



产品规格书

Product Specification

产品型号/ Product No.: SK145100300

制定/Producer	审核/Checker	批准/Approver

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1. 一般信息/ General information

1. 适用范围/ Scope

本规格书定义了东莞市欢欢能源科技有限公司（以下简称欢欢）提供给客户的可充放锂离子电芯的性能及参数。

This specification defines the performance and diameter of the rechargeable Lithium-ion battery, produced by **Dongguan Huanhuan Energy Technology Co., Ltd.**

2. 应用范围/ Application

电动汽车/储能 Electric vehicle/ Energy storage

3. 适用标准/ Applicable standard

- 1 GB/T 31484-2015 《电动汽车用动力蓄电池循环寿命要求及实验方法》；
- 2 GB/T 31485-2015 《电动汽车用动力蓄电池安全要求及试验方法》；
- 3GB/T 31486-2015 《电动汽车用动力蓄电池电性能要求及试验方法》； 1) GB/T 31484-2015 《 Cycle life requirements and test methods for traction battery of electric vehicles》；
- 2GB/T 31485-2015 《Safety requirements and test methods for traction battery of electric vehicles》；
- 3 GB/T 31486-2015 《Electrical performance requirements and test methods for traction battery of electric vehicles》

4. 产品分类/ Product type

可充电锂离子电芯/ Rechargeable Lithium-ion Battery



2. 产品标签/ Product label

项目 (Item)	内容 (Content)
产品名称 Product Name	可充电锂离子电芯 Rechargeable Lithium-ion Battery
生产日期 Date of manufacture	xxxx/xx/xx
制造商公司全称 name of the manufacturer	东莞市欢欢能源科技有限公司 Dongguan Huanhuan Energy Technology Co., Ltd.
额定容量 (Ah) Rated Capacity	60
能量 (Wh) Watt-hour	222
标称电压 (V) Nominal Voltage	3.7
型号 Product No.	SK145100300-60AH



3. 产品规格/Specification

1. 概要 (Summary)

NO.	Item	Description	Requirement
1	Basic	Cell Type	Pouch Cell
2	Parameter	Cathode Material	NCM base
3		Anode Material	NG/AG base
4		Cell Size	Width*length*thickness (mm) 301.5*99.7*14.3
5		Cell weight	Cell weight (g) 885±10
6		IR-AC	(AC, 1KHz, 25° C, 38%SOC) mΩ
7		IR-DC	(10s, 60A, SOC50%, @25°C, BOL)mΩ
8		IR-DC	(10s, 45A, SOC50%, @25°C, BOL)mΩ
9		Norminal Voltage	(1/3C/1/3C charge/discharge, @25°C, BOL)
10		Shipping OCV	@25°C, 60% RH, BOL) V
11		Insulation resistance	@25°C, 60% RH, BOL) MΩ
12	Capacity	Discharge Capacity	(Capacity, BOL 1/3/1/3C @ 25° C) (Ah)
13			(Capacity, BOL 1/3/1/3C @ 25° C) (Ah) after 10,000km or 8weeks
14	Energy	Energy	(1/3C, 25° C) Wh



15	Temperature	Operation Temperature range	° C	-30~60
16		Storage Temperature range	° C	-40~70
17	Cut-off voltage	Charge cut-off voltage	V	4.2
18		Discharge cut-off voltage	V	2.5 ($\geq 0^{\circ}\text{C}$) 2.0 ($< 0^{\circ}\text{C}$)
19	Current	Max current	(-30-60° C, 15s) (A)	400
20		Max current	(-30-60° C, 1s) (A)	450
21	Power	25° C Discharge Power (BOL)	(SOC15%, 800W) sec	≥ 15
22		25° C Discharge Power (EOL)	(SOC15%, 645W) sec	≥ 15
23		25° C Charge Power (BOL)	(SOC80%, 800W) sec	≥ 15
24		25° C Charge Power (EOL)	(SOC80%, 645W) sec	≥ 15
25		-15° C Discharge Power (BOL)	(SOC20%, 250W) sec	≥ 15
26		-15° C Charge Power (BOL)	(SOC90%, 50W) sec	≥ 15
27	Rate Capability	High Rate Discharge Capacity	(CC, 2C vs. 1/3C) %	>90
28		High Rate Charge Capacity	(CC, 2C vs. 1/3C) %	>80
29		Low temperature Discharge Capacity	(CC, -20° C vs. 25° C) %	>75
30	Cycle life	Continuous Current Cycle Life	(100%DOD, 41° C, 1C, 70%) cycles	≥ 2000
31		Pattern Cycle Life	(35° C, Mode 3, 70%) km	≥ 25000



