

产品型号 Model	ITPt 123/123/310-500E	版本号 Version No.	B4
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软包锂离子电池产品规格书

SPECIFICATION OF PRODUCT

for Pouch Lithium-ion Rechargeable Cell

型号: ITPt 123/123/310-500E

Model: ITPt 123/123/310-500E

拟定 Prepared	审核 Checked	审批 Approved
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1. 适用范围 Scope

本规格书适用于由安徽利维能动力电池有限公司生产的软包锂离子电池。

This specification is applicable to pouch lithium-ion rechargeable cell produced by EVPS Anhui Power Battery Co., Ltd.

2. 型号及说明 Model and Description

2.1 名称 Name: 软包锂离子电池 Pouch Lithium-ion Rechargeable Cell

2.2 型号 Model: ITPt 123/123/310-500E

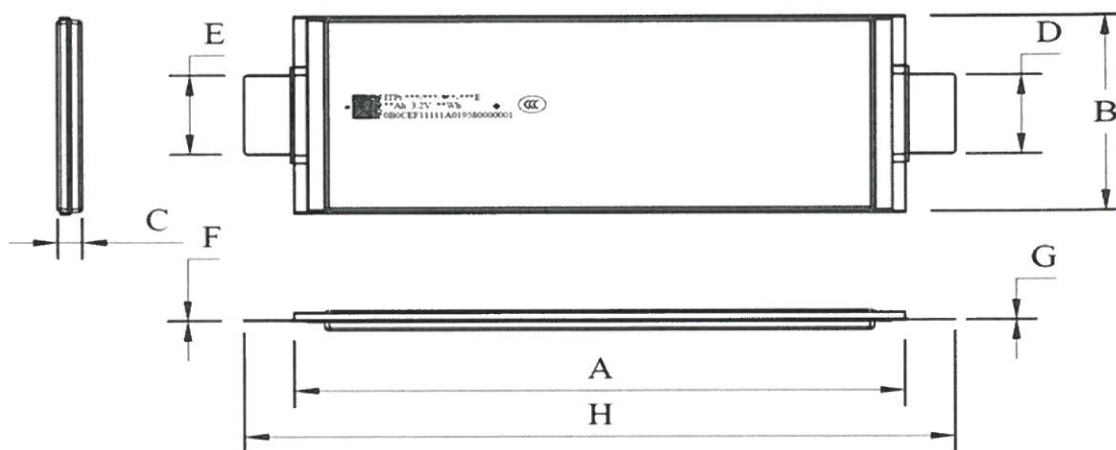
2.3 产地 Production Address: 中国安徽滁州 Chuzhou, Anhui, China

3. 产品规格 Nominal Specifications

序号 NO.	项目 ITEMS	参数 SPECIFICATION	备注 REMARK
3.1	额定容量 Rated Capacity	50.0Ah	1C@25±2°C
3.2	最小容量 Minimum Capacity	50.0Ah	1C@25±2°C
3.3	标称电压 Nominal Voltage	3.20V	
3.4	额定能量 Rated Energy	160.0Wh	1C@25±2°C
3.5	充电限制电压 Charging Cut-off Voltage	3.65V	U_{cl}
3.6	充电上限电压 Upper Limited Charging Voltage	3.65V	U_{up}
3.7	放电截止电压 Discharging Cut-off Voltage	2.00V	U_{do}
3.8	放电终止电压 Discharge End Voltage	2.00V	U_{de}
3.9	内阻 Internal Resistance	≤1mΩ(交流) ≤1mΩ (AC)	25±2°C, 1KHz
		≤3mΩ (直流) ≤3mΩ (DC)	25±2°C, 30%SOC, 3C(150A)放电 10s 25±2°C, 30%SOC, 3C(150A) discharge for 10s
3.10	最大持续充电电流 Maximum Continuous Charge Current	1.5C(75A)	25±2°C Not for Cycle 不支持寿命
3.11	最大持续放电电流 Maximum Continuous Discharge Current	2C(100A)	25±2°C Not for Cycle 不支持寿命
3.12	标准充电方式 Standard Charge Method	25°C±2°C环境温度下，以 1C(50A)恒流充电至电压达到 3.65V，转 3.65V 恒压充电到充电电流降低至 0.05C(2.5A)时停止充电。	

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		At 25°C±2°C, 1C(50A) constant current (CC) charge to 3.65V, followed by 3.65V constant voltage (CV) charge until current taper to 0.05C(2.5A).	
3.13	标准放电方式 Standard Discharge Method	25°C±2°C环境温度下，以 1C (50A)恒流放电到电压降低至 2.00V 时停止放电。 At 25°C±2°C, discharge with 1C (50A) constant current (CC) to 2.00V cut-off.	
3.14	工作温度 (电池表面温度) Operating Temperature (Cell Surface Temperature)	充电: 0°C~55°C Charge: 0°C~55°C	无论电芯处在何种充电模式，一旦发现电芯温度超过工作温度即停止充电
		放电: -20°C~60°C Discharge: -20°C~60°C	无论电芯处在何种放电模式，一旦发现电芯温度超过工作温度即停止放电
3.15	存储温度 Storage Temperature	小于 1 年: -20°C~25°C Less than 1 year: -20°C~25°C	25%~45%SOC 贮存
		小于 3 个月: -20°C~45°C Less than 3 months: -20°C~45°C	25%~45%SOC storage
3.16	重量 Weight	(910±30) g	

4. 电池尺寸



编号 Code	A	B	C	D	E	F(负极 Negative)	G(正极 Positive)	H
尺寸 Dimension /mm	310(+0,-1)	123±1	12.3±0.5	50±0.2	0.3±0.1	0.4±0.1		356±6
备注 Remark	电芯厚度测试条件: 电芯 30%SOC 电量, 使用平板测厚仪, 压力 30kgf, 持续时间 2s Thickness test conditions: 30%SOC, using a plate thickness gauge, pressure 30kgf, endurance 2s							

5. 试验条件 Standard Test Conditions

5.1 环境条件 Environmental Conditions

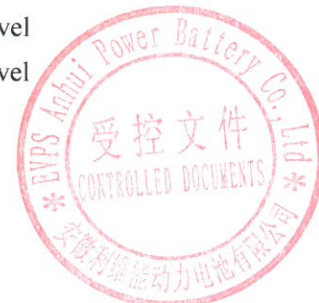
除非有特殊说明，所有测试的环境条件要求如下，温度：25±2°C；湿度：65±20% RH；大气压力：86~106 kPa。本文所提到的室温，是指25°C±2°C。

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Unless otherwise specified, all tests stated in this specification are conducted at temperature $25\pm 2^{\circ}\text{C}$; humidity $65\pm 20\%$ RH; Atmospheric pressure: 86~106 kPa. In this specification, room temperature refers to $25\pm 2^{\circ}\text{C}$.

5.2 测量仪表要求 Measuring Instrument Meter Accuracy Requirements

- 电压测量装置 Voltage measuring device: 不低于 0.5 级 no less than 0.5 level
- 电流测量装置 Current measuring device: 不低于 0.5 级 no less than 0.5 level
- 温度测量装置 Temperature measuring device: $\pm 0.5^{\circ}\text{C}$
- 时间测量装置 Time measuring device: $\pm 0.1\%$
- 尺寸测量装置 Dimension measuring device: $\pm 0.1\%$
- 质量测量装置 Quality measuring device: $\pm 0.1\%$



6. 电性能测试 Electrical Characteristics

6.1 初始容量 Initial Capacity

按标准充电方式充电后，按标准放电方式放电，重复 3 次，充电、放电时间间隔 10min，计算 3 次放电容量平均值。

Repeating the standard charging and the standard discharging for three times. The time interval between charging and discharging is 10 min. The average discharge capacity of 3 times is calculated.

