



# Specification for Lithium-ion Rechargeable Cell

## 锂离子电芯规格书

Cell Type (电芯型号) : INR18650-2600mAh

Approved 批准	Checked 审核	Designed 设计制作

Customers Name 客户名称	
Customer Approval 客户回签	

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### 1.Preface (前言)

This Product Specification describes the technique requirements, test procedure and precaution notes of prismatic type Lithium-ion Rechargeable cell to be supplied to customer by Shandong TianHan New Energy Technology Co., LTD.

本标准规定了由山东天瀚新能源科技有限公司生产的锂离子电芯技术要求，测试方法及注意事项。

### 2.Description (说明)

2.1 Product 产品: Lithium-ion Rechargeable cell 锂离子可充性电芯

2.2 Model (Type) 电芯型号: INR18650-2600mAh



### 3.Cell Size (电芯尺寸)

H=65.2mm±0.2

Φ=18.3mm±0.2

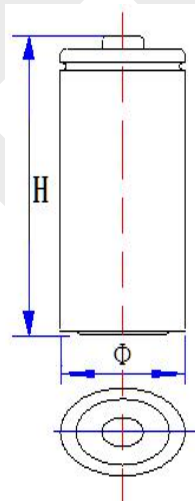


Figure A (图 A)



Product specifications  
产品规格书

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4.Specification (标准)

序号	Item 项目	Specification 标准		Remarks 备注
4.1	Capacity 容量	Nominal 标称容量	2600 mAh	0.5C discharge
		Minimum 最小容量	2550 mAh	0.5C discharge
4.2	AC-IR 交流内阻	Maximum 最大	20 mΩ	AC 1 KHZ
4.3	Nominal Voltage 标称电压		3.6 V	
4.4	Cell Weight 电芯重量		46.5±1.5g	
4.5	End-of-charge Voltage 充电限制电压		4.20±0.05 V	
4.6	End-of-charge Current 充电截止电流		52 mA	0.02C
4.7	End-of-discharge Voltage 放电截止电压		2.75±0.05 V	
4.8	Charging Time 充电时间		6 h	0.2C
			3 h	0.5C
4.9	Charge Method 充电方式	Standard 标准充电方式	1300 mA	0.5C
		Maximum Charge Current 最大充电电流	2600 mA	1C
4.10	Standard Discharge Method 标准放电方式		2600 mA	1C
4.11	Max Continuous Discharge current 最大连续放电电流		7800 mA	3C
4.12	Cycle Life 循环性能	0.5C/1C	1000cycle (80%)	25±2°C
4.13	Operating Temperature Range 操作温度范围	Charging Temp 充电温度	0~15°C	≤0.2C
			15~25°C	≤0.5C
			25~45°C	≤1C
		Discharging Temp 放电温度	-20~60°C	
	Storage Temp. 存储温度	-20~60°C	≤1 month ≤1 个月	



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			-20~45°C	≤3 months ≤3 个月
			0~25°C	≤1 year ≤1 年
4.14	Shelf Life 保质期		1 year	
4.15	Appearance 外观	Without break, scratch, distortion, contamination, leakage and so on 无破裂、划痕、变形、污迹、电解液泄露等		

5. Test Conditions (测试条件)

5.1 Standard Test Conditions 标准测试条件

Unless otherwise specified, all tests stated in this Product Specification should be conducted at temperature 25°C±2°C and humidity 65%±20% RH.

若无特别要求，此规格书上的产品测试条件均为温度：25°C±2°C，湿度：65%±20% RH。

5.2 Standard Charge 标准充电

The "Standard Charge" means charging the cell at a constant current of 0.5I<sub>1</sub> (A) until the voltage is 4.20V, then charged at a constant voltage of 4.20V until its current is less than 0.02 I<sub>1</sub> (A).