32			(35° C, Mode 4, 70%) km	
33	Calendar Life	Calendar Life	(25, 35, 45, 50, 60° C, SOC60%, @70%) years	≥15
34		Calendar Life	(25, 35, 45, 50, 60° C, SOC90%, @70%) years	≥15
35		Calendar Life	(25, 35, 45, 50, 60° C, SOC97%, @70%) years	≥15
36	Self-discharge	Self-discharge	(45° C, SOC60%, 4weeks) (V)	< 0.0015
37	Reliability Test	High Temp. Storage1	(70° C, SOC97%, 2weeks, w/ Jig)	No vent, ≤20% swelling, ≥100 MΩ insulation resistance, Meet EOL capacity, power
38		High Temp. Storage2	(60° C, SOC97%, 4weeks w/ Jig)	
39		Low Temp. Storage	(-40° C, SOC97%, 500hrs)	
40		Temp. Humidity Storage	(70°C, 95% RH, SOC97%, 168 times)	
41		Temp. Humidity Cycle	SOC97%, 10 cycles	
42		Thermal Shock	-40°C for 30 min. → 70°C for 10 min. 2160 cycles @ SOC 97%	
43		Internal pressure limit		
44	Pouch Corosion Test	SOC60%, Anode tab-pouch short, 60°C/95% 8 weeks	No leak, No corrosion, No swelling	



45	Abuse Testing	Nail	Pin ϕ 2.5 mm, Speed 80 mm/sec @ SOC 80%	Pass
46		Crush	30% crush @ SOC 100%	Pass
47		Impact	30% crush @ SOC 100%	Pass
48		Drop	Drop from 2 m height onto concrete floor 50 times @ SOC 100%	Pass
49		Immersion	0.6M NaCl in water for 2 hr. @ SOC 100%	Pass
50		Heating	130°C for 1 hr. @ SOC 100% (Heating rate 5°C/min.)	Pass
51			External Short	Resistance 5m Ω @ SOC100%, 25°C (Charge at -30°C)
52		Short Circuit Mapping	Resistance 5, 10, 15m Ω x - 30, 25, 60°C @SOC100%	Pass
53		Internal Short	Pin ϕ 20mm, 1.5R, 1,5mm/min. @ SOC100%	Pass
54		Overcharge	CC 35A/5V @ SOC0%	Pass
55		Overdischarge	1C discharge for 1 hr. @ SOC0%	Pass



4. 存储及运输要求(Storage and shipment requirement)

项目 Item		标准 Criteria
存储温度 (Storage temperature)	短期少于 1 个月 (Less than 1 month)	-10℃-45℃
	中期少于 3 个月 (Less than 3 months)	-10℃-35℃
	长期超过 3 个月 (More than 3 months)	0℃-30℃
相对湿度 (Relative humidity)		≤75% RH
荷电状态 (State of charge)		30%荷电状态 (30% SOC)

单体电芯长期不使用时, 每隔 3 个月对电芯进行一次充放电, 并将 SOC 调整至 30%。

When the cell is not used for a long time, the cell should be charged and discharged every three months, and adjust the SOC to 30%.