3 次放电容量平均值 $\geq 100\%$ × 最小容量

Average Discharge Capacity (3 times) $\geq 100\%$ × Minimum Capacity

6.2 常温倍率放电性能 Discharge Rate Performance

按标准充电方式充电后，室温下搁置 10min 后分别以 0.5C(25A)、2C(100A)恒流放电至 2.00V。

The cell is charged according to the standard charging method, and kept for 10 min, then discharged to 2.00V at constant current of 0.5C(25A), 2C(100A), respectively.

放电容量/初始容量: 0.5C $\geq 100\%$, 2C $\geq 90\%$

Discharge Capacity / Initial Capacity: 0.5C $\geq 100\%$, 2C $\geq 90\%$

6.3 常温倍率充电性能 Charge Rate Performance

按标准充电方式充电后，分别以 0.5C(25A)、1C(50A)、1.5C(75A)恒流充电至 3.65V；搁置 10min；按标准放电至 2.00V。

The cell is charged according to the standard charging method, then charged to 3.65V with constant current of 0.5C(25A), 1C(50A) and 1.5C(75A), respectively, kept for 10min, then discharged to 2.00V with the standard method.

放电容量/初始容量: 0.5C 充电后 $\geq 97\%$, 1C 充电后 $\geq 95\%$, 1.5C 充电后 $\geq 90\%$

Discharge Capacity / Initial Capacity: After 0.5C CC Charging $\geq 97\%$, After 1C CC Charging $\geq 95\%$,

After 1.5C CC Charging $\geq 90\%$

6.4 低温放电性能 Low Temperature Performance

按标准充电方式充电后，将电池分别放入 -10°C 的环境中搁置 24h，然后电池在 -10°C 环境温度下以 0.5C(25A) 电流恒流放电，放电截止电压 2.00V。(放电环境温度控制精度: $\pm 2^{\circ}\text{C}$)

The cell is charged according to the standard charging method, placed at the environment temperature of -10°C and shelved for 24h. Then the cell is discharged to 2.00V with constant current of 0.5C(25A) at -10°C environment temperature. (Discharge environment temperature control accuracy: $\pm 2^{\circ}\text{C}$)

放电容量/初始容量: $-10^{\circ}\text{C} \geq 65\%$

Discharge Capacity / Initial Capacity: $-10^{\circ}\text{C} \geq 65\%$

6.5 高温放电性能 High Temperature Performance

按标准充电方式充电后，将电池放入 55°C 环境中搁置 5h，然后电池在 55°C 环境温度下以 1C(50A) 电流恒流放电，放电截止电压 2.00V。(放电环境温度控制精度: $\pm 2^{\circ}\text{C}$)

The cell is charged according to the standard charging method, placed at the environment temperature of 55°C and

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shelved for 5h. Then the cell is discharged to 2.00V with constant current of 1C(50A) at 55°C environment temperature. (Discharge environment temperature control accuracy: $\pm 2^{\circ}\text{C}$)

放电容量/初始容量: 55°C $\geq 95\%$

Discharge Capacity / Initial Capacity: 55°C $\geq 95\%$

6.6 常温荷电保持与容量恢复 Capacity Retention and Capacity Recovery at Room Temperature

按标准充电方式充电后，室温下开路放置 28 天；标准放电至 2.00V，放电容量记为剩余容量；室温下，按标准充电方式充电后按标准放电方式放电，重复 3 次，充、放电时间间隔 10min，3 次放电容量最高值记为恢复容量。

The cell is charged according to the standard charging method, and is kept open circuit at room temperature for 28 days, then standard discharged to 2.00V, the discharge capacity is recorded as residual capacity. Repeating standard charging and standard discharging for 3 times, the time interval between charging and discharging is 10min, the maximum of 3 times discharge capacity is recorded as recovery capacity.

剩余容量/初始容量 $\geq 90\%$ ，恢复容量/初始容量 $\geq 95\%$

Residual Capacity / Initial Capacity $\geq 90\%$, Recovery Capacity / Initial Capacity $\geq 95\%$

6.7 55°C高温荷电保持与容量恢复 Capacity Retention and Capacity Recovery at High Temperature(55°C)

按标准充电方式充电后，置于 55°C 环境中，开路放置 7 天；室温下，静置 8h；按标准放电至 2.00V，放电容量记为剩余容量；室温下，按标准充电方式充电后按标准放电方式放电，重复 3 次，充、放电时间间隔 10min，3 次放电容量最高值记为恢复容量。

The cell is charged according to the standard charging method. And kept open circuit at 55°C for 7 days, then placed at room temperature environment for 8h, then standard discharged to 2.00V, the discharge capacity is recorded as residual capacity. Repeating standard charging and standard discharging for 3 times, the time interval between charging and discharging is 10min, the maximum of 3 times discharge capacity is recorded as recovery capacity.

剩余容量/初始容量 $\geq 90\%$ ，恢复容量/初始容量 $\geq 95\%$

Residual Capacity / Initial Capacity $\geq 90\%$, Recovery Capacity / Initial Capacity $\geq 95\%$

6.8 循环寿命 Cycle Life (RT, 2.00V~3.65V, 100%DOD)

采用恒间隙循环测试， $25\pm 2^{\circ}\text{C}$ ，使用两片 15mm 钢制夹具夹持电芯（钢板尺寸参照附录 3），夹板需要覆盖住电池大面，上下夹板间隙距离以单体电池厚度($12.3\pm 0.5\text{mm}$)作为基准参考，且电池外壳无明显挤压变形，用 8 颗 M8 螺丝通过扭力扳手控制夹具初始预紧力(30 ± 10) kgf。

- 1) 1C(50A)电流恒流恒压充电至 3.65V，截止电流 0.05C(2.5A)，搁置 30min；
- 2) 1C(50A)电流恒流放电至 2.00V，搁置 30min；
- 3) 重复第一步和第二步，循环 2000 次。

The method of constant gap measurement is adopted, $25\pm 2^{\circ}\text{C}$, clamp the cell with a thickness of 15mm steel fixture (refer to Appendix 3 for steel plate dimensions) and keep the distance at the thickness of the cell ($12.3\pm 0.5\text{mm}$) as reference and the cell shell has no obvious extrusion deformation, control the initial preload of the fixture (30 ± 10) kgf with 8 M8 screws through the torque wrench.

- 1) 1C(50A) constant current charge to 3.65V, followed by 3.65V constant voltage charge until current taper to 0.05C(2.5A), then rest 30 minutes;
- 2) 1C(50A) constant current discharge to 2.00V, then rest 30 minutes;
- 3) Repeat 1st step to 2nd step for 2000 times.

