



千航锂电

QIANHANG LITHIUM BATTERY

# PRODUCT SPECIFICATION

Version:

A02

DATE:

2023-09-07

DOC No:

GP-PS-0182

CUSTOMER NO: \_\_\_\_\_

## Product Specification

## 产品规格书

**MODEL/型号: GSP54173200F**

**(205Ah 3.2V)**

Prepared By/Date 编制/日期	Checked By/Date 审核/日期	Approved By/Date 批准/日期

Customer Approval 客户确认	Signature/签字	Date/日期
	Company Name/公司名称	
	Company Stamp/公司印章	



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## Amendment Records/修正记录

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A01	初版发行				2023-08-07
A02	调整低温充电规格				2023-09-07

## 目录/Content

1. Scope of application/适用范围	Page 4
2. Cell specifications/电芯规格	Page 4
2.1 General/概要	Page 4/5
2.2 Charging mode/Parameter 充电模式/参数	Page 5/6
2.3 Charging mode/Parameter 放电模式/参数	Page 6
2.4 High/Low temperature capacity/高低温容量	Page 6
2.5 Cell temperature rise/电芯温升	Page 7
3. Battery/Cell performance test criteria/电池测试性能标准	Page 7
3.1 Appearance inspection by visual/外观目测	Page 7
3.2 Environmental test condition/外界环境条件	Page 7
3.3 Test equipment accuracy/测试设备精度	Page 7
3.4 Safety performance/电芯安全	Page 8/9
3.5 Battery protection/电池保护	Page 9/10
4. Cell initial dimensions/电芯初始尺寸	Page 10/11
5. Notice for assembling battery pack/电池装配注意事项	Page 11
5.1 Prevention of short circuit within battery pack/电池内部的短路预防	Page 11
5.2 Prohibition of disassembly/禁止拆卸	Page 11
5.3 Prohibition of dumping of cells into fire/不要把电池倾倒在火中	Page 11
5.4 Prohibition of cells immersion into liquid such as water/禁止浸泡电池	Page 11
5.5 Cells replacement/更换电池	Page 11
5.6 Prohibition of use of damaged cells/禁止使用损坏的电池	Page 12
6. Period of warranty/保质期	Page 12
7. Storage of the batteries/电池的存放	Page 12
8. Other chemical reactions/其它化学反应	Page 12
9. Note/注释	Page 12

## 1 Scope of application/适用范围

This document is applied to describe the related battery products in this specification and the batteries/cells supplied by Guangzhou Great Power Energy & Technology CO. Ltd only.

本说明书只适用于描述本规格书中相关的产品以及广州鹏辉能源科技股份有限公司提供的电池。

## 2 Cell specifications/电芯规格

### 2.1 General/概要

No	Items/项目	Specifications/规格	Remark/备注
2.1.1	Nominal capacity 标称容量	205Ah	Refer to 2.2&2.3 standard charge and discharge procedure 参考 2.2 与 2.3 标准充放电模式测试
2.1.2	Nominal energy 标称能量	656Wh	
2.1.3	Nominal voltage 标称电压	3.2V	
2.1.4	Operation voltage 工作电压	2.5~3.65V, T>0°C 2.0~3.65V, T≤0°C	N/A
2.1.5	Cell impedance(ACR) 交流内阻	≤0.40mΩ	Fresh cell (20%~50%SOC), AC 1KHZ 新电池状态(20%~50%SOC), 1KHZ 交流电阻
2.1.6	Delivery capacity 出货容量	20%~50%SOC	N/A
2.1.7	Residual capacity loss 月自放电	Per month ≤3.5% ≤3.5%/月	Fresh cell after 3 month, 20%~50%SOC, 25±2°C storage 出货三个月以后的电芯, 标准充电到 20%~50%SOC, 25±2°C 储存
2.1.8	Operating temperature (charging) 工作温度(充电)	0~60°C	Reference to paragraph 2.2 参考第 2.2 节
2.1.9	Operating temperature (discharging) 工作温度(放电)	-30~60°C	Reference to paragraph 2.2 参考第 2.3 节
2.1.10	Cell weight 电池重量	3.90±0.30kg	N/A
2.1.11	Storage temperature 存储温度	-30~60°C (-10°C~35°C is recommended for storage) -30~60°C (建议-10°C~35°C)	Storage ambient humidity < 85% ROH, no condensation, the cells are advised to be charge-discharge after storage 6 months 存储环境湿度<85%ROH, 无凝露, 电池存储超过 6 个月建议充放电维护
2.1.12	Typical dimension (W*H*T) 电池尺寸	Width/宽度: 173.9±0.5mm Height/高度: 202.8±0.5mm Thickness/厚度: 53.8±0.8mm	Thickness with compression force (300±20Kgf), fresh cell (Reference to item 4) 300±20Kgf 压力下, 新鲜电池 (详见本技术协议第 4 条)
2.1.13	Rest SOC 静置 SOC	≥5%	SOC interval without load or charging 无负载或充电时的 SOC 区间

