

Specification Approval Sheet(Cell)
产品规格确认书

Type: LiFePO4 Model: F12166246
类别：磷酸铁锂 型号 : F12166246

Customer Approval 客户承认	Signature 签名	Date 日期
	Company name 公司名称:	
	Company Stamp 公司印章:	

Herewin Approved	Signature 签名	Date 日期
Prepared 制订	CLJ	20201021
Checked 审核		
Approved 批准		

	贵 州 嘉 盈 科 技 有 限 公 司	REV. :__A__ PAGE: __2__ of __14__	
文件修改履历 Revision history			
版次 Version	修订内容 Revised content	修订页码 Revised Page	修订时间 Revised Time
A	新版发行 New version	/	2020-10-21

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1.Scope 适用范围

This document describes the Product Specification of the Lithium-Polymer (LIP) rechargeable battery cell supplied by Herewin Technology Corporation Limited).

本规格说明书描述了贵州嘉盈科技有限公司（以下简称嘉盈）生产的可充电聚合物锂离子电池的产品性能指标

2.Model:F12166246

型号: F12166246

3.Specification 产品规格

NO.	Items	Specifications
1	Charge cut-off voltage 充电截止电压	3.65V
2	Nominal cut-off voltage 标称电压	3.2V
3	Discharge cut-off voltage 放电截止电压	2.0V
4	Rated Capacity 标称容量	51.0Ah @ 1.0C Discharge(放电)
5	Standard Charging method 标准充电方法	1C CC (constant current) charge to 3.65V,then CV(constant voltage 3.65V)charge till charge current decline to $\leq 0.05C$ 1.0C CC (恒流) 充电至 3.65V, 再 CV (恒压 3.65V) 充电直至充电电流 $\leq 0.05C$ (充电温度 0℃~55℃)
6	Max.charge current 最大充电电流	1.0C (充电温度 0℃~55℃)
7	Max.discharge current 最大放电电流	3C (continuous current 持续电流, 工作温度-20-60℃)
8	Operating temperature 工作温度	Charging 充电: 0℃~55℃ Discharging 放电: -20℃~60℃
9	Cell Weight 电池重量	Approx 约: 975.0g
10	Storage Temp. 储存温度	-10℃~ +45℃

4.Battery Cell Performance Criteria

电芯性能检查及测试

4.1 Electrical characteristics 电性能

NO.	Items	Test Method and Condition	Criteria
1	Rated Capacity 检测容量	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. 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。	≥51.0Ah
2	Cycle Life 循环寿命 (23±2℃)	Test condition: Charge:1C to 3.65V Discharge:1C to 2.0V 80% or more of 1 st cycle capacity at 1C discharge of Operation 测试条件: 充电: 1C 充电到 3.65V 放电: 1C 放电到 2.0V 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芯的循环寿命	≥2000 次
3	Self-discharge 自放电	After the standard charging, storied the cells under the condition as No.4.4 for 28 days, then measured the capacity with 0.5C till 2.0V 标准充电后, 在 No.4.4 条件下贮存 28 天, 再以 0.5C 放电至 2.0V 所放出的容量。	Residual capacity >90% 剩余容量>90%
4	Initial impedance 初始内阻	Internal resistance measured at AC 1KHz after 50% charge 半充状态下, 测量其 AC 1KHz 下的交流阻抗	≤1mΩ
5	Cell Voltage 电芯电压	As of shipment. 出货状态	≥3.2V
6	Temperature Characteristics 温度特性	1. According to item 4.1.1, at 23±5℃. 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 23℃ 1.在 23±5℃ 条件下, 用 4.1.1 方法将电芯充电。 2.在不同温度条件下, 用 1.0C 的电流恒流放电至 2.0V。以 23℃时放电容量为基准计算百分比。(0℃, -20℃截止电压 1.6V)	-20℃: ≥70% 0℃: ≥85% 23℃: =100% 55℃: ≥95%
7	Storage Characteristics 储存特性	1. According to item 4.1.1, at 23±5℃. 2. The battery under the condition of 55 + / - 5 °C storage 7 days, at room temperature for 5 H to 1 C discharge current until after termination voltage; Press 1C again after charging, 1 C discharge current until termination voltage; 1. 在 23±5℃ 条件下, 用 4.1.1 方法将电芯充电。 2.将电池在 55±5℃ 条件下贮存 7d, 在室温下搁置 5h 后以 1C 电流放电直至终止电压; 再按 1C 充电后, 以 1C 电流放电直至终止电压,	Retained Capacity ≥85% 容量保持≥85% Capacity recovery rate of 90% or higher 容量恢复≥90%

