trim your nail or wear glove before taking battery.
●清理工作台，避免尖锐零部件。
●Clean worktable to make sure no any sharp particle.
●严禁直接加热电池，高于 60℃度会损害电芯。
●Directly heat cell body is strictly prohibited, Battery may be damaged by heat above approx 60°C.

9.5 处理措施 Disposal :

不同国家有不同规定。请按当地规定进行处理。
Regulations vary for different countries. Dispose of in accordance with local regulations.

10. 质保期限 Warranty

质保是从出厂日期（喷码）开始起十二个月。
Warranty period for this product is 12 months starting from the date when the products left the door of manufacturer.
自出货之日起，电池的保质期限依合同而定，但是在此期限内，如果非远阳公司的制程原因而是客户的误用造成的电池质量问题，远阳公司不承诺免费更换。
The warranty period of cell is made according to business contract. However, even though the problemoccurs within this period, FLYOUNG won't replace a new cell for free as long as the problem is not due to the failure of FLYOUNG manufacturing process or is due to customer's abuse or misuse.
＞远阳公司对违反安全守则操作所产生的问题不承担任何责任。
FLYOUNG will not be responsible for trouble occurred by handling outside of the precautions in instructions.
＞远阳公司对与电路、 电芯组、充电器搭配使用所产生的问题不承担任何责任。
FLYOUNG will not be responsible for trouble occurred by matching electric circuit, cell pack and charger.
＞出货后客户在产品组装过程中产生的不良电池不在远阳公司质量保证的范围之列。
FLYOUNG will be exempt from warrantee any defect cells during assembling after acceptance.
＞规格书所未包含的其它条款由双方协议解决。
Any other items which are not covered in this specification shall be agreed by both parties.