# PRODUCT SPECIFICATION

Version:

A02

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## 2.1 General/概要 (continuous/续上表)

No	Items/项目	Specifications/规格	Remark/备注
2.1.14	Altitude 应用海拔	$\leq 4500\text{m}$	N/A
2.1.15	Cycle performance 可充放电次数	$\geq 6000\text{Cycles}$	25±2°C, cycle test by the standard charge and discharge method under 300±20Kgf preload, 70% nominal capacity 25±2°C 初始夹紧力 300±20Kgf, 标准充放电测试, 70% 标称容量
2.1.16	Storage fading 存储衰减	$\leq 5\%$	25±2°C, standard charging to 20%~50%SOC storage under 300±20Kgf preload for 6 months 25±2°C 初始夹紧力 300±20Kgf, 标准充电至 20%~50%SOC 存储 6 个月
2.1.17	Welding parameters of pole & Bus-bar 极柱与 Bus-bar 焊接参数	Max welding depth $\leq 2.0\text{mm}$ 极柱焊接熔深 $\leq 2.0\text{mm}$	No leakage 不漏液
		Max pressure $\leq 1000\text{N}$ 极柱承受最大压力 $\leq 1000\text{N}$	No deformation 不变形
		Max torque $\leq 6\text{N}\cdot\text{m}$ 极柱承受最大扭矩 $\leq 6\text{N}\cdot\text{m}$	No loose 不松动
		Max temperature $\leq 150^\circ\text{C}$ 极柱承受最高温度 $\leq 150^\circ\text{C}$	No deformation 不变形

## 2.2 Charging mode/Parameter 充电模式/参数

No	Items/项目	Specifications/规格	Remark/备注
2.2.1	Standard charge Current 标准充电电流	105A	25±2°C
2.2.2	Standard charge voltage 标准充电电压	Cell max voltage 3.65V 单体电池最大 3.65V	25±2°C
2.2.3	Standard charge method 标准充电模式	0.5C constant current charge to 3.65 V, 3.65V continue charging till current decline to 0.05C 0.5C 恒流充电至 3.65V, 恒压充电至电流为 0.05C 截止	
2.2.4	Standard charge temperature 标准充电温度	25±2°C	Cell Temperature 电芯温度
2.2.5	Absolute charging temperature (Cell Temperature) 绝对充电温度 (电芯温度)	0~60°C	No matter what charge mode the battery is in, stop charging once the cell temperature exceeds absolute charge temperature range 无论电芯处在何种充电模式, 一旦发现电芯温度超过绝对充电温度范围即停止充电
2.2.6	Absolute charging voltage 绝对充电电压	Max 3.65V 最大 3.65V	No matter what charge mode the battery is in, stop charging once the cell voltage exceeds absolute charge voltage 无论电芯处在何种充电模式, 一旦发现电芯电压超过绝对充电电压范围即停止充电



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## 2.2.7 C-Rate Other charge Condition (Mode) 其他充电条件(模式)

### 2.2.7.1 Constant current charge/恒电流充电

Cell Temperature °C 电芯温度/°C		-10	-5	0	5	10	15	20	25	45	50
Max charge current/C 最大充电电流/C	0%~100%SOC	0.1	0.1	0.1	0.15	0.25	0.5	0.7	1.0	0.8	0.5

### 2.2.7.2 Step current charge/分阶段恒电流充电

Cell Temperature/°C 电芯温度/°C		-10	-5	0	5	10	15	20	25	45	50
Max charge current/C 最大充电电流/C	0%~70%SOC	0.1	0.1	0.15	0.2	0.3	0.6	0.8	1.0	0.8	0.75
	70%~100%SOC	0.1	0.1	0.1	0.15	0.25	0.5	0.7	1.0	0.8	0.5