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 0.5I<sub>1</sub>(A) 充电至 4.20V，再以 4.20V 的恒压充电至电流小于 0.02 I<sub>1</sub> (A)。

6. Electrical Characteristics (电性能)

序号	Test Item 测试项目	Test Method 测试方法	Criteria 检验标准
6.1	Nominal capacity 额定容量	At room temperature, the battery is charged according to the method of 5.2, discharged at 0.5I <sub>1</sub> (A) current, discharged to the termination voltage, and the discharge capacity is calculated; 在室温下，电池按5.2方法充电，以0.5I <sub>1</sub> (A) 电流放电，放电至终止电压，计算放电容量；	≥2550mAh
6.2	Initial capacity 初始容量	At room temperature, after the battery is charged according to the method of 5.2, discharge with 1I <sub>1</sub> (A) current, discharge to the termination voltage, and calculate the discharge capacity; continue for 5 cycles, when the capacity range is less than 3% of the rated capacity for three consecutive times, the test can be terminated in advance, and the average value of the last three test results (in mAh) can be taken. 在室温下，电池按5.2方法充电后，以1I <sub>1</sub> (A) 电流放电，放电至终止电压，计算放电容量；持续 5 次循环，当连续3次容量极差小于额定容量的3%，可以提前结束测试，取最后3次试验结果的平均值（以mAh	capacity gap for three times <3% 3次极差<3%

		计)。	
6.3	倍率放电性能 Discharge Rate	<p>At room temperature, the battery is charged according to the method of 5.2, and then left for 10min. The battery discharges to the termination voltage with different current, and the percentage of discharge capacity (different discharge current capacity / initial capacity) is measured.</p> <p>室温下, 电池按5.2 方法充电后, 静置10min, 电池以不同的电流放电到终止电压, 计量其放电容量百分比(不同放电电流容量/初始容量)。</p>	<p>1C≥100% 2C≥95% 3C≥90%</p>
6.4	Charge Rate 室温倍率充电	<p>At room temperature, discharge with current of <math>1I_1</math> (A), discharge to the termination voltage, leave it standing for 1h, charge the battery with current of <math>2I_1</math> (A) to the termination voltage, leave it standing for 1h, discharge the battery with current of <math>1I_1</math> (A), discharge to the termination voltage, and measure its discharge capacity.</p> <p>室温下, 以<math>1I_1</math> (A) 电流放电, 放电至终止电压, 静置1H, 电池以<math>2I_1</math>(A)电流充电至终止电压, 静置1H, 电池以<math>1I_1</math>(A)电流放电, 放电至终止电压, 计量其放电容量。</p>	<p>≥80%initial capacity ≥80%初始容量</p>
6.5	Low temperature discharge 低温放电	<p>After the battery is charged according to the method in 5.2, the battery shall be placed for 24h under the environment of <math>-20\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}</math>. The battery shall be discharged at the current of <math>0.5I_1</math> (A) under the environment of <math>-20\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}</math>, discharged to 2.5V, and its discharge capacity shall be measured.</p> <p>电池按5.2方法充电后, 将电池在<math>-20\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}</math>环境下搁置24H, 电池在<math>-20\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}</math>下, 以<math>0.5I_1</math> (A) 电流放电, 放电至2.5V, 计量其放电容量。</p>	<p>≥70% initial capacity ≥70%初始容量</p>
6.6	High temperature discharge 高温放电	<p>After the battery is charged according to the method in 5.2, the battery shall be placed for 5h at <math>55\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}</math>. The battery shall be discharged at <math>1I_1</math> (A) current at <math>55\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}</math>, discharged to the termination voltage, and its discharge capacity shall be measured.</p> <p>电池按 5.2方法充电后, 将电池在<math>55\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}</math>下搁置5H, 电池在<math>55\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}</math>下, 以<math>1I_1</math>(A)电流放, 放电至终止电压, 计量其放电容量。</p>	<p>≥95% initial capacity ≥95%初始容量</p>
6.7	Room temperature Capacity Retention& Capacity	<p>After charging according to 5.2, the battery shall be stored at room temperature for 28 days, then discharged with <math>1I_1</math> (A) current, discharged to the termination voltage, and the charge retention capacity shall be measured; after charging according to 5.2, the battery</p>	<p>Charge capacity retention rate ≥ 85% initial capacity Recovery capacity rate ≥ 90% initial</p>

