

锂离子电芯规格书

PRODUCT SPECIFICATION

电芯型号: **SP-FA41255BM**

Cell Type: **SP-FA41255BM**

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History of Revision 修订记录

Version 版本	Date Modified 修改日期	Content Change 变更内容	Prepared by/ Department 拟定人/ 部门
A0	2017/7/25	首版发行	王红明/ 型号开发部
A1	2017/10/20	修订循环充放电制式；增加最低容量值	秦怀鹏/型号开发部
A2	2017/10/20	修订循环充放电制式；增加最低容量值	秦怀鹏/型号开发部
A3	2018/7/20	修订： 1.图纸及尺寸变更（包膜材质变更引起） 2.最低容量放电截止电压：2.0V 变更为 2.8V，容量 168Ah 变更为 160Ah； 3.标称容量放电截止电压：2.0V 变更为 2.8V，容量 173Ah 变更为 165Ah； 4.放电方式：截止电压统一由 2.5V 变更为 2.8V。	于广超/型号开发部
A4	2019/1/21	修订： 1.图纸及尺寸变更； 2.标称容量放电截止电压：由 2.8V 变更为 2.5V，容量由 165Ah 变更为 160Ah； 3.放电方式：截止电压统一由 2.8V 变更为 2.5V（低温放电容量，放电截止电压 2.0V 不变）； 4.低温放电容量百分比：由≥90%变更为 85%； 5.删除 45℃ 高温循环寿命规定。	潘楠/技术部
A5	2019/2/18	修订： 1. 图纸及尺寸变更； 2.放电：最大持续电流由 3C 变更为 2C，最大脉冲电流由 3.5C 变更为 3C。	潘楠/技术部

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1 SCOPE 适用范围

The purpose of this document is to specify the specifications of SP-FA41255BM square Al-Can Lithium-ion cell to be produced by Tianjin Sinopoly New Energy Technology Co.,LTD..