5. 性能及适用标准/Performance & Applicable Standard

1. 电性能 (Electrochemical performance)

1. 电性能测试项目、方法及要求 (Test items & Test method & Criteria)

章节 (Section No.)	项目 (Item)	测试方法 Test methods	标准 Criteria
5.1.1.1	室温放电容量 (Discharge Capacity at RT)	室温条件下, 标准充电后的电芯, 1C 放电至下限截至电压, 重复 5 次 (或参照 IEC62660-1: 2010); The fully charged cell discharge to cut-off voltage with constant current 1C; (Refer to IEC62660-1: 2010)	$C_R \leq C_0 \leq 110\% C_R$
5.1.1.2	低温放电容量 (Discharge capacity at -20℃)	室温条件下, 标准充电后的电芯, 在 -20℃±2℃下搁置 12h, 以 1C 放电至下限截止电压 (或参照 IEC62660-1: 2010); After resting 12h at -20℃±2℃, the fully charged cell discharge to cut-off voltage with constant current 1C (Refer to IEC62660-1:	$\geq 80\% C_0$



5.1.1.3	高温放电容量 (Discharge capacity at 55°C)	室温条件下, 标准充电后的电芯, 在 55°C ±2°C 下搁置 5h, 以 1C 放电至下限截止电压 (或参照 IEC62660-1: 2010); After resting 12h at 55°C ± 2°C, the fully charged cell discharge to cut-off voltage with constant current 1C (Refer to IEC62660-1: 2010);	≥95%Co
5.1.1.4	室温倍率放电容量 (Discharge C-Rate at RT)	室温条件下, 标准充电后的电芯以 2C 放电至下限截止电压 (或参照 IEC62660-1: 2010); The fully charged cell discharge to cut-off voltage with constant current 3C (Refer to IEC62660-1: 2010);	≥95%Co
5.1.1.5	室温倍率充电性能 (Charge C-Rate at RT)	室温条件下, 以 1C 放电至下限截止电压, 静置 1h; 2C 恒流恒压充电至上限截止电压, 截止电流 0.05C, 静置 0.5h; 以 1C 电流放电至下限截止电压 (或参照 IEC62660-1: 2010); The fully discharged cell 2C CC-CV to limited charge voltage at 0.05C; Rest 0.5h; 1C discharge to cut-off voltage (Refer to IEC62660-1: 2010);	≥80%Co
5.1.1.6	室温荷电保持与容量恢复能力 (Capacity retention & recovery at RT)	室温条件下, 标准充电后的电芯, 在室温下储存 28d, 然后以 1C 放电至下限截止电压, 充满电后 1C 放电至下限截止电压 (或参照 IEC62660-1: 2010); After resting 28d at 25°C ±2°C, the fully charged cell discharge to cut-off voltage with constant current 1C, rest 30min; then 0.5C CC-CV to limited charge voltage at 0.05C; rest 30min; 1C discharge to cut-off voltage (Refer to IEC62660-1: 2010);	保持容量 (Cap. retention) ≥ 98%Co; 恢复容量 (Cap. recovery) ≥90%Co;
5.1.1.7	高温荷电保持与容量恢复能力 (Capacity retention & recovery at 55°C)	室温条件下, 标准充电后的电芯, 在 55°C ± 2°C 下储存 7d, 室温恢复 5 小时后以 1C 放电至下限截止电压, 充满电后, 以 1C 放电至下限截止电压 (或参照 IEC62660-1: 2010); After resting 7d at 55°C ± 2°C, the fully charged cell rest 5h at RT, discharge to cut-off voltage with constant current 1C, rest 30min; then 0.5C CC-CV to limited charge voltage at 0.05C; rest 30min; 1C discharge to	保持容量 (Cap. retention) ≥ 85%Co; 恢复容量 (Cap. recovery) ≥90%Co;