	<p>Recovery 室温荷电保持与容量恢复</p>	<p>shall be discharged with <math>1I_1</math> (A) current at room temperature, discharged to the termination voltage, and the recovery capacity shall be calculated. 电池按5.2充电后, 在室温下储存28天, 然后以<math>1I_1(A)</math>电流放电, 放电至终止电压, 计量荷电保持容量; 再按照5.2充电后, 在室温下, 电池以<math>1I_1(A)</math>电流放电, 放电至终止电压, 计算恢复容量。</p>	<p>capacity 荷电容量保持率 <math>\geq 85\%</math>初始容量 恢复容量率 <math>\geq 90\%</math>初始容量</p>
<p>6.8</p>	<p>High temperature Capacity Holding&amp; Capacity Recovery 高温荷电保持与容量恢复</p>	<p>After charging according to 5.2, the battery is stored at <math>55\text{ }^\circ\text{C} \pm 2\text{ }^\circ\text{C}</math> for 7 days, then stored at room temperature for 5 hours, discharged with <math>1I_1</math> (A) current, discharged to the termination voltage, measured the charge retention capacity, and then charged according to 5.2, discharged with <math>1I_1</math> (A) current at room temperature, discharged to the termination voltage, and calculated the recovery capacity. 电池按 5.2 方法充电后, 电池在 <math>55^\circ\text{C} \pm 2^\circ\text{C}</math> 下储存 7 天, 然后再在室温下搁置 5 小时后, 以 <math>1I_1(A)</math> 电流放电, 放电至终止电压, 计量荷电保持容量, 再按照 5.2 充电后, 在室温下, 电池以 <math>1I_1(A)</math> 电流放电, 放电至终止电压, 计算恢复容量。</p>	<p>Charge capacity retention rate <math>\geq 85\%</math> initial capacity Recovery capacity rate <math>\geq 90\%</math> initial capacity 荷电容量保持率 <math>\geq 85\%</math>初始容量 恢复容量率 <math>\geq 90\%</math>初始容量</p>
<p>6.9</p>	<p>Storage 储存</p>	<p>After the battery is charged according to the method of 5.2, the battery is discharged at the current of <math>1I_1</math> (A) for 30min, and then stored at <math>45\text{ }^\circ\text{C} \pm 2\text{ }^\circ\text{C}</math> for 28 days, and then stored at room temperature for 5 hours. After charging according to the method of 5.2, the battery is discharged at the current of <math>1I_1</math> (A), discharged to the termination voltage, and the discharge capacity is measured. 电池按5.2方法充电后, 电池以<math>1I_1(A)</math>电流放电30min后, 将电池置放在 <math>45^\circ\text{C} \pm 2^\circ\text{C}</math> 下储存28天, 然后再在室温下搁置5小时后, 再按5.2方法充电后, 以以<math>1I_1(A)</math>电流放电, 放电至终止电压, 计量放电容量。</p>	<p>Capacity restoration <math>&gt; 90\%</math> initial capacity 恢复容量 <math>&gt; 90\%</math>初</p>
<p>6.10</p>	<p>Cycle Life 循环寿命</p>	<p>1. At room temperature, the battery is discharged with current of <math>1I_1</math> (A), discharged to the termination voltage, and stored for 10min; 2. After charging according to 5.2, stored for 10min; 3. The battery is discharged with current of <math>1I_1</math> (A), discharged to the termination voltage, and recorded the discharge capacity; 4. According to 2-3 If the discharge capacity is higher than 90% of the initial capacity, the experiment will be terminated. If the discharge capacity is lower than 90% of the initial capacity, the experiment will be continued for 500 cycles.</p>	<p>500 times <math>\geq 90\%</math> initial capacity 1000 times <math>\geq 80\%</math> initial capacity 500次<math>\geq 90\%</math>初始容量 1000次<math>\geq 80\%</math>初始容量</p>