此文件规定了由天津中聚新能源科技有限公司生产的 SP-FA41255BM 方形铝壳锂离子电芯的相关技术规格。

2 MODEL AND DESCRIPTION 型号及说明

型号：SP-FA41255BM

SP - F A 41 255 B M
① ② ③ ④ ⑤ ⑥ ⑦

①“SP”表示中聚新能源科技有限公司（SinoPoly）

②“F”表示电芯正极材料是 LiFePO_4

③“A”表示电芯的壳体材质为铝（Al）

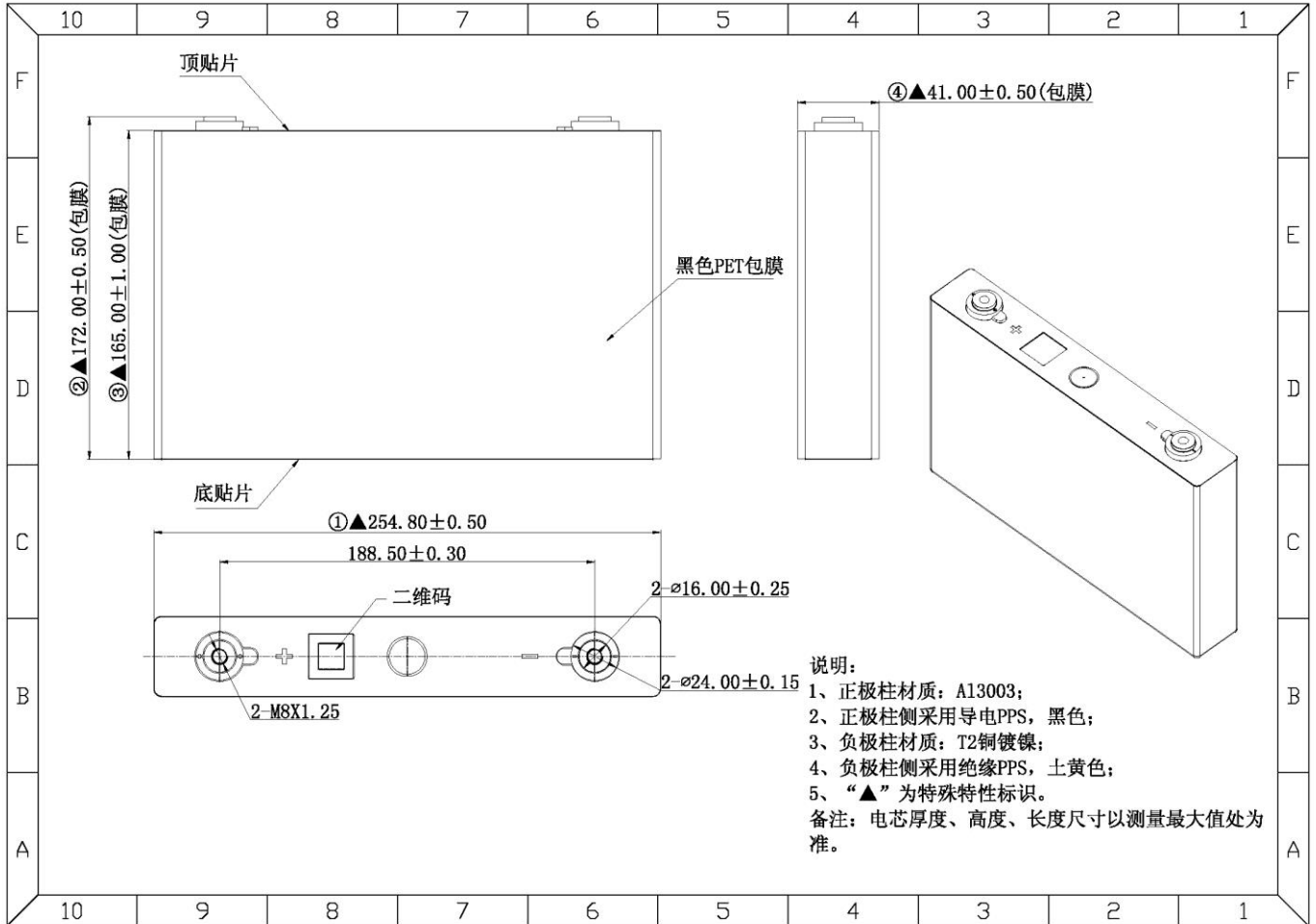
④“41”表示电芯的厚度尺寸

⑤“255”表示电芯的长度尺寸

⑥“B”表示电芯的特殊标识符

⑦“M”表示电芯为量产型号

3 CELL SIZE 电芯尺寸



4 CELL GENERAL SPECIFICATIONS 电芯常规指标

Item 项目	Spec 标准	Remarks 备注
Product Model 产品型号	SP-FA41255BM	NA
Nominal Capacity 标称容量	160Ah	RT 25±2°C; Charge: 0.5C CC-CV to 3.65V@0.05C; Discharge: 0.5CDC to 2.5V 室温 25±2°C; 充电: 0.5C 恒流充电至 3.65V 转恒压 充电, 截止电流 0.05C; 放电: 0.5C 恒流放电至 2.5V
Nominal Voltage 标称电压	3.2 V	NA
Weight 重量	3.56±0.30 Kg	NA
Internal Impedance 交流内阻	≤0.4 mΩ	AC1kHz
RT Cycle Life 常温循环寿命	≥3000 Cycles	80%SOC; RT / 0.5C 0.5C; 2.5V to 3.65V
Self-discharge Rate 自放电率	≤4.5%	Per Month 每月

Item 项目		Spec 标准	Remarks 备注
Dimension 尺寸	Height (pole) 极柱高	172.0±0.5 mm	Packaged 包膜后
	Height (can) 壳高	165.0±1.0 mm	
	Length 长	254.8±0.5 mm	
	Thickness 厚	41.0±0.5 mm	
Charge 充电	Standard Current 标准电流	0.5C	CC & CV
	Max. Continues Current 最大持续电流	2C	Max. Pulse Current 2.5C 最大脉冲电流 2.5C
	Limited Voltage 限制电压	3.65V	NA
	Cut-off Current 截止电流	0.05C	NA
Discharge 放电	Standard Current 标准电流	0.5C	NA
	Max. Continuous Current 最大持续电流	2C	Max. Pulse Current 3C 最大脉冲电流 3C
	End Voltage 截止电压	2.5 V	Low-Temp. discharge to 2.0V (<0°C) 低温放电 (<0°C)，截止电压 2.0V
Operating Temperature 工作温度	Charge 充电	0 ~ 45 °C	<p>< 0°C: Charging not allowed;</p> <p>0 ~ 10°C: Max. Charge Current 0.33C, CC Only</p> <p>10 ~ 20°C: Max. Charge Current 1C, CC Only;</p> <p>20 ~ 35°C: Max. Charge Current 2C, CC&CV</p> <p>35 ~ 45°C: Max. Charge Current 1C, CC&CV</p> <p>> 45°C: Charging not allowed;</p> <p>Cell Surface Temp. ≤ 60°C.</p> <p>< 0°C: 不允许充电;</p> <p>0 ~ 10°C: 最大充电电流 0.33C, 仅限恒流充;</p> <p>10 ~ 20°C: 最大充电电流 1C, 仅限恒流充;</p> <p>20 ~ 35°C: 最大充电电流 2C, 恒流恒压充;</p> <p>35 ~ 45°C: 最大充电电流 1C, 恒流恒压充;</p> <p>> 45°C: 不允许充电;</p> <p>电芯壳体表面温度不可高于 60°C。</p>
	Discharge 放电	-20 ~ 55 °C	<p>Cell Surface Temp. ≤60°C</p> <p>电芯壳体表面温度不可高于 60°C</p>
Storage Conditions 存储条件	Storage Temperature 存储温度	-20 ~ 40 °C	<p>Optimal Storage Temperature: 5 ~ 35°C</p> <p>Short term: -40 ~ 50°C</p> <p>最佳存储温度: 5 ~ 35°C</p> <p>短期: -40 ~ 50°C</p>
	Storage Humidity 存储湿度	15% ~ 90% RH	
	State of Charge 荷电状态	30% ~ 50% SOC	