第 2000 次放电容量/(前 3 次容量均值) $\geq 80\%$

2000th Discharge Capacity $\geq 80\% \times$ Average Discharge Capacity of the First Three Times

6.9 循环寿命 Cycle Life (RT, 80%DOD)

采用恒间隙循环测试， $25\pm 2^{\circ}\text{C}$ ，使用两片 15mm 钢制夹具夹持电芯（钢板尺寸参照附录 3），夹板需要覆盖住电池大面，上下夹板间隙距离以单体电池厚度($12.3\pm 0.5\text{mm}$)作为基准参考，且电池外壳无明显挤压变形，用 8 颗 M8 螺丝通过扭力扳手控制夹具初始预紧力(30 ± 10) kgf。

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- 1) 1C(50A)电流恒流放电至 2.00V，搁置 30min；
- 2) 1C(50A)电流恒流充电 54min，充电保护电压 3.65V，搁置 30min；
- 3) 1C(50A)电流恒流放电 48min，放电保护电压 2.00V，搁置 30min；
- 4) 1C(50A)电流恒流充电 48min，充电保护电压 3.65V，搁置 30min；
- 5) 重复第三步和第四步，循环 4000 次。

The method of constant gap measurement is adopted, $25\pm 2^{\circ}\text{C}$, clamp the cell with a thickness of 15mm steel fixture (refer to Appendix 3 for steel plate dimensions) and keep the distance at the thickness of the cell ($12.3\pm 0.5\text{mm}$) as reference and the cell shell has no obvious extrusion deformation, control the initial preload of the fixture (30 ± 10) kgf with 8 M8 screws through the torque wrench.

- 1) 1C(50A) constant current discharge to 2.00V, then rest 30 minutes;
- 2) 1C(50A) constant current charge 54min, charging protection voltage 3.65V, then rest 30 minutes;
- 3) 1C(50A) constant current discharge 48min, discharging protection voltage 2.00V, then rest 30 minutes;
- 4) 1C(50A) constant current charge 48min, charging protection voltage 3.65V, then rest 30 minutes;
- 5) Repeat 3rd step to 4th step for 4000 times.

第 4000 次放电容量/初始容量 $\geq 80\%$

4000th Discharge Capacity $\geq 80\% \times$ Initial Capacity

6.10 储存性能 Storage

50%SOC 荷电态电池在 $45\pm 2^{\circ}\text{C}$ 环境温度下储存 28 天后，按标准充、放电制度循环 3 次(充放电时间间隔 10min)，3 次放电容量最高值记为恢复容量。

The cell is kept at $45\pm 2^{\circ}\text{C}$ for 28 days with the capacity of 50%SOC. The repeating standard charging and standard discharging for 3 times (the time interval between charging and discharging is 10 min), the maximum of 3 times discharge capacity is recorded as recovery capacity.

恢复容量/初始容量 $\geq 92\%$

Recovery Capacity / Initial Capacity $\geq 92\%$

7.安全性和环境适应性测试 Safety and Environmental Suitability Testing

下述试验应在有强制排风和防爆措施的装置内进行。

The following tests should be carried out in a facility with forced ventilation and explosion-proof measures.

7.1 挤压测试 Crush

电池按标准充电方式充电后，平放于挤压平台，以半径 75mm 的半圆柱体垂直于电池极板方向施压；半圆柱体长度(L)大于被挤压电池长度；挤压速度(5 ± 1)mm/s；当单体电池电压达到 0V 或变形量达 15%后或挤压压力达到 200kN 停止挤压并观察 1h。

After standard charging, the cell is put on the extrusion platform and crushed with a half cylinder (radius 75mm) at a rate of 5 ± 1 mm/s, the length of which was bigger than the thickness of cell. The direction of the crushing force shall be vertical to axis of the cylinder. The test could be terminated if the crushed cell voltage reaches 0V or deformation extent achieves 15% or crushing force runs to 200kN and observed for 1h.

电池不起火，不爆炸

No fire, No explosion

7.2 加热测试 Heating

电池按标准充电方式充电后，放置于空气流通的热箱中，热箱内温度以($5\pm 2^{\circ}\text{C}$)/min 的速率升至 $130\pm 2^{\circ}\text{C}$ 并保持 30min，停止加热，取出电池，观察 1h。

After standard charging, the cell is heated in a hot oven with air circulation, the temperature of the oven is to be raised at a rate of $5\pm 2^{\circ}\text{C}$ per minute to $130\pm 2^{\circ}\text{C}$ and remain for 30min, Then the heating shall be stopped and observed for 1h.

电池不起火，不爆炸

No fire, No explosion

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7.3 过充电测试 Over Charge

电池上夹具，初始夹紧力(30±10)kgf，电池按标准充电方式充电后，再以 1C(50A)电流恒流充电至 5.475V，观察 1h。

The cell preload with (30±10)kgf, after standard charging, the cell is charged with a constant current of 1C(50A) to 5.475V and observed for 1h.

电池不起火，不爆炸

No fire, No explosion

7.4 短路测试 Short Circuit

电池上夹具，初始夹紧力(30±10)kgf，电池按标准充电方式充电后，将电池外部短路 10min，外部线路电阻应小于 5mΩ，观察 1h。

The cell preload with (30±10)kgf, after standard charging, then external short circuit the cell for 10min, and the resistance of the external line shall be less than 5mΩ and observed for 1h.

电池不起火，不爆炸

No fire, No explosion

7.5 过放电测试 Over Discharge

电池按标准放电方式放电后，再以 1C(50A)放电 90min，观察 1h。

After standard charging, the cell is discharged with a constant current of 1C(50A) for 90min and observed for 1h.

电池不起火，不爆炸

No fire, No explosion

7.6 低气压测试 Low Pressure Performance

电池按标准充电方式充电后，将电池放入低气压箱中，调节试验箱中气压为 11.6kPa (模拟海拔高度 8075m)，温度为室温，静置 6h，停止试验，取出电池，观察 1h。

After standard charging, the cell is put into a low-pressure box with a pressure of 11.6kPa (simulating altitude 8075m) at room temperature, kept for 6h and observed for 1h after taken out.

电池不起火，不爆炸，不漏液

No fire, No explosion, No leakage

7.7 温度循环测试 Temperature Cycle

电池按标准充电方式充电后，将电池放入温度箱中，温度箱温度按照下表进行调节，循环次数5次；观察 1h。

After standard charging, the cell is put into the constant temperature oven and the temperature of the oven is set up according to table 1, repeating for 5 times and observed for 1h.

温度循环实验一个循环的温度和时间 The temperature and time of a cycle			
温度/°C Temperature/°C	时间增量/min Increment/min	累积时间/min Accumulation /min	温度变化率/°C/min Temperature Variation rate/°C/min
25	0	0	0
-40	60	60	13/12
-40	90	150	0
25	60	210	13/12
85	90	300	2/3
85	110	410	0

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25	70	480	6/7

电池不起火，不爆炸，不漏液

No fire, No explosion, No leakage

7.8 跌落测试 Drop Test

电池按标准充电方式充电后，由 1.2m 高度自由跌落到水泥地面上，正、负端子向下各 1 次，观察 1h。

After standard charging, the cell is dropped onto the cement floor from 1.2 meters height, the positive and negative terminal is downward once, respectively.

电池不起火，不爆炸

No fire, No explosion

7.9 海水浸泡测试 Sea Water Immersing

电池按标准充电方式充电后，将电池浸入 3.5%NaCl 溶液(质量分数，模拟常温下的海水成分)中 2h，水深应完全没过电池。

After standard charging, the cell is completely immersed into 3.5% NaCl solution (mass fraction, simulating the composition of seawater under normal temperature) for 2h, the water should be under the cell.