		<p>1.室温下, 电池以<math>1I_1(A)</math>电流放电, 放电至终止电压, 搁置10min; 2.按 5.2方法充电后搁置10min; 3.电池以<math>1I_1(A)</math>电流放电, 放电至终止电压, 记录放电容量; 4.按照 2~3 条件循环500次, 若放电容量高于初始容量的90%, 则终止实验, 若放电容量低于初始容量的90%, 则继续循环500次。</p>	
<p><b>6.11</b></p>	<p>Vibration 耐振动性</p>	<p>After the battery is charged according to the method in 5.2, fasten the battery on the vibration test bench, and conduct the linear sweep vibration test according to the following conditions:</p> <ul style="list-style-type: none"> <li>----Discharge current: <math>1 / 3I_1 (A)</math> ;</li> <li>---Vibration direction: up single vibration;</li> <li>----Vibration frequency: 10Hz ~ 55Hz;</li> <li>---Maximum acceleration: 30m / S<sup>2</sup>;</li> <li>---Sweep cycle: 10 times;</li> <li>---Vibration time: 3H.</li> </ul> <p>Observe whether there is abnormal phenomenon during vibration test</p> <p>电池按5.2方法充电后, 将电池紧固在振动试验台上, 按照下述条件进行线性扫频振动试验:</p> <ul style="list-style-type: none"> <li>----放电电流: <math>1/3 I_1(A)</math>;</li> <li>---振动方向: 上下单振动;</li> <li>----振动频率: 10Hz~55Hz;</li> <li>---最大加速度: 30m/S<sup>2</sup>;</li> <li>---扫频循环: 10 次;</li> <li>---振动时间: 3h。</li> </ul> <p>振动试验过程中观察有无异常现象</p>	<p>No abnormal voltage and current, no deformation of shell, intact structure, no leakage, etc</p> <p>电压、电流无异常、壳体无变形、结构完好, 无漏液等</p>

**7.Safety Test (安全测试)**

All below tests are carried out on the equipment with forced ventilation and explosion-proof device.

Before test, all cells should be charged in accordance with 5.2, and stored 24h prior for testing.

下述试验应在有强制排风条件及防爆措施的装置内进行, 在试验前所有的电芯都按 5.2 规定标准充电方式充电, 并搁置 24h 后, 再进行以下试验。

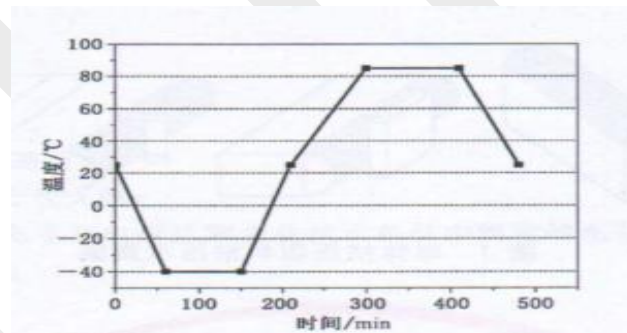
	Test Item 测试项目	Test Method 测试方法	Criteria 检验标准
<p><b>7.1</b></p>	<p>Over-discharge 过放电</p>	<p>The battery is charged according to the method of 5.2, and discharged for 90min with <math>1I_1(A)</math> current, and then observed for 1H.</p> <p>电池按5.2 方法充电, 电池以 <math>1I_1(A)</math> 电流放电 90min, 观察1H。</p>	<p>No explosion, no fire, no leakage</p> <p>不爆炸, 不起火, 不漏液</p>
<p><b>7.2</b></p>	<p>Overcharge 过充电</p>	<p>The battery shall be charged according to the method of 5.2. The battery shall stop charging after the constant current of <math>1I_1(A)</math> reaches 6.3V or the charging time</p>	<p>No explosion, no fire</p> <p>不爆炸, 不起火</p>