4.2 Mechanical characteristics

机械特性

NO.	Items	Test Method and Condition	Criteria
1	Vibration Test 振动测试	After standard charging, fixed the cell to vibration table and subjected to vibration cycling that the frequency is to be varied at the rate of 1Hz per minute between 10Hz an 55Hz,the excursion of the vibration is 1.6mm.The cell shall be vibrated for 30 minutes per axis of XYZ axes. 将标准充电后的电芯固定在振动台上, 沿 X、Y、Z 三个方向各振动 30 分钟, 振幅 1.6 mm, 振动频率为 10Hz~55Hz, 每分钟变化为 1Hz。	No fire, no leakage. 无起火、无泄漏
2	Drop Test 跌落测试	The after standard charge from a height of 1 meters down to fall to the thickness of the hard board with thickness of 20mm, X, Y, Z from the positive and negative direction (six directions) in each direction, free fall 1. 将标准充电后的电芯从 1 米高度跌落至跌落到厚度为 20mm 厚的硬木板上,从 X、Y、Z 正负方向 (六个方向) 每个方向自由跌落 1 次。	No fire, no leakage. 无起火、无泄漏

4.3 Visual inspection

There shall be no such defect as scratch, flaw, crack, and leakage, which may adversely affect commercial value of the cell.外观检查

不允许有任何影响电芯性能的外观缺陷, 诸如裂纹、裂缝、泄漏等。

4.4 Standard environmental test condition

Unless otherwise specified, all tests stated in this Product Specification are conducted at below condition:

Temperature: $23 \pm 5^{\circ}\text{C}$

Humidity: $65 \pm 20\%\text{RH}$

标准测试环境

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: $23 \pm 5^{\circ}\text{C}$

湿度: $65 \pm 20\%\text{RH}$

5.Storage and Others

贮存及其它事项

a) Long Time Storage

If the Cell is stored for a long time, the cell's storage should be 3.2~3.35V and the cell is to be stored in a condition as No.4.4.

