

文件名称: NaFR26700CY-3.2Ah钠离子电芯规格书	受控印章 2024-06-11	
文件编号: CY-QPS-RD-007	版本: A1	第 1 页 共 11 页 受控文件

产品规格书

Product specification

产品名称: 圆柱钠离子电芯

Product Name: Cylindrical Na-ion Cell

产品型号: NaFR26700CY-3.2Ah

Product Type: NaFR26700CY-3.2Ah

编制 Designed	审核 Checked	批准 Approved
岳政	种花家	张红伟

深圳市种花家科技有限公司/Shenzhen Zhonghuajia Technology Co., Ltd.

深圳市龙岗区平湖环球物流中心722-725

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深圳市种花家科技有限公司
Shenzhen Zhonghuajia Technology Co., Ltd.

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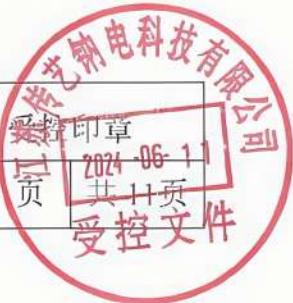
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修订记录

Revision record

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1. 适用范围 Scope

本产品规格书描述了由深圳市种花家科技有限公司生产的圆柱钠离子电芯的产品性能指标。

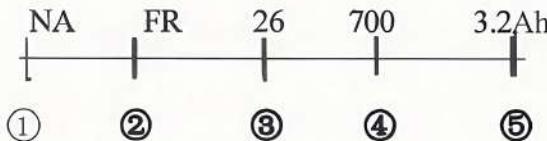
This product specification describes the performance index of cylindrical Na-ion cell produced by Shenzhen Zhonghuajia Technology Co., Ltd.

2. 说明 Description

2.1 产品/Product: 圆柱钠离子电芯 Cylindrical Na-ion cell

2.2 电芯型号/Product type: NaFR26700CY-3.2Ah

2.3 名称/Name:



① : 代表电芯类别, "Na" 代表钠离子电芯

Represents cell category, "Na" stands for Na-ion cell

② : 代表电芯形状 "FR" 代表圆柱

Represents cell shape, "FR" stands for the cylinder

③ : 代表电芯直径

Represents the cell diameter

④ : 代表电芯高度

Represents the cell height

⑤ : 代表电芯容量

Represents the cell capacity

3. 外观及尺寸 Appearance and size

项目/Items	尺寸/Sizes(mm)
直径/Diameter(Φ)	26.4±0.1
高度/Height(L)	71.4±0.2

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4. 基本特性 Basic performance

4.1 技术参数規格 Technical specifications

技术参数/Technical parameter	規格/Specifications	
额定容量/ Nominal capacity	3.2Ah (1.5-3.95V@0.5C)	
标称 电压/Nominal voltage	3.0 V	
内阻/Internal resistance	$\leq 18\text{m}\Omega$	
电芯重量/Cell weight	84.0 ± 2 g	
最大充电电压/Max. Charge Voltage	4.0V	
放电截至电压/ End discharge Voltage	1.5V	
充电方式/Charging mode	0.5C to 3.95V CC-CV	
最大充电电流/Max. Charge current	1C	
最大持续放电电流 / Max. Continuous discharge current	3C	
最大脉冲放电电流 / Max. instantaneous discharge current	12C (30S)	
工作温度范围 / Operating temperature range	充电温度 /Charging temperature	-10°C ~ +55°C
	放电温度 /Discharging temperature	-40°C ~ +60°C
外观/Appearance	无破裂、划痕、变形、污迹、电解 液泄漏等现象 No rupture, scratch, deformation, stain, electrolyte leakage, etc	

5. 测试条件 Test conditions

5.1 标准测试条件 Standard test conditions

若无特殊要求，此规格书上的产品测试条件均为：温度：25°C ± 3 °C, 湿度65% ± 20 %RH。

If there are no special requirements , the product test conditions in this specification:
Temperature: 25°C ± 3 °C, humidity: 65% ± 20 % RH.

5.2 标准充电方法 Standard charging method



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“标准充电”即在环境温度为 $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$ 的条件下，以恒流恒压 0.5C 充电至 3.95V，截止电流 0.02C。

At ambient temperature of $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$, "Standard charging" refers to charging to 3.95V at CC-CV with 0.5C, and cut off current 0.02C.

5.3 标准放电方法 Standard Discharging method

“标准放电”即在环境温度为 $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$ 的条件下，以恒定电流 0.5C 放电至 1.5V。

At the ambient temperature of $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$, "Standard discharge" refers to the discharge to 1.5V at constant current of 0.5C.

