

Square sodium ion battery specification book

Model: NaFP 71 / 173 / 204 CY-210

Version: A 1

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Document number: CY-QPS-RD003

Effective Date: 2023.09.06

| Preparation / date | Review / Date | Approval / Date |
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catalogue

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! 1. Scope of application

- This specification describes the performance index of the model sodium sodium NaFP 71 / 173 / 204 CY-210 sodium ion battery product provided by Jiangsu Chuanyi Sodium Power Technology Co., LTD.
- This product uses layered oxide cathode materials and biomass precursor hard carbon system, with excellent low temperature, multiplier, long cycle characteristics.
- This product mainly refers to the following standards for performance index evaluation:
 - UN 38.3
 - QB / T 2502-2000 General Specification for Lithium-Ion Battery
 - GB / T 31484 / 5 / 6 International Certification Standard for Energy Storage Battery
 - GB / T 36276-2018 Lithium Ion Battery for Power Storage
 - JBT 11137-2011 General Requirements for Lithium-Ion Battery Assembly

! 2. Noun definition

.12. Battery category: Square sodium ion battery

2.2 Battery model: NaFP 71 / 173 / 204 CY-210

Na-negative electrode is a system embedded with sodium ion F-positive extremely iron-based system P-battery shape 71 / 173 / 204-battery size CY-battery manufacturer-separator 210-nominal capacity, unit: Ah

2.3 Standard charging mode:

.50In a $25.0 \pm 3.0^{\circ}\text{C}$ environment, charge with the constant current of 0C to the single battery voltage of 3.95V, and then charge to a constant voltage of 3.95V. Stop charging until the current is equal to 0.05C.

2.4 Standard discharge mode:

In $25.0 \pm 3.0^{\circ}\text{C}$ environment at 0.50C to 1.50V.

.52. Nominal capacity:

Nominal capacity $\text{Cap} = 210 \text{ Ah}$, refers to the battery capacity in Cap at 2.3 and 2.4 at $25.0 \pm 3.0^{\circ}\text{C}$.

.62. Test Temperature and Humidity:

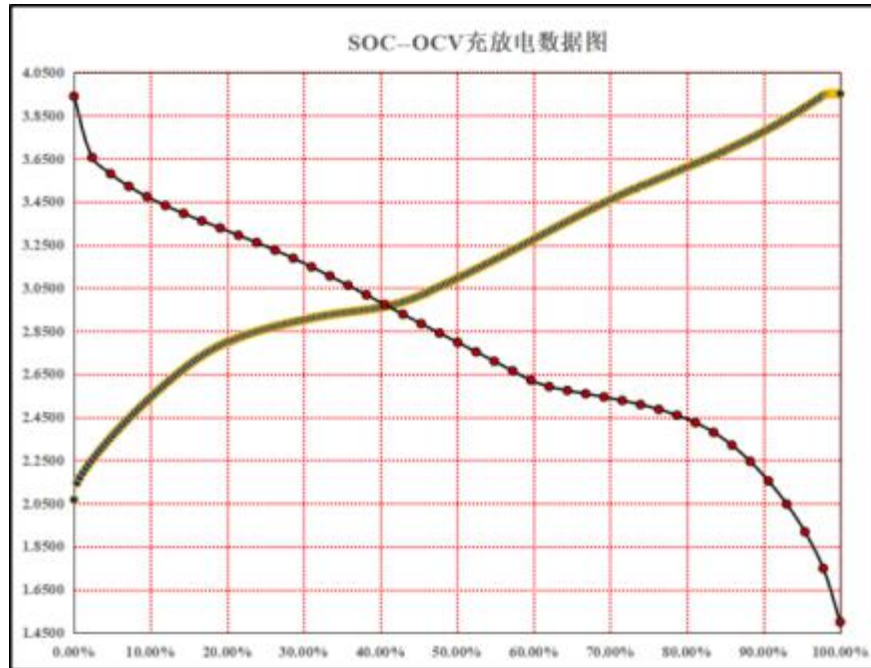
If not specified, the products tested in this specification are all temperature $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$; humidity: 65% $\pm 20\%$ RH.