		reaches 1H. Observe 1H. 电池按5.2方法充电, 电池以1I <sub>1</sub> (A) 电流恒流至电压达到6.3V或充电时间达1H后停止充电, 观察1H。	
7.3	short circuit 短路	The battery shall be charged according to the method of 5.2, the positive and negative electrodes of the battery shall be short-circuited externally for 10min, and the resistance of the external circuit shall be less than 5m Ω, observe 1H. 电池按5.2方法充电, 将电池正、负极经外部短路10min,外部线路电阻应小于5mΩ, 观察1H。	No explosion, no fire 不爆炸, 不起火
7.4	Drop 跌落	The battery shall be charged according to the method of 5.2, and the positive and negative terminals of the battery shall fall from the height of 1.5m to the cement ground freely, observe for 1H. 电池按 5.2方法充电, 电池正负端子向下从 1.5m 高度处自由跌落到水泥地面上, 观察1H。	No explosion, no fire, no leakage 不爆炸, 不起火, 不漏液
7.5	Heating 加热	Charge the battery according to the method of 5.2, put the battery into the temperature box: the temperature box rises from the room temperature to 130 ± 2 °C at the rate of 5 °C / min, and keep the temperature for 30min, then stop heating, observe 1H. 电池按5.2方法充电, 将电池放入温度箱: 温度箱按照 5°C/min 的速率由室温升至130±2°C, 并保持此温度30min后停止加热, 观察1H。	No explosion, no fire 不爆炸, 不起火
7.6	Extrusion 挤压	The battery shall be charged according to the method of 5.2 and tested according to the following conditions: ---Extrusion direction: pressure perpendicular to the direction of the battery plate ---Form of extrusion plate: semi-cylinder with radius of 75mm, the length of semi-cylinder (L) is larger than the size of extruded battery; ---Extrusion speed: (5 ± 1) mm / S; ---Extrusion degree: when the voltage reaches 0V or the deformation reaches 30% or the extrusion pressure reaches 200kn, stop extrusion and observe 1H. 电池按 5.2方法充电, 按下列条件进行试验: ---挤压方向: 垂直于电池极板方向施压 ---挤压板形式: 半径 75mm 的半圆柱体, 半圆柱体的长度 (L) 大于被挤压电池的尺寸; ---挤压速度: (5±1) mm/S; ---挤压程度: 电压达到 0V 或变形量达到 30%或挤压压力达到 200KN 后停止挤压, 观察 1H。	No explosion, no fire 不爆炸, 不起火

7.7	Acupuncture 针刺	<p>The battery is charged according to the method of 5.2. A <math>\Phi</math> 5mm-<math>\Phi</math> 8mm high-temperature-resistant steel needle (the angle of the round vertebra of the needle tip is 45-60 (the surface of the needle is smooth and clean, without rust, oxide layer and oil stain) is used to penetrate from the direction perpendicular to the battery plate at the speed of <math>(25 \pm 5)</math> mm / s. The penetration position should be close to the geometric center of the pricked surface, and the steel needle stays in the battery; observe 1H.</p> <p>电池按5.2方法充电, 用<math>\Phi</math>5mm~<math>\Phi</math>8mm的耐高温钢针(针尖的圆锥角度45~60(针的表面光洁, 无锈蚀、氧化层及油污), 以<math>(25\pm 5)</math> mm/S 的速度, 从垂直于蓄电池极板的方向贯穿, 贯穿位置宜靠近所刺面的几何中心, 钢针停留在蓄电池中; 观察1H。</p>	No explosion, no fire 不爆炸, 不起火
7.8	Seawater immersion 海水浸泡	<p>The battery shall be charged according to the method of 5.2. Immerse the battery in 3.5% NaCl solution (simulating seawater composition at normal temperature) for 2h, and the water depth shall not exceed the single battery.</p> <p>电池按5.2方法充电, 将电池浸入3.5%NaCl溶液中(模拟常温下海水成分)2H, 水深应该全部没过单体电池。</p>	No explosion, no fire 不爆炸, 不起火
7.9	Low atmospheric pressure 低气压	<p>Charge the battery according to the method of 5.2, put the battery into the low-voltage box, adjust the air pressure in the test box to 11.6kpa, the temperature to room temperature, stand for 6h; observe 1H.</p> <p>电池按 5.2 方法充电, 电池放入低压箱中, 调节试验箱中气压为 11.6kPa, 温度为室温, 静置 6H; 观察 1H。</p>	No explosion, no fire, no leakage 不爆炸, 不起火, 不漏液
7.10	Temperature cycle 温度循环	<p>Charge the battery according to the method of 5.2, put the battery into the temperature box, adjust the temperature of the temperature box according to table 1 and figure 1 below, and cycle for 5 times; observe for 1H.</p> <p>电池按5.2方法充电, 电池放入温度箱中, 温度箱温度按照下表1和图1进行调节, 循环5次; 观察1H。</p> <p>Table 1 The temperature and time of a cycle 表 1 温度循环试验一个循环的温度和时间</p>	No explosion, no fire, no leakage 不爆炸, 不起火, 不漏液