6. 电性能 Electrical characteristics

项目/Items	测试条件/Test conditions	规格/Specifications
6.1 高温性能 High-temperature characteristics	<p>按照5.2标准充满电，将电芯放入 $60^{\circ}\text{C} \pm 2^{\circ}\text{C}$ 的高温箱中 恒温 8h，然后在高温箱中以 0.5C 电流放电至放电终止电压 1.5V，实验结束后，将电芯取出置于环境温度为 $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$ 的条件下搁置 2h，目测电芯外观。</p> <p>Fully charged per 5.2, put the cell into $60^{\circ}\text{C} \pm 2^{\circ}\text{C}$ high-temperature box for 8 h, then discharge the cell of 0.5C to 1.5V in box. After the experiment, take out and place it at the ambient temperature of $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$ for 2h, and watch the appearance of the cell visually.</p>	<p>电芯外观无异，容量保持率 $\geq 95\%$。</p> <p>The appearance is OK; Capacity remaining rate $\geq 95\%$</p>
6.2 低温性能 Low-temperature characteristics	<p>按照5.2标准充满电，将电芯放入 $-20^{\circ}\text{C} \pm 2^{\circ}\text{C}$ 的低温箱中 恒温 8h，然后在低温箱中以 0.5C 电流放电至放电终止电压 1.5V，实验结束后，将电芯取出置于环境温度为 $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$ 的条件下搁置 2h，目测电芯外观。</p> <p>Fully charged per 5.2, put the cell into a low-temperature box of $-20^{\circ}\text{C} \pm 2^{\circ}\text{C}$ for 8 hours, then discharge the cell in the box with a current of 0.5C to 1.5V. After the experiment, take out and place at the ambient temperature of $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$ for 2h, and watch appearance the cell visually.</p>	<p>电芯外观无异常，容量保持率 $\geq 80\%$。</p> <p>The appearance is OK Capacity remaining rate $\geq 80\%$</p>



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6.3 常温荷电保持及恢复能力 The normal Temperature capacity Retention and Recovery capability	<p>按照5.2标准充满电，环境温度为 $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$ 的条件下，将电芯搁置28天，再以0.5C电流放电至放电终止电压，记录电芯保持容量；按照5.2标准充满电，再以0.5C电流放电至放电终止电压，记录电芯恢复容量。</p> <p>Fully charged per 5.2, under the ambient temperature of $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$, put the cell aside for 28 days, then discharge to the end voltage with 0.5C, record the cell capacity; fully charge per 5.2, and then discharge to the end voltage with 0.5C, and record the recovery capacity.</p>	<p>容量保持率$\geq 90\%$， 容量恢复率$\geq 95\%$。 Capacity remaining rate $\geq 90\%$ Capacity recovery rate $\geq 95\%$</p>
6.4 高温荷电保持及恢复能力 High Temperature capacity Retention and Recovery capability	<p>按照5.2标准充满电，环境温度为 $55^{\circ}\text{C} \pm 3^{\circ}\text{C}$ 的条件下，将电芯搁置7天，再以0.5C电流放电至放电终止电压，记录电芯保持容量；按照5.2标准充满电，再以0.5C电流放电至放电终止电压，记录电芯恢复容量。</p> <p>Fully charged per 5.2, under the ambient temperature of $55^{\circ}\text{C} \pm 3^{\circ}\text{C}$, put the cell aside for 7 days, then discharge to the end voltage with 0.5C, record the cell capacity; fully charge per 5.2, and then discharge to the end voltage with 0.5C, and record the recovery capacity.</p>	<p>容量保持率$\geq 90\%$， 容量恢复率$\geq 95\%$。 Capacity remaining rate $\geq 90\%$ Capacity recovery rate $\geq 95\%$</p>
6.5 循环性能 Cycle characteristics	<p>电芯按 0.5 C CC/CV 充电后搁置 10 min，然后以 1 C 恒流放电至 1.5 V 结束，搁置 10 min，再进行下一次循环。</p> <p>Cell shall be charged at CC/CV mode(CC: 0.5 CC, CV: 3.9 V, End-of-charge current: 0.02 C); After stored for 10 min, cell shall be discharged at CC mode(1 C, End-of-charge voltage: 1.5 V); After stored for 10 min, continue to the next cycle.</p>	<p>2000周容量保持率$\geq 80\%$。 2000cls capacity remaining rate $\geq 80\%$</p>
6.6 倍率放电性能 Rate discharge capability	<p>按照 5.2 标准充满电后，搁置 10 min，再以 3C 电流放电至放电终止电压，记录放电容量。</p> <p>Fully charged per 5.2, put aside for 10 min, and then discharge to the end voltage with 3C, and the discharge capacity shall be recorded.</p>	<p>放电容量$\geq 93\%$。 Discharge capacity rate $\geq 93\%$</p>