电池不起火，不爆炸

No fire, No explosion

8. 产品外观 Appearance

8.1 条码清晰，可完整正确的扫取电池条码信息，确保读取成功率≥99.5%。

Barcode clear, complete and correct barcode information can be scanned to ensure read success rate≥99.5%.

8.2 电池表面平整，无磕碰、褶皱等不良，无划痕、硌伤、破损、腐蚀。

The surface of the cell is smooth, without bumps, wrinkles, scratches or crushes.

8.3 电池无破损、腐蚀等损伤，密封性良好，无漏液。

Cell without damage, corrosion and other damage, good sealing, no leakage.

9. 产品包装 Product Packaging

9.1 产品包装严格执行国家和行业有关标准。

Product packaging shall strictly comply with relevant national and industrial standards.

9.2 提供产品供货清单、出厂检验报告、合格标签。

Provide the product supply list, factory inspection report and qualified label.

9.3 电池使用吸塑盘盛放，外包装使用瓦楞纸箱，每箱包装 20 只电池。

The cells are stored in a blister tray and their outer packaging is corrugated, the packed in a carton for 20 cells.

10. 产品运输 Product Transport

10.1 箱内做好防震措施确保运输过程的安全，行驶过程中尽量避免紧急启动或者刹车。

Take anti-shock measures in the box to ensure the safety of the transportation process. Try to avoid emergency start or brake during the driving process.

10.2 在运输过程中不和易燃、易爆、易腐蚀的物品同车装运，不经受雨、雪或液体物质的淋袭与机械损伤。

In the process of transportation, inflammable, explosive and easily corroded articles shall not be transported together with the vehicle and shall not be subjected to rain, snow or liquid substances and mechanical damage.

10.3 产品装卸时，采用升降车或专用工具对产品进行装、卸车，轻取轻放不扔掷、挤压，避免造成电池损坏或对人身造成意外伤害，不与酸碱等腐蚀物品放在一起。

When loading and unloading the products, lift cars or special tools shall be used to load and unload the products. Take

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and put them gently without throwing or squeezing, so as to avoid cell damage or accidental personal injury and not put them together with acid, alkali and other corrosive materials.

11.使用注意事项 Caution

11.1 当使用中电池内阻超过这个电池最初内阻的 150%，或电池的容量小于等于 80%标称容量应停止使用。

Discontinue use when the internal resistance of the cell exceeds 150% of the initial internal resistance of the cell, or the capacity of the cell is less than or equal to 80% of the nominal capacity.

11.2 若预计将电池存放 30 天以上，应将电池电量调整为满电态容量的 25%~45%。

If the cell is expected to be stored for more than 30 days, the cell should be adjusted to 25% to 45% of its full capacity.

11.3 电箱设计应充分考虑到电池的散热、防水、防尘问题，满足国家有关标准规定的防水、防尘等级，由于电箱问题导致电池过热损坏电池，或由于防水、防尘问题导致电池损坏(如腐蚀、生锈等)，利维能动力电池有限公司不承担质量保证责任。

The design of the electric box should fully take into account the problems of heat dissipation, waterproof and dustproof of the cell, and meet the requirements of the relevant national standards for waterproof and dustproof. EVPS Anhui Power Battery Co., Ltd will not be liable for the quality guarantee if the cell is damaged due to overheating of the cell due to electrical box problems, or if the cell is damaged due to waterproof or dustproof problems (corrosion, rust, etc.).

11.4 电池在任何正常使用情况下，电池的温度不能超过 60℃，电池避免在低于 0℃条件下充电，否则可能出现容量快速衰竭现象。

In any normal use of the cell, the temperature of the cell should not exceed 60℃, the cell should not be charged under the condition of 0℃, otherwise there may be rapid capacity depletion.

11.5 不要用超过规格要求的电流对电池进行充放电。

Do not charge and discharge the cell with more current than required.

11.6 严格按照指示和说明连接电池正负极，禁止反向充电。

Strictly follow the instructions and instructions to connect the positive and negative terminals of the cell, do not reverse charge.

11.7 避免电池受机械振动碰撞及压力冲击，否则电池内部可能短路，产生高温或火灾。

Avoid the cell by mechanical vibration impact and pressure impact, otherwise the cell may short circuit, high temperature or fire.

11.8 电池应储存在阴凉干燥处。

Cell should be stored in a cool, dry place.

11.9 禁止将电池投入火中或试图拆开。

Do not throw cells into fire or attempt to disassemble.

11.10 禁止电池正负极短路和过充，否则强电流和高温可能导致人身伤害或者火灾。

Do not short-circuit or overcharge the positive and negative terminals of the cell, otherwise strong current and high temperature may cause personal injury or fire.

11.11 避免电池过放电，过放电会导致电池永久性的破坏。

Avoid over discharging the cell, which can cause permanent damage to the cell.

11.12 当电解液泄漏时，应避免皮肤和眼睛接触到电解液，如有接触，应使用大量的清水冲洗接触区域，并向医生寻求帮助，禁止任何人和动物吞食电池任何部件或电池所含物质。

When electrolyte leakage should avoid skin and eyes contact with the electrolyte. If there is contact, should use plenty of water to wash the contact area and seek help from a doctor, prohibit people and animals to swallow any parts of the cell

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or cell contained substances.

11.13 为了安全起见，如有设备设计、锂离子电池系统保护电路或高电流、快速充电和其它方面的特殊应用，请先咨询本公司相关事宜。

For the sake of safety, if you have equipment design, lithium-ion cell system protection circuit or high current, fast charging and other special applications, please consult with us first.

11.14 对因违反安全守则操作或因电池组装、电路、电池组、充电器滥用等情况造成电池质量问题，本公司不承认电池质量保证责任。

The company does not accept the responsibility of cell quality assurance for cell quality problems caused by operation in violation of safety rules or cell assembly, circuit, cell pack, charger abuse, etc.

12. 保证 Guarantee

12.1 电池正常使用半年内，经确认出现产品本身原因而造成的质量问题，可由本公司予以解决，此期限外或非产品本身原因而是客户误用造成的电池质量问题，本公司不承诺免费更换。

Within half a year of normal use of the cell, the company can solve the quality problems caused by the product itself after confirmation. After this period or the cell quality problems caused by the customer's misuse of the product, the company does not promise to replace the cell free of charge.

12.2 为了安全起见，如有设备设计、锂离子电池系统保护电路或高电流、快速充电和其它方面的特殊应用，请先咨询本公司相关事宜。

For the sake of safety, if you have equipment design, lithium-ion cell system protection circuit or high current, fast charging and other special applications, please consult with us first.

12.3 本公司对违反安全守则操作所产生的问题不承担任何责任。

The company does not assume any responsibility for any problems arising out of operation in violation of safety rules.

12.4 本公司对于电路，电池组以及充电器搭配使用所产生的问题不承担任何责任。

The company is not responsible for any problems caused by the combination of the circuit, cell pack and charger.

12.5 本公司对于出货后客户在电池组装过程中产生的不良电池不予以质量保证。

The company does not guarantee the quality of defective cells produced by customers during the cell assembly process after shipment.