Temperature 温度(℃)	Time increment 时间增量 (min)	Cumulative time 累计时 间 (min)	Rate of change of temperature 温度变化率 (℃/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
25	70	480	6/7

Fig.1 The graph of temperature cycling test  
图 1温度循环试验示意图



### 8. Package (包装)

The product name, model, nominal voltage, quantity, gross weight, delivery date and internal resistance and capacity of corresponding grade shall be indicated on the outside of the battery packing box.

电池包装箱外应标明产品名称、型号、标称电压、数量、毛重、出厂日期及相应等级的内阻、容量。

### 9.Shipment (运输)

The capacity of delivery cell is approximately at 30~40% of charging. It is not specified more than 30%~40% capacity remain at customer, because of self-discharge. During transportation, keep the cell from acutely vibration, impacting, solarization, drenching.

出货电芯处于 30~40%充电状态，由于电芯存在自耗，运送到客户端的电芯无法完全保证 30%~40%荷电量。运输过程应防止剧烈振动、冲击、日晒雨淋。

### 10.Warranty (质量保证)

The warranty period of cell is made according to business contract. However, even though the problem



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occurs within this period, TianHan won't replace a new cell for free as long as the problem is not due to the failure of TianHan manufacturing process or is due to customer's abuse or misuse.

自出货之日起, 电芯的保质期限依合同而定。但是, 在此期限内, 如果非天瀚公司的制程原因而是客户的误用造成的电芯质量问题, 天瀚公司不承诺免费更换。

>TianHan will not be responsible for trouble occurred by handling outside of the precautions in instructions.

天瀚公司对违反安全守则操作所产生的问题不承担任何责任。

>TianHan will not be responsible for trouble occurred by matching electric circuit, cell pack, and charger.

天瀚公司对与电路、电池组、充电器搭配使用所产生的问题不承担任何责任。

>TianHan will be exempt from warrantee any defect cells during assembling after acceptance.

出货后客户在电芯组装过程中产生的不良电芯不在天瀚公司质量保证的范围之列。

### 11.Precautions and Safety Instructions (安全守则)

Lithium-Ion rechargeable batteries subject to abusive conditions can cause damage to the cell and/or personal injury. Please read and observe the standard cell precautions below before using utilization.

滥用锂离子充电电芯可能会造成电芯的损害或人身的伤害。在使用锂离子充电电芯以前, 请仔细阅读以下的安全守则:

Note 1. The customer is required to contact TianHan in advance, if and when the customer needs other applications or operating conditions than those described in this document.

注释 1.如果客户需要将电芯在该文件之外的条件下操作或应用, 请先咨询天瀚公司相关事宜。

Note 2. TianHan will take no responsibility for any accident when the cell is used under other conditions than those described in this Document.

注释 2.在该文件说明的条件之外使用该电芯而产生的事故, 天瀚公司不承担任何责任。

#### 11.1 Standard cell Precaution 电芯防范措施

a. Do not expose the cell to extreme heat or flame.

不要将电芯暴露在极热或有火星的环境中。

b. Do not short circuit, over-charge or over-discharge the cell.

不要将电芯短路, 过充或过放。

c. Do not subject the cell to strong mechanical shocks.

不要使电芯承受过重的机械冲击。

d. Do not immerse the cell in water or seawater, or get it wet.

不要将电芯浸入海水或水中, 或者使其吸湿。

e. Do not reverse the polarity of the cell for any reason.

不要颠倒电芯的正负极。

f. Do not disassemble or modify the cell.

不要拆卸或修整电芯。

g. Do not handle or store with metallic-like necklaces, coins or hairpins, etc.

不要和项链, 硬币或发夹等金属物品放置在一起。

h. Do not use the cell with conspicuous damage or deformation.

不要使电芯受到明显的损害或变形。

i. Do not connect cell to the plug socket or car-cigarette-plug.

不要将电芯与插座连接。

j. Do not make the direct soldering onto a cell.