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7. 安全性能 Safety performance

项目/Items	测试条件/Test conditions	规格/Specifications
7.1 过充性能 Over charge	<p>按照5.2标准充满电后,测量电芯的初始状态, 电芯状态正常时, 以1C电充电到 6V或充电时间达到2h后停止充电, 观察电芯的外观变化</p> <p>Fully charged per 5.2, measure the initial state of the cell. When the cell state is normal, charge it to 6V with 1C or stop charging after the time reaches 2h, and observe the appearance of the cell.</p>	<p>不起火、不爆炸。 No fire, no explosion.</p>
7.2 过放性能 Over discharge	<p>按照5.2标准充满电后,测量电芯的初始状态,电芯状态正常时 ,再以 0.5C电流放电至0V, 搁置90 min。</p> <p>Fully charged per 5.2, measure the initial state of the cell. When the cell state is normal, discharge to 0V with 0.5C, lay aside 90 min.</p>	<p>不起火、不爆炸, No fire, no explosion.</p>
7.3 外部短路 External short circuit	<p>按照5.2标准充满电后, 测量电芯的初始状态, 电芯状态正常时, 置于防爆罩中直接短路其正、负极(线路总电阻不大于50 mΩ)120 min, 当电芯温度下降到比峰值温度低20°C时或短接时间达1h结束, 观察电芯的温度及外观变化。</p> <p>Fully charged per 5.2, measure the initial state of the cell. When the cell state is normal, place it into explosion-proof cover and directly short- circuit its positive and negative electrodes (the total resistance is less than 50 mΩ) for 120 min, till the cell temperature drops 20 °C lower than the peak temperature or short circuit time up to 1h, observe the temperature and appearance changes of the cell</p>	<p>不起火、不爆炸, 最高温度不高于 150°C。 No fire, no explosion. Max temperature is lower than 150°C .</p>
7.4 重物冲击 Heavy impact	<p>将一直径为15.8mm的钢棒放置于满电电芯中部; 然后将重量为10Kg的铁锤从1.0m高处自由落体到电芯上部, 观察 6h。</p> <p>Place a steel bar with a diameter of 15.8 mm on the middle of the fully charged cell, and then drop a 10 kg hammer from 1.0 m to the upper part of the cell, observe 6h.</p>	<p>不起火、不爆炸。 No fire,no explosion .</p>



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7.5 挤压测试 Squeeze test	<p>按照5.2标准充满电后，测量电芯的初始状态，电芯状态正常时，用半径为75mm的半圆柱体挤压板以(5 ± 1)mm/s的速度沿垂直于电芯极板方向对电芯施压，当电压达到0V或变形量达到30%或挤压压力达到200kN后停止测试，观察电芯外观变化。</p> <p>Fully charged per 5.2, measure the initial state of the cell. When the cell state is normal, use a semi cylindrical extrusion plate with radius of 75 mm to apply pressure to the cell along the direction vertical to the electrode plate of the cell at the speed of (5 ± 1) mm/s. Stop the test when the voltage reaches 0 V or the deformation reaches 30% or the extrusion force reaches 200kN, observe the appearance change.</p>	不起火、不爆炸。 No fire, no explosion.
7.6 高低温冲击 High and low temperature shock	<p>按照5.2标准充满电后，放入温度-40°C的低温环境中搁置1 h，再在85°C条件下搁置1h，如此循环32次结束试验。试验结束后将样品取出，再在25°C±3°C的条件下搁置6 h，然后对样品进行外观目测检查。</p> <p>Fully charged per 5.2, put it into -40°C for 1h, and then place it for 1h at 85°C for another 1h. The test is completed after 32 cycles. After the test, take out the sample, and then put it aside for 6h under the condition of 25°C±3°C , and then observe the appearance change.</p>	不起火，不爆炸。 No fire, no explosion.
7.7 热箱 Hot bin	<p>按照 5.2 标准充满电后，将电芯放置在烤箱中，并以 3°C~7°C/min 的速度升温，温度升至 130°C 开始计时，并保持温度一直处于(130±2)°C 范围内 1h。试验结束后目测检查外观。</p> <p>Fully charged per 5.2, place the cell in the oven, and raise the temperature at the speed of 3 °C~ 7 °C/ min, and start timing when the temperature rises to 130°C , and keep the temperature within the range of (130±2)°C for 1h. Visual inspection of appearance was carried out after the test.</p>	不起火，不爆炸。 No fire, no explosion.

8. 使用说明 Instruction for use

8.1 充电 Charge

8.1.1 充电时选用钠离子电芯专用充电装置。



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Special charging device for Na-ion cell is selected for charging.