5 CELL STRUCTURE 电芯结构

The Cell is composed of cathode, anode, separator, electrolyte, Al- Can and poles.

电芯由正极、负极、隔膜、电解液、铝壳和极柱组成。

6 TEST CONDITIONS AND DEFINITIONS 测试条件和定义

6.1 Definitions 定义

I_1 Rate ("C"): The rate at which a fully charged cell is discharged to its end voltage in 1 hour (A).

I_1 倍率 ("C"): 满电电芯 1 小时恒流放电至终止电压所用的电流大小 (A)。

6.2 Measuring Equipment 测试设备

6.2.1 Voltmeter 伏特计

Internal impedance $>1000 \Omega/V$.

内阻 $>1000\Omega/V$ 。

6.2.2 Ampere-meter 安培表

Total external resistance (ammeter and wire) $<0.01 \Omega$.

总外阻抗（安培表和线路） $<0.01 \Omega$ 。

6.2.3 Vernier caliper 游标卡尺

The precision of the vernier caliper is 0.02 mm.

游标卡尺精度为 0.02mm。

6.2.4 Impedance meter 内阻测试仪

The impedance meter should be operated at AC 1kHz.

在 1kHz 交流条件下进行内阻测试。

6.3 Test Condition 测试条件

6.3.1 Environmental Condition 环境条件

Unless otherwise specified, all tests shall be performed at standard temperature of $25\pm 2 \text{ }^\circ\text{C}$, standard humidity of 15% ~ 90% RH and standard atmospheric pressure of 86 ~ 106 kPa.

除特殊要求外，所有测试均在标准温度 $25\pm 2 \text{ }^\circ\text{C}$ 、标准湿度 15% ~ 90% RH 和标准大气压力 86 ~ 106 kPa 的条件下进行。

6.3.2 Charge method 充电方式

Standard Charge: The cell shall be charged at a constant current rate of 0.5C to 3.65V at RT 25±2 °C. Then it shall be charged at a constant voltage of 3.65V at the same temperature until the charge current tapering to 0.05C.

标准充电：室温 25±2 °C 下，电芯以 0.5C 恒流充电至 3.65V，再以 3.65V 恒压充电至电流衰减为 0.05C。

6.3.3 Discharge method 放电方式

Standard Discharge: The cell shall be discharged at a constant current of 0.5C to 2.5V at RT 25±2 °C.