13. 长时间存储 Storage for Long Time

存储带电量建议 25%~45% SOC，湿度在 25%~85%RH。如果电池长期存储，应在 3.15 规定的条件下进行，储存过程中电池不能结露。此外，每六个月给电池充电一次。另外，若以带电量 6.5%SOC 存储，建议最佳存储时间为 1 个月内，存储时间最长不超过 90 天(3 个月)。

The recommended cell storage capacity of 25% to 45% SOC and the recommended humidity of 25% to 85% RH. If the cell is stored for a long period of time, it shall be stored under the conditions specified in 3.15 and the cell shall not be dewy during storage. Also, charge the cell every six months. In addition, for 6.5%SOC storage, the recommended best storage time is 1 month, and the maximum storage time is no more than 90 days (3 months).

14. 其它 Others

规格书未尽事宜，由双方协商解决。

Matters not mentioned in the specifications shall be settled by both parties through negotiation.

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附录 1 Appendix 1:

锂离子电池使用指南

Lithium-ion Cell Usage Guide

使用锂离子电池前请参阅此文件，由安徽利维能动力电池有限公司提供。

Please refer to this document before using lithium-ion cell, provided by EVPS Anhui Power Battery Co., Ltd.



1. 概括 Generalize

本文件旨在为客户提供适当的警告和禁止措施，以便客户在使用安徽利维能动力电池有限公司生产和提供的锂离子电池时获得最佳的性能和安全性。

The purpose of this document is to provide customers with appropriate warnings and prohibitions so that customers can obtain the best performance and safety when using lithium-ion cell manufactured and supplied by EVPS Anhui Power Battery Co., Ltd.

2. 充电 Charge

2.1. 充电电流 Charge Current

充电电流应不高于产品规格书规定的最大充电电流。

The charging current shall not be higher than the maximum charging current specified in the product specification.

2.2. 充电电压 Charge Voltage

充电电压应不高于产品规格书规定的电压。

The charging voltage shall not be higher than the voltage specified in the product specification.

2.3. 充电温度 Charge Temperature

电池应在产品规格书中规定的温度范围内充电。

The cell shall be charged in the temperature range specified in the product specification.

2.4. 反向充电 Reverse Charge

连接电池时应确认其两极正确对齐，严禁反向充电。如果电池连接不当，可能会损坏。

When connecting the cell, make sure its two poles are aligned correctly and reverse charging is strictly prohibited. The cell can be damaged if they are not properly connected.

3. 放电 Discharge

3.1. 放电 Discharge

放电电流应不高于产品规格书中规定的最大放电电流。

The discharge current shall not be higher than the maximum discharge current specified in the product specification.

3.2. 放电温度 Discharge Temperature

3.2.1. 电池应在产品说明书规定的温度范围内放电。

The cell shall be discharged in the temperature range specified in the product specification.

3.2.2. 电池在规定温度范围外放电，会造成电池的性能损失。

The cell discharge outside the specified temperature range will result in cell performance loss.

3.3. 过放 Over Discharge

3.3.1. 系统应配置防止超过产品规格书中规定的放电截止电压后进一步放电的装置。

The system shall be equipped with a device to prevent further discharge beyond the discharge cut-off voltage specified in the product specification.

3.3.2. 过放会导致电池性能、特性和功能的损失。

Over discharge can result in loss of cell performance, characteristics and functions.

3.3.3. 电池长时间不使用，电池的自放电可能会导致过放电。

Over discharge may occur when the cell is not used for a long time.

3.3.4. 充电器应装有检测电池电压和确认充电程序的装置。

The charger should be equipped with a device to detect the cell voltage and confirm the charging procedure.

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4. 存储 Storage

4.1. 存储条件 Storage Condition

4.1.1. 电池应储存在产品规格书规定的温度范围内。

The cell should be stored in the temperature range specified in the produce specification.

4.1.2. 电池存储在规定的温度范围外，可能会导致电池性能损失、泄漏。

The cell storage outside the specified temperature range may result in loss of cell performance and leakage.

4.2. 长期储存 Long-term Storage

4.2.1. 充电后应短期内使用，长期存放会因电池的自放电而导致容量损失。

After charging, it should be used for a short time. Long-term storage will result in capacity loss due to self-discharge of the cell.

4.2.2. 如果需要长期储存，电池应在产品规格书规定条件内以较低的电压储存，因为较高的电压储存可能造成性能的损失。

If long-term storage is required, the cell should be stored at a lower voltage within the range specified in the product specification, as higher voltage storage may result in loss of performance.

5. 循环寿命 Cycle Life

5.1. 循环寿命表现 Cycle Life Performance

5.1.1. 电池可以在产品规格书规定的次数内重复充放电，并保持有产品规格书内规定的容量。

The cell can be charged and discharged repeatedly within the number of times specified in the product specifications and maintain the capacity specified in the product specifications.

5.1.2. 电池的循环寿命由充电、放电、工作温度、储存环境和预紧力决定。

The cycle life of the cell is determined by charging, discharging, operating temperature, storage environment and preloading force.

6. 系统设计 Systematic Design

6.1. 电池与电池的连接 Cell to Cell Connection

6.1.1. 电池不能直接用导线焊接。应该先在电池端子上焊接导线，再在焊点上进行锡焊固定。

The cell cannot be welded directly with wires. The conductors should be soldered to the cell terminals and then soldered to the solder joints.

6.1.2. 直接用导线焊接，产生的热量会对隔膜、绝缘片等部件造成损坏。

Direct use of wire welding, the heat generated will cause damage to the diaphragm, insulation and other parts.

6.2. 在系统中定位电池 Locate the Cell in the System

6.2.1. 电池应尽可能远离热源和高温元件。

The cell should be as far away from heat sources and high-temperature components as possible.

6.2.2. 电池离热源和高温元件近，会造成性能损失。

The cell proximity to heat sources and high-temperature components can cause performance loss.

6.3. 电池的机械减震保护 Mechanical Shock Absorber Protection for Cell

6.3.1. 电池应配备减震器，以尽量减少冲击。

The cell should be equipped with shock absorbers to minimize impact.

6.3.2. 电池未配备减震器，会引起变形、漏液、发热或破裂。

The cells are not equipped with shock absorbers, which can cause deformation, leakage, heating or rupture.

6.4. 电池与充电器/系统之间的连接 The Connection Between the Cell and the Charger/System

电池应设计成只能连接到指定的充电器和系统，即使在指定的系统中，也应避免使用特殊的电池设计，如特殊的终端，用来防止电池反向连接。

The cell should be designed to be connected only to specified chargers and systems. Even in specified systems, special cell designs, such as special terminals, should be avoided to prevent the cell from being connected in reverse.

6.5. 电池管理系统控制要求 Cell Management System Control Requirements

6.5.1. 当电池的电压达到 3.65V 时终止充电。

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The charging is terminated when the voltage of the cell reach to 3.65V.

6.5.2. 当电池电压达到 3.80V 触发一级保护终止充电。

The first-level protection is triggered to terminate the charging when the cell voltage reach to 3.80V.

6.5.3. 当电池电压达到4.00V触发二级保护终止充电，并锁定电池管理系统直到技术人员解决问题。

The secondary protection is triggered to terminate the charging and lock the cell management system until the technician solves the problem when the cell voltage reach to 4.0V.