8.1.2 充电温度范围为 -10°C ~ +55°C。

The range of charging temperature is -10°C ~ + 55°C .

8.1.3 严禁电芯过充电压超过4.0V。

The voltage of the cell is strictly forbidden to exceed 4.0V.

8.1.4 严禁电芯正、负极颠倒充电。

No reserve charge.

8.2 使用环境要求 Environmental requirements

8.2.1 电芯充电温度范围: -10°C ~ +55°C

Cell charge temperature range: -10°C ~ +55°C

8.2.2 电芯放电温度范围: -40°C ~ +60°C

Cell discharge temperature range: -40°C ~ +60°C

8.2.3 电芯存放温度范围: - 20°C ~ +45°C

Cell storage temperature range: - 20°C ~ +45°C

8.3 存储及其他事项Storage and other matters

长期储存的电芯（超过3个月）须置于干燥、通风处，储存环境要求如 4.1，储存电压: 1.5-3.95V，且每三个月对电芯进行一次充放电循环。

Cell stored for a long time (more than 3 months) must be placed in dry and ventilated environment. The storage environment requirements follow item 4.1, storage voltage (1.5-3.95V), and the cells shall be charged and discharged every three months.

9. 电芯使用注意事项 Cell using point for attention

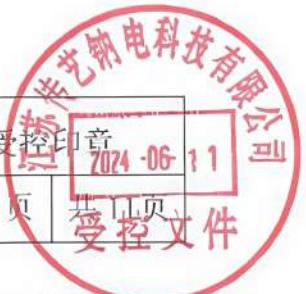
钠离子电芯的滥用可能会造成电芯损坏或人身伤害，在使用钠离子电芯以前，请仔细阅读以下电芯防范措施：

The abuse of sodium ion cell may cause cell damage or personal injury. Please read the following precautions carefully before using sodium ion cell:

9.1 将电芯放置在远离儿童的地方。

Keep the cell away from children.

9.2 严禁将电芯浸入海水或水中，保存不用时，应放置于阴凉干燥的环境中。



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Do not immerse the cell in seawater or water. When it is stored, it should be placed in cool and dry environment.

9.3 严禁将电芯在高温下放置或使用。

It is strictly forbidden to place or use the cell under high temperature.

9.4 严禁将电芯短路、过充。

It is forbidden to short circuit or overcharge.

9.5 严禁颠倒正、负极使用电芯。No reserve charge.

9.6 严禁拆卸或修整电芯。No remove or repair.

9.7 严禁将电芯正、负端直接插入电源插座。

Forbidden to insert the positive and negative into the power socket directly.

9.8 严禁将电芯与金属，如发夹、项链等一起运输或贮存。

Forbidden to transport or store the cell together with metal, such as hairpin and necklace.

9.9 严禁敲击、抛掷、踩踏、坠落、冲击电芯等。

Forbidden to knock, throw, trample, fall, impact the cell, etc.

9.10 严禁直接焊接电芯和用钉子或其它利器刺穿电芯。

Forbidden to directly weld the cell and pierce the cell with nails or other sharp tools.

9.11 严禁在强静电和强磁场的地方使用，否则易破坏电芯安全保护装置,带来不安全的隐患。

Forbidden to use it in the place with strong static electricity and strong magnetic field, otherwise, it is easy to damage the safety protection device of the cell and bring unsafe hidden danger.

9.12 如果电芯发生泄漏，电解液进入眼睛，请不要揉擦，应用清水冲洗眼睛，并立即送医治疗，否则会伤害眼睛。

If the cell leaks and electrolyte enters the eyes, please do not rub them. Rinse the eyes with clean water and send them to the doctor immediately for treatment, otherwise the eyes will be hurt.

9.13 如果电芯发出异味、发热、变色、变形或使用、贮存、充电过程中出现任何异常，立即停止充电或停止使用，并将其从装置中移出或隔离。

If the cell gives off odor, heat, discoloration, deformation or any abnormality occurs in the process of use, storage and charging, immediately stop charging or use, and remove or isolate it from the device.

9.14 如果电极弄脏，使用前应用于布抹净，否则可能会导致接触不良功能失效。



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If the electrode is dirty, wipe it with dry cloth before use, otherwise it may lead to poor contact function failure.

10. 包装 Package

电芯的包装应该干燥、防尘、防震。

The packaging of the cell should be dry, dust proof and shockproof.

11. 运输 Transport

电芯以低电压($\leq 3.0V$)进行运输，在运输过程中，应防止剧烈震动、冲击或挤压，防止日晒雨淋。

The cell is transported in the state of half power ($\leq 3.0 V$). In the process of transportation, no violent vibration, no impact, no extrusion, the sun and rain shall be