		cut-off voltage (Refer to IEC62660-1 : 2010) ;	
5.1.1.8	循环寿命 (Cycle life at 25°C ±5°C)	a. 室温下电芯 1C 放电至下限截至电压 b. 搁置 30min c. 0.5C 恒流恒压充电至上限截止电压, 终止电流降至 0.05C 停止充电 d. 搁置 30min e. 1C 放电至下限截止电压 f. 循环 b~e 直到放电容量达到 80% C ₀ (或参照 IEC62660-1: 2010) ; 1C discharge to cut-off voltage, rest 0.5h, CC-CV 0.5C charge to limited charge voltage at 0.05C, rest 0.5h, Repeat above steps till continuously discharging capacity less than 80% C ₀ (Refer to IEC62660-1: 2010) ;	循环次数达到 2000 次时放电容量不低于初始容量的 80%. (After 2000cycles, the discharge capacity ≥ 80% C ₀)
5.1.1.9	储存 (Storage)	将电芯调节至 54%SOC, 45°C ± 2°C 搁置 28 天, 室温恢复 5 小时, 标准充电, 搁置 30 分钟后 1C 放电至截止电压 (或参照 IEC62660-1: 2010) ; Adjust SOC to 54%, rest 28 days at 45°C ± 2°C, after resting 5 hours, adjust SOC to 100% with standard charge method, rest 30min; 1C discharge to cut-off voltage (Refer to IEC62660-1: 2010) ;	恢复容量 (Cap. recovery) ≥ 90% C ₀ ;

* C₀: The discharge capacity of the first cycle; C_R: Rated Capacity;



		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 (Refer to IEC62660-1: 2010) ;	
5.2.1.3	外部短路 (Short circuits)	标准充电后的电芯, 经外部短路 10min, 外部线路电阻 < 5mΩ, 结束后观察 1h (或参照 IEC62660-2: 2010) ; The fully charged cells are short-circuited by connecting the positive and negative poles with a resistance load less than 5mΩ for 10 minutes (Refer to IEC62660-2: 2010) ; ;	不起火, 不爆炸; No fire, No explosion;

5.2.2 机械安全性能 (Mechanical tests)

章节 (Section No.)	项目 Item	测试方法 (Test method)	标准 (Criteria)																
5.2.2.1	振动 (Vibration)	<p>调整 SOC 为 100%, 依据 IEC 60068-2-64 对电芯进行随机振动测试, 持续 8h。振动加速度 27.8m/s², 功率谱密度与频率之间的关系见 5.2.2.1 表。最大振动频率为 3000Hz (或参照 GD22-2015)。</p> <p>a) Adjust the SOC of cell to 100 %.</p> <p>b) Perform the test referring to IEC 60068-2-64 random vibration. Use test duration of 8 h for each plane of the test cell.</p> <p>c) The r.m.s. acceleration value shall be 27.8 m/s². The power spectrum density (PSD) vs frequency is shown in the table below. The maximum frequency shall be 3000Hz (Refer to GD22-2015) .</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Frequency Hz</th> <th>PSD (m/s²)²/Hz</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>20</td> </tr> <tr> <td>55</td> <td>6,5</td> </tr> <tr> <td>180</td> <td>0,25</td> </tr> <tr> <td>300</td> <td>0,25</td> </tr> <tr> <td>360</td> <td>0,14</td> </tr> <tr> <td>1 000</td> <td>0,14</td> </tr> <tr> <td>2 000</td> <td>0,14</td> </tr> </tbody> </table> <p style="text-align: center;">Table 5.2.2.1- Values for PSD and frequency</p>	Frequency Hz	PSD (m/s ²) ² /Hz	10	20	55	6,5	180	0,25	300	0,25	360	0,14	1 000	0,14	2 000	0,14	不起火, 不爆炸, 不漏液; No fire, No explosion; No electrolyte leakage;
Frequency Hz	PSD (m/s ²) ² /Hz																		
10	20																		
55	6,5																		
180	0,25																		
300	0,25																		
360	0,14																		
1 000	0,14																		
2 000	0,14																		
5.2.2.2	机械冲击	调整 SOC 为 100%, 按照表 5.2.2.2 执行测试。在																	