6.5.4. 当电池的电压达到 2.00V 终止放电，并触发一级保护，将电流降为 0。

The first-level protection is triggered to terminate the discharge and the current is reduced to 0 when the voltage of the cell reach to 2.00V.

6.5.5. 当电池电压低于 1.80V 时触发二级保护终止充电，将电流降为 0，锁定电池管理系统直到技术人员解决问题。

The secondary protection is triggered to terminate the charging and reduce the current to 0, and lock the cell management system until the technician solves the problem when the cell voltage is lower than 1.80V.

6.5.6. 发生短路时，触发短路保护，由过流器断开电池。

When a short circuit occurs, the short circuit protection is triggered and the cell is disconnected by the overcurrent device.

6.5.7. 电池管理系统控制放电电流符合规格书规定。

The cell management system controls the discharge current to comply with the specification.

6.5.8. 当温度超过本规格书规定时，终止充电/放电。

When the temperature exceeds the specification of this specification, the charge/discharge is terminated.

备注：以上 No.6.5.2、6.5.3、6.5.4、6.5.5 为警示条款，提醒客户注意：当电池达到上述任何一项条款描述的指标和参数状态时，意味着电池已超出本规格书规定的使用条件，客户需依“保护动作”及本规格书其他相关规定对电池采取保护措施，同时，声明对上述使用状态的电池质量不承担任何保证责任，并对因此而导致的客户及第三方的任何损失不予赔偿。

Remarks: The above No.6.5.2, 6.5.3, 6.5.4, 6.5.5 are warning clauses, please pay attention to customers: when the cell reaches the indicators and parameters described in any of the above clauses, it means that the cell has exceeded this limit. For the conditions of use specified in the specification, the customer shall take protective measures for the cell in accordance with the "protective action" and other relevant provisions of this specification. And any damages to third parties will not be compensated.

7. 电池组组装 Cell Pack Assembly

7.1. 禁止使用已损坏的电池 Do Not Use Damaged Cell

7.1.1. 组装前应先目视检查电池。

The cell should be visually checked before assembly.

7.1.2. 发现壳体变形或电解液异味，请勿使用。

Do not use if the shell is deformed or the electrolyte smells.

7.2. 运输 Transportation

电池需要运输到订购地点，应采取谨慎的预防措施，以避免电池损坏。

The cell need to be shipped to the place of order and careful precautions should be taken to avoid cell damage.

8. 其它 Others

8.1. 拆卸 Disassembly

8.1.1. 严禁从电池组中拆卸电池。

Do not remove the cell from the pack.

8.1.2. 由拆卸引起的内部短路可能导致发热和/或泄气。

Internal short circuits caused by disassembly may result in heating and/or deflating.

8.1.3. 当电解液接触皮肤或眼睛时，应立即用清水冲洗并就医。

When the electrolyte comes into contact with the skin or eyes, rinse immediately with water and seek medical attention.

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8.2. 短路 Short Circuit

8.2.1. 短路会产生巨大的电流而导致发热。

A short circuit will generate a large current and cause heat.

8.2.2. 应采用适当的电路来保护意外短路。

An appropriate circuit should be used to protect against accidental short circuits.

8.3. 焚烧 Incineration

严禁在火中焚烧或处理电池，因为这会导致电池破裂。

It is strictly prohibited to burn or dispose of cell in a fire as this can cause them to rupture.

8.4. 浸泡 Immerse

严禁将电池浸泡在水中，因为这会导致组件熔化而损伤功能。

Do not immerse the cell in water, as this will cause the component to melt and damage its function.

8.5. 混合使用 Combination

8.5.1. 混用不同类型的电池或不同厂家的相同类型电池，由于电池的特性不同，可能导致电池破裂或对系统造成损坏，虽然电池不含铅或镉等对环境有害的成分，电池在处理时仍应按当地规定进行。

Mixed use of different types of cells or the same type of cells from different manufacturers may lead to cell rupture or damage to the system due to different characteristics of the cells. Although the cells do not contain environmentally harmful ingredients such as lead or cadmium, the cells should be handled in accordance with local regulations.

8.5.2. 处理电池时应为放完电状态，以避免因意外短路而产生热量。

The cell should be handled in the drained state to avoid heat generation due to accidental short circuit.

8.6. 警告 Warning

8.6.1. 如果使用不当，电池可能有起火或化学腐蚀的危险。

If not used properly, the cell may be a fire hazard or chemical corrosion.

8.6.2. 禁止拆卸电池，禁止将电池加热至超过 100°C 或焚烧。

Do not remove the cell, do not heat the cell to more than 100°C or incinerate it.

8.6.3. 在电池替换时仅可使用利维能电池，使用其它电池可能有起火或爆炸的危险。

Use only EVPS cell when replacing cell. There is a risk of fire or explosion when using other cells.

8.6.4. 及时处理用过的电池。切勿随意拆卸，切勿在火中弃置。

Dispose of used cell in a timely manner. Do not disassemble at will, do not discard in the fire.

8.6.5. 禁止坠落、冲击、弯折电池。

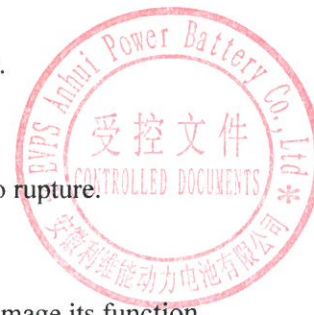
Do not fall, impact or bend the cell.

8.6.6. 电池外壳设计和包装禁止损伤电池。

Cell enclosure design and packaging shall not damage the cell.

8.6.7. 远离儿童。

Away from children.



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附录 2 Appendix 2:

锂离子电池的处理注意事项和禁止事项

Lithium-ion Cell Handling Matters Needing Attention and Prohibited Matters

锂离子电池处理不当可能导致泄漏、发热、烟雾、爆炸或火灾，可能会导致电池性能下降或电池性能丧失或安全事故，请务必仔细按照说明操作。

Improper handling of lithium-ion cell may result in leakage, heat, smoke, explosion or fire, which may lead to cell performance degradation or loss of cell performance or safety accidents. Please be sure to follow the instructions carefully.

1. 存储 Storage

存储电池应在室温(推荐 $25 \pm 3^{\circ}\text{C}$)、湿度低($<50\%\text{RH}$)、没有灰尘和腐蚀性气体的整洁干净环境中。

The cell should be stored at room temperature (recommended $25 \pm 3^{\circ}\text{C}$)、low humidity($<50\%\text{RH}$)、free of dust and corrosive gases and clean and tidy environment.

2. 安全预防和禁止事项 Safety Precautions and Prohibitions

为确保产品安全，请在使用说明书中说明以下注意事项。

To ensure the safety of the product, please state the following points for attention in the instruction manual.

3. 危险 Danger

3.1 电池滥用 Cell Abuse

3.1.1. 使用专用充电。

Use dedicated charging.

3.1.2. 仅在专用应用程序中使用或充电电池。

Use or charge the cell in dedicated applications only.

3.1.3. 不要直接用插座或点烟器充电器给电池充电。

Do not charge the cell directly from an outlet or cigarette lighter charger.

3.1.4. 不要给电池反向充电。

Do not reverse charge the cell.

3.2 环境滥用 Environmental Abuse

3.2.1. 不要把电池放在靠近火源或热源的地方。

Do not place cell near a fire or heat source.

3.2.2. 不要把电池扔进火里。

Do not throw cell into the fire.