标准放电：室温 25±2 °C 下，电芯以 0.5C 恒流放电至 2.5V。

7 CHARACTERISTICS 电性能

Item 测试项目	Test Method 测试方法	Spec 标准
Discharge Capacity 放电容量	Full charge at 6.3.2, rest for 1 hour, then discharge at the same temperature at 6.3.3. 按照 6.3.2 的方法充满电, 静置 1 小时, 然后在相同的温度下按照 6.3.3 的标准放电方式放电。	Discharge Capacity: $\geq 160\text{Ah}$ 放电容量 $\geq 160\text{Ah}$
2C Rate Discharge Capacity (RT) 2C 倍率放电容量 (室温)	Full charge at 6.3.2, rest for 1 hour, then discharge at the same temperature at 3C to 2.5V. 按照 6.3.2 的方法充满电, 静置 1 小时, 然后在相同的温度下以 2C 恒流放电到 2.5V。	Discharge Capacity/ Initial Capacity: $\geq 96\%$ 放电容量/初始容量 $\geq 96\%$
2C Rate Charge Performance (RT) 2C 倍率充电性能 (室温)	Charge at a constant current of 2C to 3.65V, then charge at a constant voltage of 3.65V until the charge current tapering to 0.05C, rest for 1 hour, then discharge at the same temperature at 6.3.3. 室温下, 以 2C 恒流充电至 3.65V, 转为恒压充电至电流衰减为 0.05C, 静置 1 小时, 然后在相同的温度下按照 6.3.3 的标准放电方式放电。	Discharge Capacity/ Initial Capacity: $\geq 96\%$ 放电容量/初始容量 $\geq 96\%$
Low Temp. Discharge Capacity (-20°C) 低温放电容量 (-20°C)	Full charge at 6.3.2, stand by 24h at $-20\pm 2^\circ\text{C}$, then discharge at the same temperature with 1C to 2.0V. 按照 6.3.2 的方法充满电, 在 $-20\pm 2^\circ\text{C}$ 环境下静置 24 小时, 然后在相同的温度下以 1C 电流恒流放电至 2.0V。	Discharge Capacity/ Initial Capacity: $\geq 85\%$ 放电容量/初始容量 $\geq 85\%$
High Temp. Discharge Capacity (55°C) 高温放电容量 (55°C)	Full charge at 6.3.2, stand by 5h at $55\pm 2^\circ\text{C}$, then discharge at the same temperature with 1C to 2.5V. 按照 6.3.2 的方法充满电, 在 $55\pm 2^\circ\text{C}$ 环境下静置 5 小时, 然后在相同的温度下以 1C 电流恒流放电至 2.5V。	Discharge Capacity/ Initial Capacity: $\geq 98\%$ 放电容量/初始容量 $\geq 98\%$
RT Storage Performance (100% SOC) 室温荷电保持与容量恢复能力	Full charge at 6.3.2, then store in an ambient temperature of $25\pm 2^\circ\text{C}$ for 28d, then discharge at 6.3.3. Full charge at 6.3.2 again, then discharge at the same temperature at 6.3.3. 电芯按 6.3.2 方法充电, 然后在环境温度为 $25\pm 2^\circ\text{C}$ 条件下, 将电芯搁置 28 天; 再以 6.3.3 方式放电, 之后再按 6.3.2 标准方式充满电, 以 6.3.3 方式放电。	Discharge Retention Capacity / Initial Capacity: $\geq 96\%$; Discharge Recovery Capacity / Initial Capacity: $\geq 97\%$. 放电保持容量/初始容量 $\geq 96\%$ 放电恢复容量/初始容量 $\geq 97\%$
HT Storage Performance (100% SOC) 高温荷电保持与容量恢复能力	Full charge at 6.3.2, and store in an ambient temperature of $55\pm 2^\circ\text{C}$ for 7d. After that, store in an ambient temperature of $25\pm 2^\circ\text{C}$ for 5h, then discharge at 6.3.3. Full charge at 6.3.2 again, then discharge at the same temperature at 6.3.3. 电芯按 6.3.2 方法充电结束后, 在环境温度为 $55\pm 2^\circ\text{C}$ 条件下, 将电芯搁	Discharge Retention Capacity / Initial Capacity: $\geq 96\%$; Discharge Recovery Capacity / Initial Capacity: $\geq 97\%$ 放电保持容量/初始容量 $\geq 96\%$

Item 测试项目	Test Method 测试方法	Spec 标准
	置 7 天，然后在室温下搁置 5h 后，按 6.3.3 方式放电，之后再按 6.3.2 标准方式充满电，以 6.3.3 方式放电。	放电恢复容量/初始容量≥97%
45℃ Storage Performance (50% SOC) 45℃ 储存性能 (50% SOC)	Full charge at 6.3.2, discharge at the same temperature with 1C for 30min, store at 45±2 °C for 28d, then store in an ambient temperature of 25±2 °C for 5h. Full charge at 6.3.2, then discharge at the same temperature at 6.3.3. 按照 6.3.2 的标准方法充满电后，以 1C 电流放电 30 分钟，在 45±2 °C 环境下储存 28 天，然后在室温下搁置 5h 后，按 6.3.2 标准方式充满电，以 6.3.3 方式放电。	Discharge Capacity/ Initial Capacity: ≥98% 放电容量/初始容量≥98%
RT Cycle Life 室温循环寿命	a. Discharge at 25±2 °C with 0.5C to 2.5V 25±2 °C，0.5C 恒流放电至 2.5V b. Stand by 25±2 °C for 0.5h 25±2 °C，静置 0.5h c. Full charge at 6.3.2 按照 6.3.2 充满电 d. Stand by 25±2 °C for 0.5h 25±2 °C，静置 0.5h e. Discharge at 25±2 °C with 0.5C to 2.5V 25±2 °C，0.5C 恒流放电至 2.5V f. Repeat b to e until Discharge Capacity < 128Ah 重复 b 到 e 步直到放电容量小于 128Ah。	≥3000 cycles ≥3000 次 (0.5C/0.5C)
Vibration Resistance 耐振动性	Full charge at 6.3.2, then fasten the cell to the vibration test table. Do the linear sweep frequency vibration test as follows: a. Discharge current: 1/3C; b. Vibration direction: Single vibration up and down; c. Vibration frequency: 10Hz ~ 55Hz; d. Maximum acceleration: 30 m/s ² ; e. Sweep cycles: 10 times; f. Vibration time: 3h. Observe whether there is abnormal phenomenon during the vibration test. 按照 6.3.2 的标准方法充满电后，将电芯紧固到振动试验台上，按下述条件进行线性扫频振动试验：	No abnormal phenomena such as sharp variation of discharge current, abnormal voltage, deformation of battery's Al-Can, leakage of electrolyte and so on. And keep the connection is reliable, the structure is intact. 无放电电流锐变、电压异常、电池壳变形、电解液溢出等异常现象，并保持连接可靠、结构完好。