## 2.3 Discharging mode/Parameter 放电模式/参数

No	Items/项目	Specifications/规格	Remark/备注
2.3.1	Standard discharge current 标准放电电流	0.5C	25±2°C
2.3.2	Maximum discharge current (continuous) 最大持续放电电流	1.0C	25±2°C
2.3.3	Discharge cut-off voltage 放电截止电压	2.5V, T>0°C 2.0V, T≤0°C	N/A
2.3.4	Standard discharge temperature 标准放电温度	25±2°C	Cell temperature 电芯温度
2.3.5	Absolute discharge temperature (Cell Temperature) 绝对放电温度 (电芯温度)	-30~60°C	Stop discharging once cell temperature is outside this range regardless of whether continuous or pulse current is adopted. 无论电芯处在持续放电模式或脉冲放电模式, 若电芯温度超过绝对放电温度, 则停止放电

### 2.3.6 D-Rate Other discharge Condition (Mode)其他放电条件(模式)

Cell Temperature/°C 电芯温度/°C		-30	-20	-20	0	5	10	15	20	25	45
Max discharge current/C 最大放电电流/C	0%~100%SOC	0.2	0.5	0.5	0.5	0.5	0.5	0.8	1.0	1.0	1.0

## 2.4 High/Low temperature capacity 高低温容量

No	Items/项目	Specifications/规格	Remark/备注
2.4.1	Capacity@55°C 55°C 容量	≥205Ah	Fresh cell, 55°C, 0.5C, 2.5V~3.65V 新电池状态, 55°C, 0.5C, 2.5V~3.65V
2.4.2	Capacity@-20°C -20°C 容量	≥154Ah	Fresh cell, -20°C, 0.5C, 2.0V~3.65V 新电池状态, -20°C, 0.5C, 2.0V~3.65V

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## 2.5 Cell temperature rise/电芯温升

The temperature rise refers to the surface temperature of the cell after discharge minus the surface temperature of the cell before discharge. The measurement of the temperature rise of the cell should be carried out in a room where the ambient temperature is relatively stable and the space is large enough. For each cell temperature measurement, a calibrated temperature sensor that records time data should be selected.

本规格书中温升是指放电后的电池表面温度减去放电前的电池表面温度。电池温升的测量应在环境温度较为稳定且空间足够大的房间里进行。每个电池温度测量应选取经过校正的可以记录时间数据的温度感应器。

No	Items/项目	Specifications/规格	Remark/备注
2.5.1	Continuous discharge temperature rise 持续放电温升	$\leq 10^{\circ}\text{C}$	The cell is discharged in the standard discharge method 电池以标准放电模式进行放电
2.5.2	Pulse discharge temperature rise 脉冲放电温升	$\leq 5^{\circ}\text{C}$	The cell is discharged at 410A for 30s under any state of charge 在任何充电状态下, 每个电池以 410A 电流放电 30 秒

## 3 Battery/Cell performance test criteria 电池测试性能标准

### 3.1 Appearance inspection by visual/外观目测

There shall be no such defect as flaw, crack, rust, stain, leakage, which may adversely affect commercial value of battery.  
电池外观应没有裂纹、爆裂、锈渍、污渍、漏液等影响商业价值的缺陷存在。

### 3.2 Environmental test condition/外界环境条件

Unless otherwise specified, all test stated in this product specification are conducted at below test condition.

所有测试应按以下环境条件进行, 除非特殊指定外。

Temperature:  $25\pm 2^{\circ}\text{C}$

Ambient pressure: 86KPa~106KPa

### 3.3 Test equipment accuracy/测试设备精度

Voltage measurement accuracy  $\geq 0.5$  grade

电压测量精度:  $\geq 0.5$  级.

Current measurement accuracy  $\geq 0.5$  grade

电流测量精度:  $\geq 0.5$  级.

Temperature measurement accuracy:  $\pm 0.5^{\circ}\text{C}$

温度测量精度:  $\pm 0.5^{\circ}\text{C}$ .

Time measurement accuracy:  $\pm 0.1\%$

时间测量精度:  $\pm 0.1\%$ .

Size measurement accuracy:  $\pm 0.1\%$

尺寸测量精度:  $\pm 0.1\%$ .