长期贮存

长期贮存的电池 (超过 3 个月) 须置于干燥、凉爽处。贮存电压为 3.2~3.35V 且贮存环境要求如 4.4。

b) Others

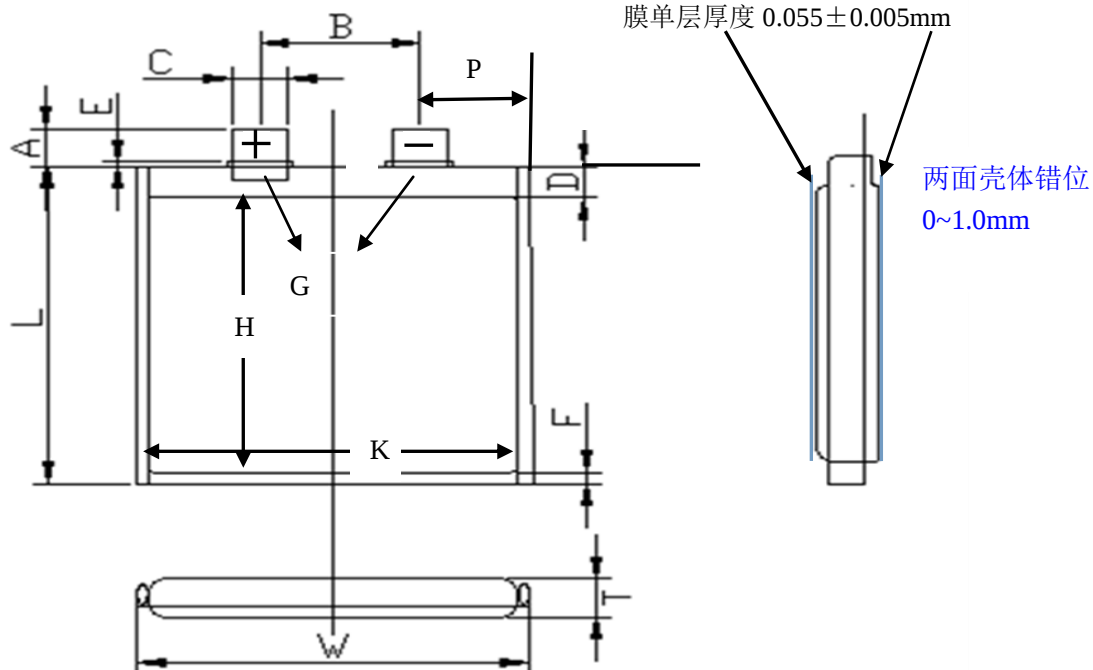
Any matters that this specification does not cover should be conferred between the customer and HEREWIN.

其它事项

任何本说明书中未提及的事项, 须经双方协商确定

6. Drawing (all unit in mm, not in scale)

外形尺寸 (单位: mm;未按比例)



Items	Description	Dimension and Spec
T	Thickness 电芯厚度	$\leq 12.6\text{mm}$ (裸电芯厚度)
W	Width 电芯宽度	$\leq 166.0\text{mm}$
L	Length 电芯长度	$\leq 246.0\text{mm}$
A	Tab length 极耳长度	$21.5 \pm 2.0\text{mm}$
B	Tab center 极耳中心距	$90 \pm 2.0\text{mm}$
C	Tab width 极耳宽度	$40 \pm 0.5\text{mm}$
D	Top sealing Width 顶封宽度	$14.0 \pm 1.0\text{mm}$
E	Sealant Length Sealant 长度	3.0mm for ref.
F	Bottom sealing Width 底封边宽度	$5.0 \pm 1\text{mm}$
G	Tab thickness 极耳厚度	铝极耳 $0.3 \pm 0.01\text{mm}$ 铜镀镍极耳 $0.2 \pm 0.01\text{mm}$
H	电芯主体长度 Length	$223 \pm 1.0\text{mm}$
K	电芯主体宽度 Width	$163 \pm 1.0\text{mm}$
P	正、负极耳偏心距	$38 \pm 2.0\text{mm}$

Appendix

附录

Handling Precautions and Guideline
For LIP(Lithium-Ion Polymer)Rechargeable Batteries
聚合物锂离子充电电芯操作指示及注意事项

Preface

This document of Handling Precautions and Guideline LIP Rechargeable Batteries shall be applied to the battery cells manufactured by HEREWIN.

前言

本文件“聚合物锂离子充电电芯操作指示及注意事项”仅适用于贵州嘉盈科技有限公司生产的电芯。

Note(1):

The customer is requested to contact HEREWIN in advance, if and when the customer needs other applications or operating conditions than those described in this document. Additional experimentation may be required to verify performance and safety under such conditions.

声明一:

客户若需要将电芯用于超出文件规定以外的设备，或在文件规定以外的使用条件下使用电芯，应事先联系嘉盈科技，因为需要进行特定的实验测试以核实电芯在该使用条件下的性能及安全性。

Note(2):

HEREWIN will take no responsibility for any accident when the cell is used under other conditions than those described in this Document.

声明二:

对于在超出文件规定以外的条件下使用电芯而造成的任何意外事故，嘉盈科技概不负责。

Note(3):

HEREWIN will inform, in a written form, the customer of improvement(s) regarding proper use and handing of the cell, if it is deemed necessary.