	(Mechanical shock)	<p>冲击试验中, 加速度的方向应与车辆受到的冲击加速度方向一致。如果冲击造成的影响不明确在某个特定方向, 那么电池的六个方向均应做测试 (或参照 IEC62660-2: 2010)。</p> <p>a) Adjust the SOC of cell to 100 %.</p> <p>b) Perform the test as shown in Table 5.2.2.2. Acceleration from the shock in the test shall be applied in the same direction as the acceleration of the shock that occurs in the vehicle. If the direction of the effect is not known, the cell shall be tested in all six spatial directions (Refer to IEC62660-2: 2010) .</p> <table border="1" data-bbox="588 741 1230 887"> <tr> <td>Pulse shape</td> <td>half-sinusoidal</td> </tr> <tr> <td>Acceleration</td> <td>500 m/s²</td> </tr> <tr> <td>Duration</td> <td>6 ms</td> </tr> <tr> <td>Number of shocks</td> <td>10 per test direction</td> </tr> </table> <p>Table 5.2.2.2- Mechanical shock test – parameters</p>	Pulse shape	half-sinusoidal	Acceleration	500 m/s ²	Duration	6 ms	Number of shocks	10 per test direction	
Pulse shape	half-sinusoidal										
Acceleration	500 m/s ²										
Duration	6 ms										
Number of shocks	10 per test direction										
5.2.2.3	挤压 (Crush)	<p>调整 SOC 为 100%。电池放置在绝缘平面上, 用直径为 154mm 球型挤压工具挤压电池, 挤压力的方向应与电池内部正负极分层界面垂直。这个挤压工具使电池产生形变, 形变量近乎与挤压力成正比。当电池电压降为初始电压的 1/3, 或电池出现 15%或者超过 15%的形变, 又或者挤压力达到电池重量的 1000 倍时, 挤压力撤除。电池保持测试状态 24h 或者温度下降到最大温度的 20%, 两者取最快结束 (或参照 IEC62660-2: 2010)。</p> <p>a) Adjust the SOC of cell to 100 %.</p> <p>b) The cell shall be placed on an insulated flat surface and be crushed with a crushing tool of hemisphere with a 154 mm diameter. The force for the crushing shall be applied in direction nearly perpendicular to a layered face of positive and negative electrodes inside cell. The crushing tool shall be selected so that the cell is deformed nearly in proportion to the increase of crushing force.</p> <p>c) The force shall be released when an abrupt voltage drop of one-third of the original cell voltage occurs, or a deformation of 15 % or more of initial cell dimension occurs or the force of 1 000 times the weight of cell applied. The cells remain on test for 24 h or until the case temperature declines by 20 % of the maximum temperature rise, whichever is the sooner (Refer to IEC62660-2: 2010) .</p>	不起火, 不爆炸; No fire, No explosion;								



5.2.2.4	跌落 (Drop)	<p>将标准充电后的电芯正负极端子朝下, 从 1.5m 高度处自由跌落到水泥地面上 (或参照 GB/T 31485-2015)。 The fully charged upside down cell is dropped from a height of 1.5m to strike a concrete surface (Refer to GB/T 31485-2015) .</p>	<p>不起火, 不爆炸, 不漏液; No fire, No explosion; No electrolyte leakage;</p>
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5.2.3环境安全性能 (Environmental safety tests)

(Section No.)	项目 Item	测试方法 (Test method)	标准 (Criteria)
5.2.3.1	外观检查 (Appearance inspection)	<p>检查受试电芯的外观结构、选用材料、制造工艺和标志等, 以确保受试电芯符合: 1) 符合 GD 22-2015 有关规定; 2) 制造厂制定的技术条件; 3) 有关电芯标准; 4) 图纸及设计资料 (或参照 GD 22-2015)。 Check the appearance structure, material selection, manufacturing process and logo of the tested cells to ensure that the tested cells conform to: 1) comply with relevant provisions of GD 22-2015; 2) technical conditions formulated by the manufacturer; 3) relevant cell standards; 4) drawings and design materials (Refer to GD 22-2015) .</p>	<p>符合测试方法中 1) ~4) 内容; Comply with content 1)~4) of test method;</p>
5.2.3.2	绝缘电阻测量 (Insulation resistance measurement)	<p>测试位置: 1) 正极与壳体; 2) 负极与壳体 (或参照 GD 22-2015)。 The test position: 1) positive pole and shell; 2) negative pole and shell (Refer to GD 22-2015) .</p>	<p>阻值不小于 100 Ω/V; Resistance is not less than 100 Ω/V</p>
5.2.3.3	温度循环 (Temperature cycling)	<p>调整 SOC 为 100%, 按照表 5.2.3.1 执行温度循环。最低测试温度为 -40℃ 或者厂商规定的温度, 最高测试度是 85℃ 或者厂商规定温度, 按照说明测试 30 次循环 (或参照 IEC62660-2: 2010)。 a) Adjust the SOC of cell to 100 % b) Perform the temperature cycling in Table 5.2.3.1. The minimum operating temperature shall be -40 °C or T_{min} specified by the manufacturer and the maximum operating temperature shall be 85 °C or T_{max} specifie by the manufacturer. Perform 30 test cycles as specified (Refer to IEC62660-2: 2010) .</p>	<p>温 不起火, 不爆炸, 不漏液; No fire, No explosion; No electrolyte leakage;</p>