### 3.4 Safety performance/电芯安全

No	Items/项目	Test method and condition/测试方法及条件	Criteria/标准
3.4.1	Over charge test 过充电试验	<p>After standard charging, the battery shall be charged in the constant current until 1.5 times of the termination voltage or the time reaches 1h, and then observe for 1h. The charging current shall be the smaller value between 1C and the maximum continuous charging current of the product.</p> <p>电池初始化充电后，以恒流方式充电至终止电压的 1.5 倍或时间达到 1h 时停止充电，充电电流取 1C 与产品最大持续充电电流中的较小值，观察 1h。</p>	No explosion, no fire 不起火，不爆炸
3.4.2	Over discharge test 过放电试验	<p>After standard charging, the battery shall be discharged until the time reaches 90min or the voltage reaches 0V, and then observe for 1h. The discharge current is the smaller value between 1C and the maximum continuous discharge current of the product.</p> <p>电池单体初始化充电；电池单体以恒流方式放电至时间达到 90min 或电压达到 0V 时停止放电，放电电流取 1C 与产品的最大持续放电电流中的较小值，观察 1h。</p>	No explosion, no fire 不起火，不爆炸
3.4.3	Short circuit test 短路试验	<p>After standard charging, the cell is short circuit for 10 min by connecting the positive and negative terminals with a total external resistance less than 5mΩ, and observe 1h.</p> <p>电池单体初始化充电，将电池单体正、负极经外部短路 10min，外部线路电阻应小于 5mΩ；观察 1h。</p>	No explosion, no fire 不起火，不爆炸
3.4.4	Crush test 挤压测试	<p>After standard charging, The battery shall be placed on a semi-cylinder bar with a diameter of 75mm. The battery is pressed at a rate of (5±1)mm/s, until the voltage reaches 0V or the deformation amount reaches 30% or the extrusion force reaches 13±0.78 kN. Holding for 10min, and then stop the test after observing for 1h.</p> <p>电池初始化充电，放置在直径75mm的半圆柱体下，以（5±1）mm/s 的速度垂直于电池方向施压，直到电压达到0V 或者变形量达到30% 或挤压力达到13±0.78kN，保持10min后停止挤压，观察1h。</p>	No explosion, no fire 不起火，不爆炸
3.4.5	Drop test 跌落试验	<p>After standard charging, the battery which is turned the positive or negative terminal down, is dropped from a height of 1.5m to the cement floor once and observe for 1h.</p> <p>电池单体初始化充电，将电池单体的正极或负极端子朝下从 1.5m 高度处自由跌落到水泥地面上 1 次，观察 1h。</p>	No explosion, no fire 不起火，不爆炸



### 3.4 Safety performance/电芯安全(continuous/续上表)

No	Items/项目	Test method and condition/测试方法及条件	Criteria/标准
3.4.6	Low pressure test 低气压试验	<p>电池单体初始化充电, 将电池单体放入低气压箱中, 将气压调节至 11.6kPa, 温度为 (25±5) °C, 静置 6h, 观察 1h。</p> <p>After standard charging, the battery is putted into a low-pressure box, and then adjust the air pressure to 11.6kPa and the temperature is to 25±5°C. Rest for 6h and observe for 1h.</p>	No explosion, no fire, no leakage 不起火, 不爆炸, 不漏液
3.4.7	Heating test 加热试验	<p>电池单体初始化充电, 将电池放入加热试验箱, 以 5°C/min 的速率由环境温度升至 (130±2) °C, 并保持此温度 30min 后停止加热, 观察 1h。</p> <p>After standard charging, the cell is placed in the heating test chamber, which was increased from the ambient temperature to 130±2°C at a rate of 5°C/min. After maintaining the temperature for 30min, stop heat and observe for 1h.</p>	No explosion, no fire 不起火, 不爆炸
3.4.8	Thermal runaway test 热失控试验	<p>电池单体初始化充电后, 用 1C 恒流充电 12min, 启动加热装置对测试对象持续加热, 当发生热失控或监测点温度达到 300°C 时, 停止触发, 关闭加热装置, 观察 1h。(发生热失控: 升温速率≥1°C/s, 电池产生电压降或升温速率≥1°C/s, 温度达到 300°C)</p> <p>After standard charging, the cell is charged with 1C constant current for 12min, and then start the heating device to heat the battery continuously. When thermal runaway occurs or the temperature of the monitoring point reaches 300°C, turn off the heating device and observe for 1h. (Thermal runaway: heating rate ≥1°C/s, battery voltage drop or heating rate ≥1°C/s, temperature reaches 300°C)</p>	No explosion, no fire 不起火, 不爆炸