声明三:

如有必要，嘉盈科技会以书面形式告之客户有关正确操作使用电芯的改进措施。

1. Charging

充电

1.1 Charging current:

Charging Specification. Charging with higher current than recommended value may cause damage to cell electrical, mechanical and safety performance and could lead to heat generation or leakage.

充电电流

充电电流不得超过本标准书中规定的最大充电电流。使用高于推荐值电流充电将可能引起电芯的充放电性能、机械性能和安全性能的问题，并可能会导致发热或泄漏。

1.2 Charging voltage:

Charging shall be done by voltage less than that specified in the Product Specification (3.65V/cell). Charging beyond 3.8V, which is the absolute maximum voltage, must be strictly prohibited. The charger shall be designed to comply with this condition.

It is very dangerous that charging with higher voltage than maximum voltage may cause damage to the cell electrical, mechanical safety performance and could lead to heat generation or leakage.

充电电压

充电电压不得超过本标准书中规定的额定电压（3.65V/电芯）。3.8V 为充电电压最高极限，充电器的设计应满足此条件。

电芯电压高于额定电压值时，将可能引起电芯的充放电性能、机械性能和安全性能的问题，可能会导致发热或泄漏。

1.3 Charging temperature:

The cell shall be charged within 0℃~55℃ range in the Product Specification.

充电温度

电芯必须在 0℃~55℃的环境温度范围内进行充电。

1.4 Prohibition of reverse charging:

Reverse charging is prohibited. The cell shall be connected correctly. The polarity has to be confirmed before wiring, In case of the cell is connected improperly, the cell cannot be charged. Simultaneously, the reverse charging may cause damaging to the cell which may lead to degradation of cell performance and damage the cell safety, and could cause heat generation or leakage.

禁止反向充电

正确连接电池的正负极，严禁反向充电。若电池正负极接反，将无法对电芯进行充电。同时，反向充电会降低电芯的充放电性能、安全性，并会导致发热、泄漏。

2. Discharging

放电

2.1 Discharging current

The cell shall be discharged at less than the maximum discharge current specified in the Product Specification.

High discharging current may reduce the discharging capacity significantly or cause over-heat.

放电电流

放电电流不得超过本标准书规定的最大放电电流，大电流放电会导致电芯容量剧减并导致过热。

2.2 Discharging temperature

The cell shall be discharged within -20℃~60℃ range specified in the Product Specification.

电芯必须在-20℃~60℃的环境温度范围内进行放电。

2.3 Over-discharging:

It should be noted that the cell would be at over-discharged state by its self-discharge characteristics in case the cell is not used for long time. In order to prevent over-discharging, the cell shall be charged periodically to maintain between 3.2V and 3.35V.

Over-discharging may causes loss of cell performance, characteristics, or battery functions.

The charger shall be equipped with a device to prevent further discharging exceeding a cut-off voyage specified in the Product Specification. Also the charger shall be equipped with a device to control the recharging procedures as follows:

The cell battery pack shall start with a low current (0.01C) for 15-30 minutes, i.e.-charging, before rapid charging starts. The rapid charging shall be started after the (individual) cell voltage has been reached above 2.5V within 15-30 minutes that can be determined with the use of an appropriate timer for pre-charging. In case the (individual) cell voltage does not rise to 2.5V within the pre-charging time, then the charger shall have functions to stop further charging and display the cell/pack is at abnormal state.

过放电

需要注意的是，在电芯长期未使用期间，它可能会用其它自放电特性而处于某种过放电状态。为防止放电的发生，电芯应定期充电，将其电压维持在 3.2V 至 3.35V 之间。

过放电会导致电芯性能、电池功能的丧失。

充电器应有装置来防止电池放电至低于本标准书规定的截止电压。此外，充电器还应有装置以防止重复充电，步骤如下：

电池在快速充电之前，应先以一小电流（0.01C）预充电 15~30 分钟，以使（每个）电芯的电压达到 2.5V 以上，再进行快速充电。可用一计时器来实现该预充电步骤。如果在预充电规定时间内，（个别）电芯的电压仍未升到 2.5V 以上，充电器应能够停止下一步快速充电，并显示该电芯/电池正处于非正常状态。

3. Protection Circuit Module(PCM)

保护电路模块（PCM）

The cell/battery pack shall be with a PCM that can protect cell/battery pack properly.