3.2.3. 不要在温度可能超过规定的工作温度范围及存储温度范围的条件下使用，如直射阳光下或类似条件。

Do not use in conditions where the temperature may exceed the specified operating temperature range and storage temperature range, example for direct sunlight or similar conditions.

3.2.4. 请勿将电池浸没、抛掷、浸湿于水中。

Do not immerse, throw or immerse the batter in water.

3.3 其它 Others

3.3.1. 不要将电池与钥匙、项链、发夹、硬币或螺丝等金属物品一起存放在口袋或袋子里。

Do not store cells in pockets or bags with metal objects such as keys, necklaces, hairpins, coins or screws.

3.3.2. 不要故意将电池的正负极端子用金属物体连接。

Do not intentionally connect the positive and negative terminals of the cell with metal objects.

3.3.3. 不要用针、螺丝刀等锋利的物体刺穿电池。

Do not pierce the cell with a sharp object such as a needle or screwdriver.

3.3.4. 不要用烙铁等加热物体加热电池。

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Do not heat the cell with a soldering iron or other heating object.

3.3.5. 不要用锤子等重物击打电池。

Do not hit the cell with a hammer or other heavy object.

3.3.6. 请勿踩在电池上，将电池扔或摔在坚硬的地板上，以免造成机械冲击。

Do not step on the cell. Throw or drop the cell on a hard floor to avoid mechanical impact.

3.3.7. 请勿拆解电池。

Do not disassemble the cell.

3.3.8. 不要直接在电池上焊接。

Do not solder directly on the cell.

3.3.9. 不要使用严重损坏或变形的电池。

Do not use badly damaged or deformed cell.

3.3.10. 不要将电池放入微波炉、烘干机或高压容器中。

Do not put the cell in microwave ovens, dryers, or high-pressure containers.

3.3.11. 请勿将电池与其他厂电池、不同类型或其它型号电池(如干电池、镍氢电池或镍镉电池)一起使用或组装。

Do not use or assemble the cell with other factory cell, different or other types of cell (such as dry cell, nickel-metal hydride cell or nickel-cadmium cell).

3.3.12. 不要混合使用或组装新旧电池。

Do not mix or assemble old and new cell.

4. 警告 Warning

4.1. 如果在规定时间内没有完成充电，请停止充电。

If the charging is not completed within the specified time, please stop charging.

4.2. 如果在使用、充电或储存过程中发现电池出现异常发热、变色、变形或异常情况，请停止使用电池。

If the cell appears abnormal heat, discoloration, deformation or abnormal conditions during use, charging or storage, please stop using the cell.

4.3. 如发现有泄漏或异味，应立即远离火源。如果液体泄漏到皮肤或衣物上，立即用清水冲洗干净。

If there is leakage or odor, keep away from the fire immediately. If liquid leaks onto skin or clothing, rinse immediately with clean water.

4.4. 如果电池漏液进入眼睛，不要揉搓眼睛，应用清水洗净并立即前往医院治疗。

If the cell leaks into your eyes, do not rub your eyes. Rinse them with clean water and go to the hospital immediately.

4.5. 如果电池的正负极端子变脏，使用前用干布擦拭。

If the positive and negative terminals of the cell are dirty, wipe them with a dry cloth before use.

4.6. 电池可在以下温度范围内使用。请勿超过这些范围。

充电温度：0°C ~ 55°C。放电温度：-20°C ~ 60°C。

The cell can be used in the following temperature range. Do not exceed these limits.

Charging temperature: 0°C ~ 55°C. Discharge temperature: -20°C ~ 60°C.

4.7. 处理电池前应先用合适的绝缘胶带覆盖正、负极端子。

Cover the positive and negative terminals with appropriate insulating tape before handling the cell.

5. 谨慎操作 防止电池滥用 Careful Operation to Prevent Cell Abuse

5.1. 电池必须使用恒流恒压充电。

Cell must be charged with constant current and constant voltage.

5.2. 充电电流必须控制在电池规格书中指定的值以内。

The charging current must be controlled within the value specified in the cell specification.

5.3. 充电截止电压不得超过 3.65V。

Charging cut-off voltage shall not exceed 3.65V.

5.4. 当达到电池规格中指定的充电时间或电流时，充电器必须停止充电。

The charger must stop charging when the charging time or current specified in the cell specification is reached.

5.5. 放电电流必须控制在电池规格书中指定的值以内。



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The discharge current must be controlled within the values specified in the cell specification.

5.6. 放电截止电压不得小于 2.00V。

Discharge cut-off voltage shall not be less than 2.00V.

6. 运输安全操作规程 Code for Safe Operation of Transportation

6.1. 包装被压坏、刺破或撕开查看过的不得运输，此类包装应予以隔离。

Package crushed, punctured or torn upon inspection shall not be transported and such packages shall be quarantined.

6.2. 漏液产品如果包装破损导致电池或电池漏液的，应及时收集和隔离漏液产品，并与发货人联系以获得指示。

If the cell or cell leakage is caused by damaged packaging, the leaking product should be collected and isolated in time and contact the shipper for instructions.

6.3. 电池组在应用中防止高温对电池性能的影响，电池在应用和充电过程中应远离产生热量的区域。

The cell pack shall be used to prevent the effect of high temperature on the performance of the cell, and the cell shall be kept away from the area of heat generation during the application and charging process.

7. 其它 Others

7.1. 电池远离婴幼儿，避免发生吞咽等意外。

Keep the cell away from infants to avoid swallowing and other accidents.

7.2. 如儿童使用电池，其监护人应在使用前说明正确使用方法及注意事项。

If children use cell, their guardians should explain the correct use methods and precautions before using them.

7.3. 在使用电池前，请务必阅读使用说明书及注意事项。

Please read the instructions and precautions before using the cell.

7.4. 在使用充电器前，请务必阅读充电器使用说明书。

Please read the instructions before using the charger.

7.5. 在从应用中安装和拆卸电池之前，请务必阅读应用的使用说明书。

Be sure to read the instruction manual before installing and removing the cell from the application.

7.6. 当电池的使用时间比以往短很多时，请及时更换电池。

When the cell life is much shorter than before, please replace the cell in time.

7.7. 如果电池需要储存较长一段时间，应先将电池从应用中拆卸出，并存放于阴凉干燥处。

If the cell needs to be stored for an extended period of time, it should be removed from the service and stored in a cool and dry place.