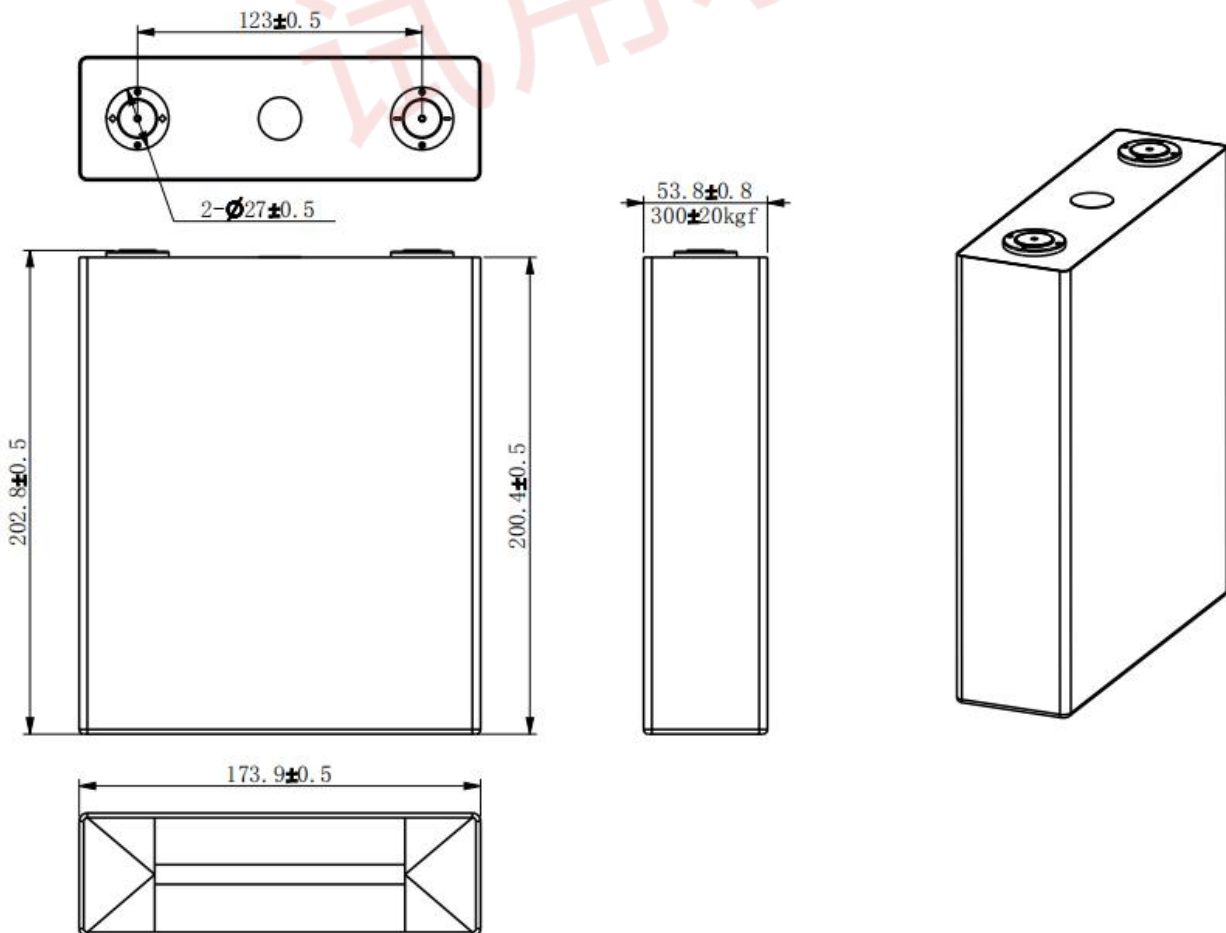
### 3.5 电池保护 Battery protection

No	Items/项目	Parameters/参数	Protective action/保护动作
3.5.1	Secondary over charge protection 第二级过充电保护	≥3.8V	Charge current limit to zero 充电电流限制为零
3.5.2	Primary over charge protection 第一级过充电保护	≥3.7V	Charge current limit to zero 充电电流限制为零
3.5.3	Secondary over discharge protection 第二级过放电保护	≤2.0V (>0°C) ≤1.6V (≤0°C)	Forced terminate discharge 强制终止放电

### 3.5 Battery protection/电池保护(continuous/续上表)

No	Items/项目	Parameters/参数	Protective action/保护动作
3.5.4	Primary over discharge protection 第一级过放电保护	$\leq 2.3V$ ( $>0^{\circ}C$ ) $\leq 1.8V$ ( $\leq 0^{\circ}C$ )	Current reduce to minimum permitted 电流降至最小
3.5.5	Over current protection 过流保护	$\leq 220A$	N/A
3.5.6	Over heating protection 过热保护	Battery temperature $\leq 60^{\circ}C$ 电芯温度 $\leq 60^{\circ}C$	Charge/discharge shall be terminated when the temperature exceeds the stipulation in this specification 电芯温度超过本规格书规定时，终止充/放电
3.5.7	Short circuit protection 短路保护	No permission 不允许短路	N/A