Item 测试项目	Test Method 测试方法	Spec 标准
	<p>a. 放电电流: 1/3C;</p> <p>b. 振动方向: 上下单振动;</p> <p>c. 振动频率: 10Hz ~ 55Hz;</p> <p>d. 最大加速度: 30 m/s²;</p> <p>e. 扫频循环: 10次;</p> <p>f. 振动时间: 3h。</p> <p>振动试验过程中, 观察有无异常现象出现。</p>	

The electrochemical performances of the cell pass GB/T 31484-2015 and GB/T 31486-2015.

电芯电性能通过国标 GB/T 31484-2015 和 GB/T 31486-2015 认证。

8 SAFETY 安全性能

Item 测试项目	Test Method 测试方法	Spec 标准
Over-discharge 过放电	Charge at 6.3.2, and then discharge with 1C for 90 min. Observe the phenomenon for 1h. 电芯按照 6.3.2 方法充电, 然后以 1C 恒流放电 90min, 观察 1h。	No fire, explosion or leakage 不起火、不爆炸、不漏液
Overcharge 过充电	Charge at 6.3.2, and then charge with a constant current of 1C. Stop charging when the voltage is 1.5 times of the limited voltage, or charge for 1h. Observe the phenomenon for 1h. 电芯按照 6.3.2 方法充电, 然后以 1C 电流恒流充电至电压达到充电终止电压 1.5 倍, 或充电时间达 1 小时后停止充电, 观察 1h。	No fire or explosion 不起火、不爆炸
External Short-Circuit 短路	Charge at 6.3.2, and then cells are short-circuited by connecting the positive and negative poles with a resistance load less than 5mΩ for 10 minutes. Observe the phenomenon for 1h. 电芯按照 6.3.2 方法充电, 然后电芯正负极之间用不大于 5mΩ 的负载连接 10 分钟, 观察 1h。	No fire or explosion 不起火、不爆炸
Free Fall 跌落	Charge at 6.3.2, then let cells fall off from a height of 1.5m to the cement ground. The drop is implemented with the positive and negative poles of cells facing down. Observe the phenomenon for 1h. 电芯按照 6.3.2 方法充电, 然后将电芯正负端子向下, 由高度 1.5m 的位置自由跌落至水泥地面上。观察 1h。	No fire, explosion or leakage 不起火、不爆炸、不漏液
Heating 加热	Charge at 6.3.2, heat cells in a circulating air oven at a rate of 5°C per minute from room temperature to 130±2°C, and stop heating after storing at 130°C for 30min. Observe the phenomenon for 1h. 电芯按照 6.3.2 方法充电, 然后将电芯放入温度箱, 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 fire or explosion 不起火、不爆炸
Crush 挤压	Charge at 6.3.2, then test as follows: Crushing direction: Crushing direction is perpendicular to the electrode in cell; Crushing plate form: Radius of the half cylinder is 75mm, and the length is longer than the crushed cell; Crushing speed: (5±1) mm/s; Crushing level: Stop crushing while the voltage of the cell is 0V, or the deformation reaches 30%, or the crushing force reaches 200kN. Observe the phenomenon for 1h.	No fire or explosion 不起火、不爆炸