		Cumulative time		Temperature	
		min		°C	
		0		25	
		60		T_{min}	
		150		T_{min}	
		210		25	
		300		T_{max}	
		410		T_{max}	
		480		25	

Table 5.2.3.1 Temperatures and time duration for temperature cycling

5.2.3.4	耐高温 (High temperature endurance)	待测电芯在热滥用试验箱中加热, 以 $5\pm 2^{\circ}\text{C}/\text{min}$ 速度升温至 130°C , 并保持 30min 后停止, 观察 1 小时 (或参照 IEC62660-2: 2010)。The fully charged cell is stabilized at room temperature, is placed in a gravity or circulating air-convection oven; The oven temperature is raised at a rate of $5^{\circ}\text{C}/\text{min}\pm 2^{\circ}\text{C}/\text{min}$ to a temperature of $130^{\circ}\text{C}\pm 2^{\circ}\text{C}$; The cell remains at this temperature for 30min before the test is discontinued; Observe the phenomenon for 1h (Refer to IEC62660-2: 2010) .	不起火, 不爆炸, 不漏液; No fire, No explosion; No electrolyte leakage;
5.2.3.5	海水浸泡 (Immersion)	将单体蓄电芯浸入 3.5%NaCl 溶液 (质量分数模拟常温下的海水成分) 中 2h, 水深应完全没过电芯 (或参照 GB/T 31485-2015)。 The fully charged cell is completely submerged in the sea (3.5% NaCl Solution) for 2 hours; Observe the phenomenon for 1h (Refer to GB/T31485-2015) .	不起火, 不爆炸; No fire, No explosion;
5.2.3.6	低气压 (Altitude simulation)	将单体蓄电芯放入气压为 11.6kPa 的试验箱中, 静置 6h (或参照 GB/T 31485-2015)。 The fully charged cell is placed in an altitude simulation test chamber; The pressure is reduced to 11.6kPa and maintaining this pressure for 6h; Observe the phenomenon for 1h (Refer to GB/T31485-2015).	不起火, 不爆炸, 不漏液; No fire, No explosion; No electrolyte leakage;
5.2.3.7	交变湿热 (Damp heat, cyclic)	将待测电芯放入试验箱的有效空间内, 先在温度为 $25^{\circ}\text{C}\pm 3^{\circ}\text{C}$, 相对湿度为 45%~75% 的条件下进行预处理, 使待测电芯温度达到稳定。按图 5.2.3.5 所示的周期循环 2 次 (或参照 GD22-2015)。 The temperature of the cell shall be stabilized at $25^{\circ}\text{C}\pm 3^{\circ}\text{C}$. During the stabilization of temperature, the relative humidity shall be 45%~75%, After the temperature of cell is steady, 2 Damp heat cycles should be performed in Figure 5.2.3.5 (Refer to GD22-2015) .	不起火, 不爆炸, 不漏液; No fire, No explosion; No electrolyte leakage;



6. 外观和尺寸/ Appearance & Dimension

1. 外观/ Appearance

外观没有深划痕, 裂缝, 锈蚀, 污点或泄漏, 等影响产品商业价值的缺陷。

There is no scratch, no rip, corrosion, no stain, no leakage or other defect would affect the commercial value.