### 4 Cell initial Dimensions/电芯初始尺寸



No	Items	Units: mm	备注 Remark
1	厚度 (300Kgf)	53.8±0.8	参考值, 实际为准
2	宽度	173.9±0.5	参考值, 实际为准
3	高度 (不含极柱)	200.4±0.5	参考值, 实际为准
4	高度 (含极柱)	202.8±0.5	参考值, 实际为准
5	极柱间距	123.0±0.5	参考值, 实际为准

## 5 Notice for assembling battery pack/电池装配注意事项

Shocks, high temperature, or contacts of sharp edge components should not be allowed in battery pack assembling process.  
在电池装配过程中不允许撞击、高温或接触尖锐部分。

### 5.1 Prevention of short circuit within a battery pack/电池内部的短路预防

Enough insulation layers between wiring and the cells shall be used to maintain extra safety protection. the battery pack shall be structured with no short circuit within the battery pack, which may cause generation of smoke or firing.  
在电池和引线之间应该有足够的绝缘层用于安全保护。电池的包装构成应没有导致起烟起火的短路情况。

### 5.2 Cells replacement/更换电池

The cells replacement shall be done only by either cells supplier or device supplier and never be done by the user.  
更换电池应由电池生产商或设备供应商完成, 用户不要自行更换。

### 5.3 Prohibition of disassembly/禁止拆卸

#### 1) Never disassemble the cells

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

#### 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.

#### 1)不要拆卸电池。

拆卸电池会发生电池内部短路, 会引起起火、爆炸、有害气体或者其它问题。

#### 2) 电解液是有害的

万一电解液沾到皮肤、进入眼睛, 应立即用清水冲洗以及求助医生。

### 5.4 Prohibition of dumping of cells into fire/不要把电池倾倒入火中

Never incinerate nor dispose the cells in fire. these may cause explosion of the cells, which is very dangerous and is prohibited.  
不要焚毁电池, 否则会致电池爆炸, 这个很危险, 必须禁止。

### 5.5 Prohibition of cells immersion into liquid such as water/禁止浸泡电池

The cells shall never be soaked with liquids such as water, seawater, drinks such as soft drinks, juices, coffee or others.  
请不要把电池浸泡在液体当中, 像清水、海水, 及非酒精饮料、果汁、咖啡或者其它的饮料。

## 5.6 Prohibition of use of damaged cells/禁止使用损坏的电池

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 an electrolyte, an 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 or explosion.

电池可能在出货途中碰撞而受损。如果发现电池有异常，例如包装损坏、电池包裹变形，有电解液的味道、发现漏液等，不要再使用这些电池。

电池如果有电解液的味道或者出现漏液，电池放置应该远离火源避免起火及爆炸。

## 6 Period of Warranty/保质期

The period of warranty is subject to the commercial contract. 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.

电池的保质期以商务合同为准。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。

## 7 Storage of the Batteries/电池的存放

The batteries should be stored at room temperature, charged to about 20% to 50% of capacity. We recommend that batteries be charged about once per half a year to prevent over discharge.

电池应当在室温下存放，应充到 20%至 50%的电量。如长时间储存，建议每半年充一次电以防止电池过放电。

## 8 Other Chemical Reactions/其它化学反应

Because batteries utilize a chemical reaction, battery performance will deteriorate over time even if stored for a long period of time without being used. In addition, if the various usage conditions such as charge, discharge, ambient temperature, etc. are not maintained within the specified ranges the life expectancy of the battery may be shortened or the device in which the battery is used may be damaged by electrolyte leakage. If the batteries cannot maintain a charge for long periods of time, even when they are charged correctly, this may indicate it is time to change the battery.

由于电池是利用化学反应的原理，所以随时间的增加电池的性能会降低，即使是存放很长一段时间而不使用。如果使用条件如充电、放电及周围环境温度等情形不在指定的使用范围内，会使缩短电池的使用寿命，或者会产生漏液导致设备损坏。如果电池长周期不能充电，即使充电方法正确，这样需要更换电池了。

## 9 Note/注释

Any other items which are not covered in this specification shall be agreed by both parties.

本说明书未包括事项应由双方协议确定。