Item 测试项目	Test Method 测试方法	Spec 标准
	电芯按照 6.3.2 方法充电，然后按下列条件进行试验。 挤压方向：垂直于电芯极板方向施压； 挤压板形式：半径为 75mm 的半圆柱体，半圆柱体的长度大于被挤压电池的尺寸； 挤压速度：(5±1) mm/s； 挤压程度：直至电芯电压变为 0V，或变形量达到 30%或挤压力达到 200kN 后停止挤压。观察 1h。	
Nail 针刺	Charge at 6.3.2, and then penetrate through the cell with a steel nail of Ø5mm-8mm near the center of its biggest surface at the speed of (25±5) mm/s. The steel nail should stay in cells. Observe the phenomenon for 1h. 电芯按照 6.3.2 方法充电，然后用 Ø5mm~Ø8mm 的耐高温钢针、以 (25±5) mm/s 的速度，从电池的最大平面靠近中心的部位快速完全刺穿电池。钢针应停留在电芯中。观察 1h。	No fire or explosion 不起火、不爆炸
Soaking in seawater 海水浸泡	Charge at 6.3.2, and then cells are totally immersed in 3.5% NaCl solution for 2h. Observe the phenomenon for 1h. 电芯按照 6.3.2 方法充电，然后完全浸没于 3.5% NaCl 溶液中 2h。观察 1 小时。	No fire or explosion 不起火、不爆炸
Temp. Cycling 温度循环	Charge at 6.3.2, then put cells into a temperature box. The temperature box is adjusted according to table 1 and figure 2 of GB/T 31485-2015 which is repeated for 5 cycles. Observe the phenomenon for 1h. 电芯按照 6.3.2 方法充电，然后放入温度箱中，温度箱按照 GB/T 31485-2015 中表 1 和图 2 进行调节并循环 5 次。观察 1h。	No fire, explosion or leakage 不起火、不爆炸、不漏液
Low Pressure 低气压	Charge at 6.3.2, then put cells into a low pressure test chamber for 6h. The air pressure of the test chamber shall be set to 11.6 KPa, and temperature shall be set to room temperature. Observe the phenomenon for 1h. 电芯按照 6.3.2 方法充电，然后放入低气压箱中，调节试验箱中气压为 11.6 KPa，温度为室温，静置 6 小时。观察 1h。	No fire, explosion or leakage 不起火、不爆炸、不漏液

The safety performances of the cell pass GB/T 31485-2015.

电芯安全性能通过国标 GB/T 31485-2015 认证。

9 PRECAUTIONS AND SAFETY INSTRUCTIONS 安全守则

Abuse of lithium-ion rechargeable batteries can cause damage to the cell and/or personal injury. Please read and observe the standard cell precautions below before using utilization.

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

a. Customer is required to contact sinopoly in advance, if and when the customer needs other applications or operating conditions than those described in this specification.

客户需要将电芯在该规格书说明以外的条件下操作或应用，请先咨询中聚公司相关事宜。

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

在该规格书说明条件之外使用该电芯而产生的事故，中聚公司不承担任何责任。

10 TRANSPORTATION 运输

The capacity of delivery cell is $\leq 50\%$ SOC. During transportation, keep the cell from acutely vibration, impacting, sun and rain. Shipping environment temperature should be controlled at $0 \sim 45^{\circ}\text{C}$.

出货电芯容量不可高于 50% SOC 状态。运输过程应防止剧烈振动、冲击、日晒雨淋。运输过程中，环境温度应当控制在 $0 \sim 45^{\circ}\text{C}$ 。

11 CELL DIRECTION FOR USE 电芯使用说明

11.1 Charge 充电

a. Charging voltage must be set to 3.65V/cell. Even if the charge could be out of order, charge voltage of charger should not be above 3.8V/cell to avoid over-charging. Cell life will be shortened by charging voltage above 3.65V.

电芯充电电压设定为3.65V，即使在异常情况下，充电电压不可超过3.8V以避免过充电。充电电压高于3.65V会导致电芯循环寿命缩短。

b. Charger should start charging at temperature range $0^{\circ}\text{C} \sim +45^{\circ}\text{C}$. Cell surface temperature is $\leq 60^{\circ}\text{C}$ during using process.

电芯充电温度范围为 $0^{\circ}\text{C} \sim +45^{\circ}\text{C}$ 。使用过程中，电芯表面温度不可高于 60°C 。

Charging is not allowed when temperature is $< 0^{\circ}\text{C}$;

温度小于 0°C ，不允许充电；

When charge within 0°C ~ 10°C, Max. Charge Current:	0.33C, CC Only
0°C ~ 10°C 最大充电电流:	0.33C, 仅限恒流充
When charge within 10°C ~ 20°C, Max. Charge Current:	1C, CC Only
10°C ~ 20°C 最大充电电流:	1C, 仅限恒流充
When charge within 20°C ~ 35°C, Max. Charge Current:	2C, CC & CV
20°C ~ 35°C 最大充电电流:	2C, 恒流恒压充
When charge within 35°C ~ 45°C, Max. Charge Current:	1C, CC & CV
35°C ~ 45°C 最大充电电流:	1C, 恒流恒压充
Charging is not allowed when temperature is >45°C;	
温度大于 45°C, 不允许充电。	

c. Use a constant current, constant voltage (CC/CV) lithium-ion (Li+) cell charge controller. Do not use the continuous charging method without voltage limit.