7.8. 电池在充电、使用和储存过程中，应远离会产生静电的物体。

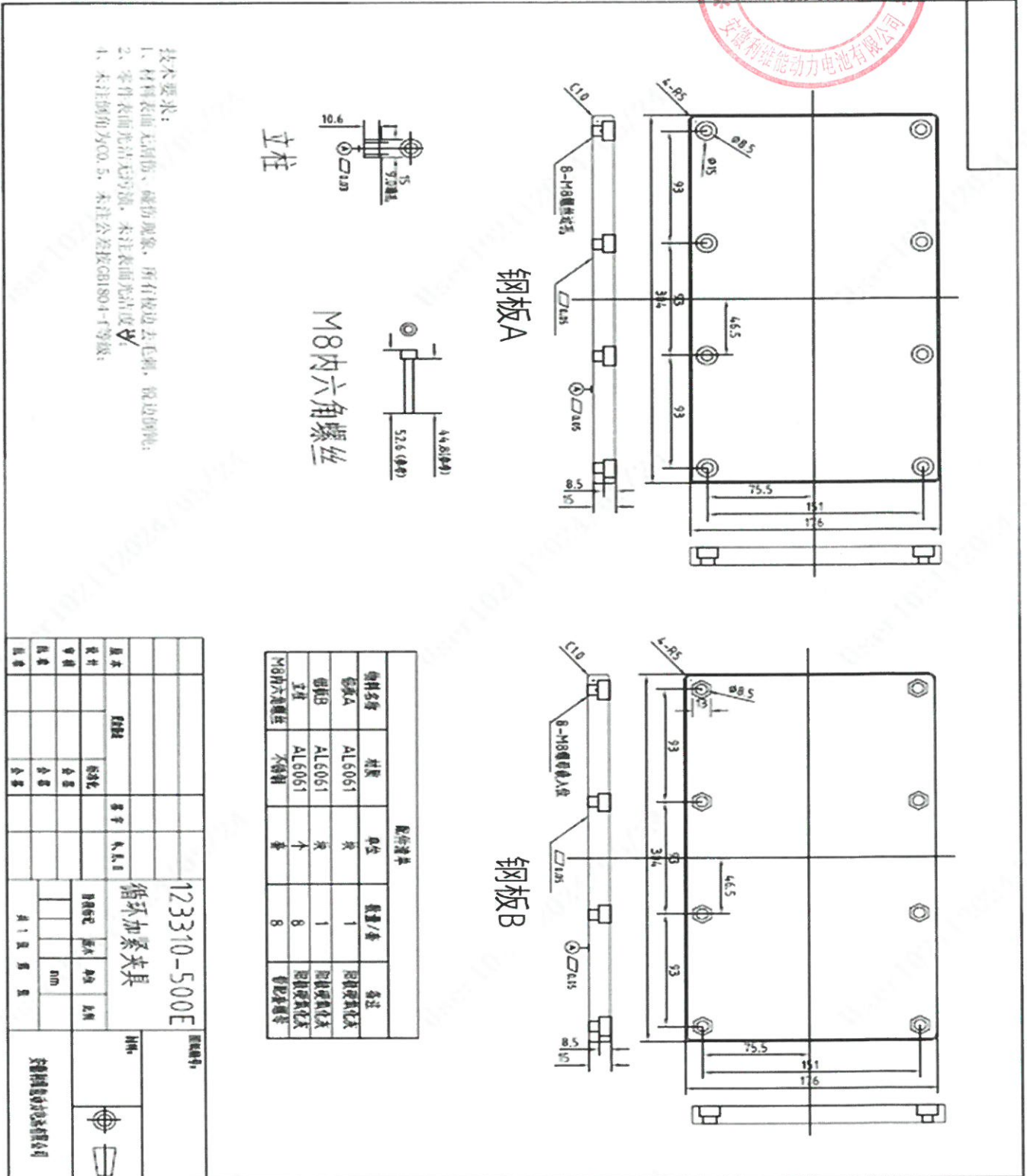
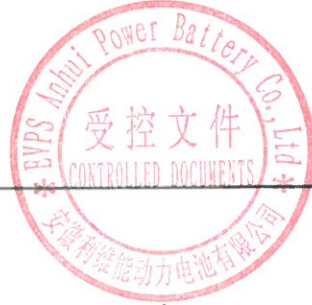
The cell should be charged, used and stored away from objects that will generate static electricity.



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附录3 Appendix 3:

循环夹具图纸 Cycle Test Fixture Drawing



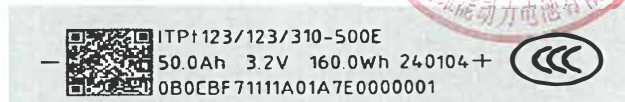
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附录 4 Appendix 4:

喷码规则

Code-spraying Rules

1. 图示 Diagram

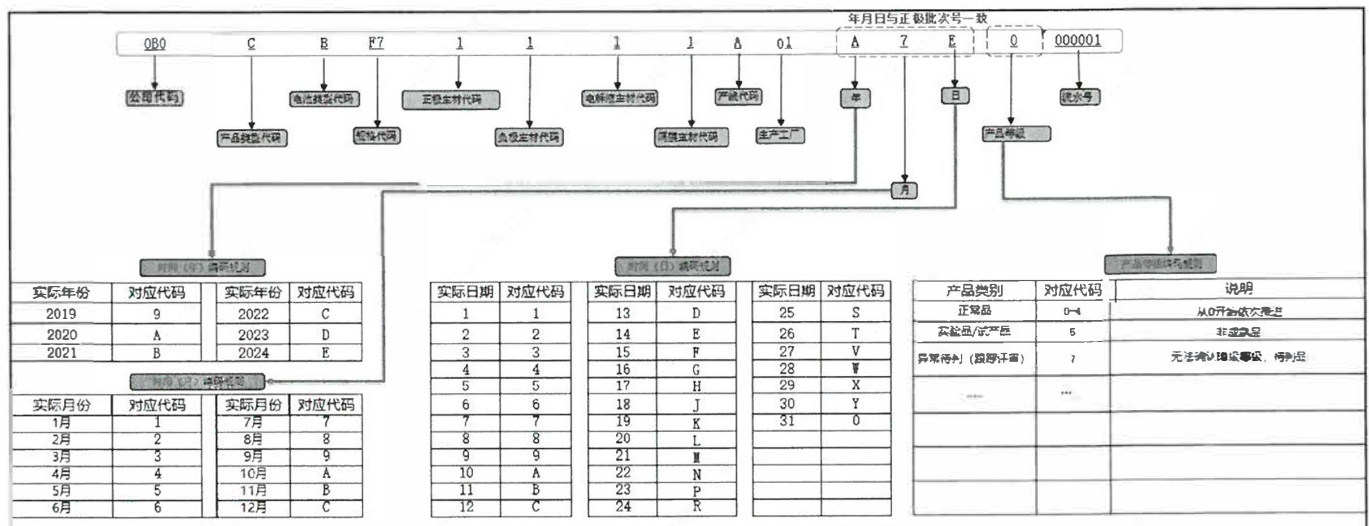


条码款

2. 批号注释 Cod Annotation

2.1 0B0CBF71111A01A7E0000001: 前三位为厂商代码，具体见下图《锂离子电池喷码规则》说明。

0B0CBF71111A01A7E0000001: The first three digits represent the manufacturer code, please refer to the "Lithium ion cell printing code rules" for details.



2.2 + - 标识: 电池极性

+ - Sign: Cell Polarity

2.3 ITPt123/123/310-500E: 电池型号

ITPt123/123/310-500E: Cell Model

2.3.1 ITP: 材料体系

ITP: Material System

2.3.2 t123/123/310: 厚度/宽度/长度 单位: mm

t123/123/310: Thickness / Width/Length Unit: mm

2.3.3 500: 产品容量 单位: 0.1Ah

500: Product Capacity Unit: 0.1Ah

2.3.4 E: 能量型

E: Type of Energy

2.4 50.0Ah: 额定容量

50.0 Ah: Rated Capacity

2.5 3.2V: 标称电压

3.2 V: Nominal Voltage

2.6 240104: 机器喷码日期(年年月月日日)

240104: Machine Spray Code Date (Year, Month, Day)