PCM shall have functions of (1) overcharging prevention, (2) over-discharging prevention, and (3) over current prevention to maintain safety and prevent significant deterioration of cell performance.

The over current can occur by external short circuit

电芯/电池包装应配有 PCM 以正确保护电芯/电池。PCM 应具备以下功能以保证安全并防止损坏电芯性能：1）过充电保护；2）过放电保护；3）过流保护。

3.1 Overcharging prohibition:

Overcharging prevention function shall stop charging if any one of the cells of the battery pack reaches 3.65V.

过充电保护

当电池中任一电芯的电压达 3.65V 时，过充电保护功能应立刻启动并停止充电。

4. Storage

贮存

The cell shall be storied within $-10^{\circ}\text{C}\sim 45^{\circ}\text{C}$ range environmental condition.

If the cell has to be storied for a long time (Over 3 months),the environmental condition should be:

Temperature: $23\pm 5^{\circ}\text{C}$

Humidity: $65\pm 20\%\text{RH}$

The voltage for a long time storage shall be $3.2\text{V}\sim 3.35\text{V}$ range.

电芯储存温度必须在 $-10^{\circ}\text{C}\sim 45^{\circ}\text{C}$ 的范围内。

长期存储电池（超过 3 个月）须置于温度为 $23\pm 5^{\circ}\text{C}$ 、湿度为 $65\pm 20\%\text{RH}$ 的环境中。

贮存电压为 $3.2\text{V}\sim 3.35\text{V}$

5. Handling of Cells

电芯操作注意事项

Since the battery is packed in soft package, to ensure its better performance, it's very important to carefully handle the battery

由于电芯属于软包装，为保证电芯的性能不受损害，必须小心对电芯进行操作。

5.1 Soft Aluminum foil

The soft aluminum packing foil is very easily damaged by sharp edge parts such as Ni-tabs, pins and needles.

- Don't strike battery with any sharp edge parts
- Trim your nail or wear glove before taking battery
- Clean worktable to make sure no any sharp particle

铝箔包装材料易被尖锐部件损伤，诸如镍片，尖针。

- 禁止用尖锐部件碰撞电池；
- 取放电芯时，请修短指甲或戴上手套；
- 应清洁工作环境，避免有尖锐物体存在

5.2 Sealed edge

Sealing edge is very flimsy.

- Don't bend or fold sealing edge

顶封边

顶封边非常容易受到损害。

- 禁止弯折顶封边

5.3 Folding edge

The folding edge is form in battery process and passed all hermetic test

- Don't open or deform folding edge

折边

折边在电池生产过程中已完成，并通过了密封测试。

- 禁止打开或破坏折边。

5.4 Tabs

The battery tabs are not so stubborn especially for aluminum tab.

- Don't repeated bend tab.

极耳

极耳的机械强度并非异常坚固，特别是铝极耳

- 禁止反复弯折极耳。

5.5 Mechanical shock

- Don't Fall, hit, bend battery body

机械撞击

- 禁止坠落、冲击、弯折电芯。

5.6 Short

Short terminals of battery is strictly prohibited, it may damage battery.

短路

任何时候禁止短路电芯，它会导致电芯严重损坏。

6. Notice Designing Battery Pack

电池外壳设计注意事项

6.1 Pack design

- Battery pack should have sufficient strength and battery should be protected from mechanical shock
- No Sharp edge components should be inside the pack containing the battery.