2. 尺寸/ Dimension thick145*width100*height300 mm



序号	代码	尺寸 (mm)
1	T1	145±0.5
2	W2	100±0.5
3	H1	300±0.5



7. 注意事项及禁止条款/ Notice and Caution

下面是使用可充放磷酸铁锂电芯的注意事项。电芯处理不当可能会导致发热、着火和性能恶化。请务必遵守以下事项: / Please notice the following cautions. It would cause heating, fire and broken if do not handle the battery correctly.

注意/ Notice

- √ 使用装有电芯的设备前, 应先阅读使用手册。在充电前请阅读充电装置说明书。 / Please read the handbook at first, before using the equipment with battery. Please read the charging equipment indication before using charging.
- √ 当电芯连接充电装置一段时间后, 却并未充入电量的话, 停止充电。 / Stop charging, if do not get electric power when you charge some time.
- √ 装配电芯前请检查正(+)、负(-)方向。 / Please check the Positive (+) and negative (-) before assembling batteries.
- √ 对电芯进行连接装配时, 应检查绝缘, 以防短路。 / Please check insulation when connecting batteries, prevent short circuit.
- √ 电芯必须单独存储。 / Batteries must be stored separate.
- √ 电芯需要长期存储时, 必须存储在干燥与温度较低 ($\leq 25^{\circ}\text{C}$) 的环境中。 / Please store in dry and low temp ($\leq 25^{\circ}\text{C}$) environment if batteries would be stored for long time.
- √ 不可以将电芯放置在阳光直射或高温环境中。 / Do not put the battery under sun-light and high temp.
- √ 在第一次使用时检测到气味或生锈, 请立即将产品退回卖方。 / Please return battery pack to the seller, if there is smell or stain when you use the first time.
- √ 电芯必须远离儿童和宠物。 / Keep batteries far away from children and pets.
- √ 当电芯经过长时间使用后寿命缩短, 请更换新电芯。 / Please change the battery when the cycle life shorter after long time using.
- √ 在处理电芯时, 不可以佩戴金属物体。(例如戒指, 手表, 配件等) / When operating batteries, please keep from metal materials. (For example: ring, watch, components)
- √ 使用电芯制作模块或电池组时, 应遵循“先进先出”原则。 / Please do as the rule of “1st in, 1st out ” when you operating batteries.
- √ 充放电条件符合规格书中规定。 / Charging condition must follow specification.
- √ 电芯不可以暴露于本文件规定的工作温度范围外。 / Do not put the battery in the temperature do not specified in the specification.



禁止 / Caution

- √ 不可以使用不同的充电设备。 / Do not use different charger.
- √ 不可以超过最大充电倍率。 / Do not be over than Max charging current.
- √ 不可以拆卸或改造电芯。 / Do not disassemble or reform the battery.
- √ 不可以扔或撞击电芯。 / Do not drop or shock the battery.
- √ 不可以用锋利的东西刺破电芯。(如钉、刀、铅笔、钻孔机) / Do not use sharp goods to puncture batteries. (For example: nail, knife, pencil, drill)
- √ 不可以与其他电芯混用。 / Do not use with other batteries.
- √ 不可以直接焊接电芯。 / Do not weld the batteries directly.
- √ 制造过程中电芯不可以负载。 / Do no be with load when make batteries.
- √ 不可以将旧电芯和新电芯一起包装。 / Do not use the new battery and old battery together.
- √ 不可以将电芯暴露在高温下。(如火) / Do not put the battery in high temperature. (For example: fire)
- √ 不可以将电芯放入微波炉或高压容器中。 / Do not put the battery in microwave oven and high pressure container.
- √ 不可以将电芯倒置。 / Do not put the battery convert.
- √ 不可以将正负极与金属材料接触。(如金属、电线) / Do not connect the positive and negative pole with metal material.
- √ 不允许用水或海水将电芯淹没或浸湿。 / Do not submerge and soak the battery by water and seawater.
- √ 未经电芯制造商允许时不可以弯曲电芯。 / Do not wind the battery without permission of the manufacturer.