采用恒流恒压模式的锂离子电池充电器，不可采用无限压的持续充电方式。

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

不要持续充电超过标准的应充电时间。

e. No reverse charging.

不可反向充电。

f. In case of cell voltage is below 2.0V, cell should be charged with pre-charge that current is below 2.5A. When cell voltage reaches over 2.0V, standard charge starts. And if cell voltage never reaches 2.0V in specified period (timer), charger will stop charging.

当电芯电压低于2.0V时，必须使用低于2.5A电流对电芯进行预充电，直到电芯电压高于2.0V再进行标准方式充电。

如果电芯电压在限定时间内无法充至2.0V，充电器需停止充电。

11.2 Discharge 放电

a. Discharge end voltage must be over 2.5V (Low temperature discharge end voltage can be).

电芯放电终止电压需高于2.5V（低温放电终止电压可以下探到2.0V）。

b. Discharge temperature range should be -20°C ~ +55°C. Cell surface temperature is ≤60°C during using process.

电芯放电温度范围为-20°C ~ +55°C。使用过程中，电芯壳体表面温度不可高于60°C。

c. During the process of discharging, the maximum continuous discharge current should be less than 2C. To optimize the battery life, we recommend charge and discharge the battery to the depth of 20% ~ 80% (DOD) during operating.

电池在放电过程中，持续放电电流最大为2C；如要优化电池寿命，建议电池组使用时的放电深度为20%~80% (DOD)。

11.3 Storage 储存

a. Any storage, cell should be in a dry area and no corrosive gas and there is no pressure on the cell.

电芯应在干燥无腐蚀性气体的环境下储存，不要让电芯承受任何压力。

b. Cells should be stored at the optimum SOC in the range of 30% ~ 50%, charge the cell once per month to avoid the cell is over-discharge.

建议电芯在 30% ~ 50% SOC 下存储，每一个月进行一次补充电，以免电芯过放，影响性能。

When stored within 1 month: -40°C ~+50°C

储存期 1 个月: -40°C ~+50°C

When stored within 6 months: -20°C ~+40°C

储存期 6 个月: -20°C ~+40°C

When stored within 12 months: 5°C ~+35°C

储存期 12 个月: 5°C ~+35°C

11.4 Precautions on Handling Lithium Ion Cells 电芯使用方式

a. Do not use abnormal cell which is damaged by shipping stress, drop, external short-circuit or anything else, and which gives off electrolyte odor.

不要使用由于运输损伤，跌落，短路或其它原因造成破损或漏液电芯。

b. Do not use or put the cell under the blazing sun (or in heated car by sunshine). The cell may generate heat, smoke or flame. And also, it might cause the deterioration of cell's performance or cycle life.

不要使用或将电芯放在太阳光直射的地方（或阳光直接照射的车内）。这种情况会使得电芯产热，冒烟或起火，也可能使得电芯性能衰减及循环寿命缩短。

c. If the skin or cloth is smeared with liquid from the cell, wash with clean water. It may cause the skin inflammation, see a doctor immediately.

如果电芯流出液体接触到皮肤或衣服，使用清水清洗。可能会引起皮肤炎症，请立即就医。

d. In order to monitor the voltage, current and temperature of the single cells of the battery pack in real-time and effectively prevent overcharge, over-discharge and overheating of the cells, the battery pack must be configured with a battery management system (BMS), which has a complete and reliable performance and accurate data collection function.

为了实时监控电池组内单体电池的电压、电流和温度，有效防止发生电池过充、过放、过热现象，电池组必须配置功能完善、性能可靠、数据采集准确的电池管理系统（BMS）。

11.5 CAUTION AND PRECAUTION 提醒与预防

The cell includes the flammable objects such as the organic solvent. If the handling is missed there will be possibility that the cell rupture flames or hot, or it will cause the damage to the cell and/or personal injury. Please observe the following prohibitive matters. And also, add the protection device to the equipment for fear that the trouble would affect the cell by the abnormality of equipment. Please read and observe the standard cell precautions below before using utilization.