外壳设计

- 电池外壳应有足够的机械强度以保证其内部电芯免受机械撞击。
- 外壳内安装电芯的部位不应有锋利的边角。

6.2 PCM design

- The overcharge threshold voltage should not be exceed 3.65V
- The over-discharge threshold voltage should not be lower than 2.0V
- The PCM should have short protection function built inside

保护电路模块设计

- 过充的限制电压应小于 3.65V
- 过放的限制电压应大于 2.0V
- 保护电路模块应具有短路保护功能。

7. Notice for Assembling Battery Pack

电芯与外壳组装注意事项

7.1 Tab connection

- Ultrasonic welding or spot welding is recommended to connect battery with PCM or other parts.
- If apply manual solder method to connect tab with PCM, below notice is very important to ensure battery performance.
 - a) The solder iron should be temperature controlled and ESD safe
 - b) Soldering temperature should not exceed 350°C
 - c) Soldering time should not be longer than 3s
 - d) Soldering time should not exceed 5 times Keep battery tab cold down before next time soldering.
 - e) Directly heat cell body is strictly prohibited, Battery may be damaged by heat above approx.100°C

电芯的连接

建议使用超声波焊接或点焊技术来连接电芯与保护电路模块或其它部分。

如使用手工锡焊，须注意以下事项，以保证电芯的功能：

- a) 烙铁的温度可控能防静电；
- b) 烙铁温度不能超过 350°C
- c) 锡焊时间不能超过 3 秒；
- d) 锡焊次数不能超过 5 次；
- e) 必须在极片冷却后再进行二次焊接；禁止直接加热电芯，高于 100°C会导致电芯损坏。

7.2 Cell fixing

- The battery should be fixed to the battery pack by its large surface area.
- No cell movement in the battery pack should be allowed.

电芯的安装

- 应将电芯的宽面安装在外壳内；
- 电芯不得在壳内活动。

8. Others 其它事项

8.1 Prevention of short circuit within a battery pack

Enough insulation layers between wiring and the cells shall be used to maintain extra safety protection.

电池组的短路预防

电池引线及单体电池间必须要有足够的绝缘层以保证电池组不短路。

8.2 Prohibition of disassembly

严禁拆卸电芯

1) Never disassemble the cells

The disassembling may generate internal short circuit in the cell, which may cause gassing, firing, or other problems.

在任何情况下不得拆卸电芯

拆卸电芯可能会导致内部短路，进而引起鼓气、着火及其它问题。

2) Electrolyte is harmful

LIP battery should not have liquid from electrolyte flowing, but in case the electrolyte come into contact with the skin, or eyes, physicians shall flush the electrolyte immediately with fresh water and medical advice is to be sought.

电解液有害

聚合物锂电池理论上不存在流动的电解液，但万一有电解液泄漏而接触到皮肤、眼睛或身体其它部位，应立即用清水冲洗电解液并就医。

8.3 Prohibition of dumping of cells into fire

Never incinerate nor dispose the cells in fire. These may cause firing of the cells, which is very dangerous and is prohibited.

严禁将电芯投入火中

在任何情况下，不得燃烧电芯或将电芯投入火中，否则会引起电芯燃烧，这是非常危险的，应绝对禁止。

8.4 Prohibition of cells immersion into liquid such as water

The cells shall never be soaked with liquids such as water, seawater drinks such as soft drinks, juices coffee or others.

严禁将电芯浸入液体，如水

不得将电芯浸泡液体，如淡水、海水、饮料（果汁、咖啡等）。

8.5 Battery cells replacement

The battery replacement shall be done only by either cells supplier or device supplier and never be done by the user.

电芯的更换

更换电芯应由电芯供应商或设备供应商完成，用户不得自行更换。

8.6 Prohibition of use of damaged cells

The cells might be damaged during shipping by shock. If any abnormal features of the cells are found such as damages in a plastic envelop of the cell, deformation of the cell package, smelling of electrolyte, electrolyte leakage and others, the cells shall never be used any more.

The cells with a smell of the electrolyte or a leakage shall be placed away from fire to avoid firing.

禁止使用已损坏的电芯

电芯在运输过程中可能因撞击等原因而损坏，若发现电芯有任何异常特征，如电芯塑料封边损坏，外壳破损，闻到电解液气体，电解液泄漏等，该电芯不得使用。

有电解液泄漏或散发电解液气味的电池应远离火源以避免着火。