不要直接焊接电芯。

k. Do not touch a leaked cell directly.

不要直接接触泄漏的电芯。

l. Do not use for other equipment.

不要将电芯用于其它设备。

m. Do not use Lithium-ion cell in mixture.

不要将锂离子电芯混合使用。

n. Do not use or leave the cell under the blazing sun (or in heated car by sunshine).

不要将电芯放置在太阳光直射的地方。

o. Keep cell away from children.

将电芯放置在远离儿童的地方。

p. Do not drive a nail into the cell, strike it by hammer or tread it.

不要针刺、锤打或践踏电芯。

q. Do not give cell impact or fling it.

不要撞击或投掷电芯。

## 11.2 Cell Operation Instruction 电芯使用说明

### 11.2.1. Charging 充电

a. Charge the cell in a temperature range of 0°C to 45°C.

电芯充电温度范围为 0°C~45°C。

b. Charge the cell at a constant current of 0.5C until 4.20V is attained. Charge rates greater than 1C are not recommended (C: Rated Capacity of cell).

0.5C 的电流恒流充电至 4.20V，超过 1C 的电流建议不要使用（C：标称容量）。

c. Maintain charge voltage at 4.20V for 1 hour (recommended for maximum capacity).

保持恒压 4.20V 充电 1 小时（最大容量）。

d. Cell must be charged with constant current-constant voltage method.

必须使用恒流恒压方式对电芯进行充电。

e. Do not continue to charge cell over specified time.

不要超过标准时间持续充电。

### 11.2.2. Discharging 放电

a. Recommended cut-off voltage to 2.75V. Recommended max continuous discharge current is 3C. 建议放电终止电压为 2.75V，建议最大持续恒流放电电流为 3C。

b. For maximum performance, discharge the cell in a temperature range of -20 °C to 60°C.

为了达到较好的性能，电芯的放电温度范围为 -20°C ~ 60°C。

### 11.2.3. Storage Recommendations 储存建议

a. Short Period Storage 短期存放

Storage the cell at temperature of -20 ~ 45°C (less than 3 months), low humidity, and no corrosive gas atmosphere.

如果短期存放（不超过 3 个月）电芯应储存在温度范围为 -20 ~ 45°C，低湿度和不含腐蚀性气体的环境中。

\* No press on the cell

不要让电芯承担任何压力。

b. Long Period Storage 长期存放



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In case of long period storage (more than 3 months), storage the cell at temperature range of 0 ~ 25°C, low humidity, no corrosive gas atmosphere.

如果长期存放（超过 3 个月），电芯应存储在温度范围为 0~25°C，低湿度和不含腐蚀性气体的环境中。

- \* No press on the cell  
不要让电芯承担任何压力。

### 12.Consultation （技术咨询）

As to the obscurity, contact the following:

Address: Fuyuan 5th Road, Lithium battery Industrial Park, High-Tech District, ZaoZhuang, Shandong, China

Tel No.: 86-632-8015263/8059888

Website: [Http://www.thbattery.com](http://www.thbattery.com)

如有疑问，请按以下方式咨询：

厂址：中国·山东省枣庄市高新区锂电产业园复元五路

电话：86-632-8015263/8059888

网址：[Http://www.thbattery.com](http://www.thbattery.com)

### 13. Requirement for Safety Assurance （安全保证要求）

For the sake of safety assurance, please discuss the equipment design, its system, and protection circuit of Lithium-ion cell with TianHan in advance. And consult about the high rate current, rapid charge and special application in the same way.

为了安全起见，如有设备设计，锂离子电芯系统保护电路或大电流，快速充电和其它方面的特殊应用，请先咨询天瀚公司相关事宜。

网址：[Http://www.thbattery.com](http://www.thbattery.com)

### 14. Requirement for Safety Assurance （安全保证要求）

For the sake of safety assurance, please discuss the equipment design, its system, and protection circuit of Lithium-ion cell with TianHan in advance. And consult about the high rate current, rapid charge and special application in the same way.

为了安全起见，如有设备设计，锂离子电芯系统保护电路或大电流，快速充电和其它方面的特殊应用，请先咨询天瀚公司相关事宜。