电芯含有有机溶剂等易燃物质，如使用不当可能引起电芯产热或起火，造成电芯的损害或人身的伤害。请注意使用禁止事项，同时应增加保护装置以避免使用设备异常造成电芯事故。在使用锂离子可充电电芯以前，请仔细阅读以下的安全守则。

a. Don't use or expose the cell to extreme heat, flame, disposed in fire or water or get it wet. Don't modify or disassemble the cell. It will be dangerous, and may cause ignition, heating, leakage or explosion.

不要使用或放置电芯于过热，有火星的环境。不要将其投入火中，水中或使其吸湿。不要修理或拆解电芯，存在引发电芯起火、过热、漏液或爆炸的危险。

b. Don't short-circuit cell positive (+) and negative (-) poles. Keep away from metal or other conductive materials. Jumbling the cells of direct contact with positive (+) and negative (-) poles or other conductive materials may cause short-circuit. Don't reverse the positive (+) and negative (-) terminals for any reason.

不要将电芯混乱摆放，同时远离金属或导电材料，以避免正（+）负（-）极短路，不要颠倒电芯正（+）负（-）极使用。

c. Don't use the unspecified charger and breach charging requirement. Cell charged with unspecified condition maybe lead cell to be overcharged or abnormal chemical reaction. It causes the generating heat, smoke, rupture or flame.

不要使用非规定充电设备和违反充电要求。非规定条件充电会引发电芯过充电或异常化学反应，发生产热，冒烟，

破裂或起火情况。

d. Don't overcharge, over-discharge, drive nail into the cell, strike it by hammer or tread it.

不要过充、过放、针刺、锤击或践踏电芯。

e. Don't give cell impact or drop, and not use the cell with conspicuous damage or deformation.

不要撞击或投掷电芯，不要使用受到明显的损害或变形的电芯。

f. Don't connect cell to the plug socket or car-cigarette-plug. Don't use lithium-ion cell in mixture of different batch or use cell for other equipment.

不要将电芯与插座直接连接，不同批次锂离子电芯不可混合使用，或将电芯用于其它设备。

g. Do not use Lithium ion cell with the primary batteries or secondary batteries whose capacity or kinds or maker is different. If do that, the cell will be discharged or charged excessively in use. And it may cause the generating heat, smoke, rupture or flame because of the abnormal chemical reaction in cells.

不要将锂离子电芯与一次电芯或不同厂家生产的二次电芯混合使用，混合使用会造成电芯充电或放电过度，引发电芯由于非正常化学反应产热，冒烟，破裂或起火。

h. Do not use or leave the cell under the blazing sun (or in heated car by sunshine), and keep cell away from little children in order to avoid troubles by Swallowing. In case of swallowing the cell, see a doctor immediately.

不要将电芯放置在太阳光直射的地方（或阳光直接照射的车内），电芯要远离儿童放置以避免儿童吞咽事故，如发生吞咽情况，请立即就医。

i. If the cell gives off an odor, generates heat, becomes discolored, or in any way appears abnormal during use, recharging or storage, immediately remove(Don't touch a abnormal cell directly) it from the device or cell charger and stop using it.

电芯在使用、充电或储存过程中，出现释放气味、过度产热或变色等异常情况，立即将电芯从使用设备或充电器取出（不要直接接触异常电芯）并停止使用。

j. Do not continue to charge cell over specified time. If the cell is not finished charging over regulated time, let it stop charging. There is possibility that the cell might generate heat, smoke, rupture or flame.

电芯不要持续充电超过限定时间。如电芯在限定时间内仍无法完成充电，要停止充电，继续充电有可能发生电芯产热，冒烟，破裂或起火。

k. Do not put cell into a microwave or a high pressure container. It causes the generating heat, smoke, rapture or flame because of a sudden heat or damage of sealing condition of cell.

不要将电芯置于微波或高压容器内，突然高温或密封状态破坏会引起电芯产热，冒烟，破裂或起火。

CONSULTATION 技术咨询

Any obscurity, please contact us as following:

Add: Tianjin Sinopoly New Energy Technology Co., LTD.

20 Huangshan North Rd, Hangu Binhai New Area, Tianjin, China.

Tel No.: 86-22-67158000.

Fax No.: 86-22-67158722.

<http://www.sinopolybattery.com>.

如有任何疑问，请按照以下方式咨询：

厂址：中国天津市滨海新区汉沽黄山北路 20 号，天津中聚新能源科技有限公司。

电话：86-22-67158000.

传真：86-22-67158722.

For the sake of safety assurance, please discuss the equipment design, its system and protection circuit of Lithium-ion cell with sinopoly 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高电流，快速充电和其它方面的特殊应用，请先咨询中聚公司相关事宜。