! 3. Battery parameters

3.1, General parameters

| project | specifications |
|--|--|
| nominal capacity | .00210Ah @0.50C in a 25.0 ± 3.0°C environment |
| Typical capacity | .00215Ah @0.50C in a 25.0 ± 3.0°C environment |
| nominal voltage | ≈3.10V |
| Upper limit voltage | .953 ±0.05 V |
| Lower limit voltage | 1.50 ± 0.05 V can discharge to 0V, no battery performance |
| DC internal resistance | ≤0.50m Ω |
| Battery size | Length: 173.60±0.50mm Thickness: 71.25±0.50mm Height: 203.70±0.50mm |
| energy density | ≥140.00Wh /Kg |
| Battery weight | 4.70±0.50Kg |
| Storage temperature (charge state at shipment) | -20~60°C Vent and protected from light |
| Temperature and charging performance | ≤ -20°C: sodium battery performance is affected -20~0°C : ≤0.20C 0~45°C : ≤0.50C 45°C: When using, the performance of the sodium battery is affected |
| Temperature and discharge properties | ≤ -40°C: sodium battery performance is affected -40~0°C : ≤0.50C 0~45°C : ≤0.50C 45~60°C: ≤0.20C 60°C: When used, the sodium battery performance is affected |
| Instant maximum discharge current | Instant current: 3.00C Duration: 30s |
| Maximum continuous discharge current | Continuous current: 1.00C discharge temperature rise 15°C |

.23 Charge and discharge data diagram



3.3, and the cycle parameters

3.3.1 Test the cycle according to the system of 2.3 and 2.4, when the actual capacity / 70% of nominal capacity, 4000 times.

3.4, and the low-temperature performance

3.4.1-40°C 0.5C discharge capacity / 25°C 0.5C discharge capacity 65.00%;

3.4.2-30°C 0.5C discharge capacity / 25°C 0.5C discharge capacity 80.00%;

3.4.3-20°C 0.5C discharge capacity / 25°C 0.5C discharge capacity 90.00%;

3.4.4-10°C 0.5C discharge capacity / 25°C 0.5C discharge capacity: 97.00%.

3.5, and the high-temperature performance

3.5.1 60°C 0.5C discharge capacity / 25°C 0.5C discharge capacity 95.00%;

3.5.2 45°C 0.5C discharge capacity / 25°C 0.5C discharge capacity 100.00%.

3.6, safety performance

| order number | test item | performance criteria | Test conditions and methods |
|--------------|--------------------|--|---|
| 1 | Vibration test | No fire, no explosion, no liquid leakage | Ref.: UL1642-16 After standard charging, the battery shall withstand vibration with amplitude of 0.8mm, and the vibration frequency varies at the rate of 1Hz / min in the range of 10-55 HZ, and the vibration is 60min. |
| 2 | Heating test | No fire, no explosion | Reference: GB 38031 8.1.5 After standard charging, the oven temperature was increased to 130°C ± 2°C at 5 ± 2°C / min, retaining this temperature for 30min and observing for 1 hour. |
| 3 | Short circuit test | No fire, no explosion | Reference: GB 38031 8.1.4 After standard charging, observe the battery positive terminal and negative terminal through the external short circuit 10min (external line resistance <5m Ω) at 25°C± 3°C for 1 hour. |
| 4 | Overcharge test | No fire, no explosion | Reference: GB 38031 8.1.3 After standard charging, the battery was stopped at 25°C± 3°C with 1C constant current to 5.0V or 120% SOC and observed for 1 hour. |
| 5 | Over-put test | No fire, no explosion | Reference: GB 38031 8.1.2 After standard charging, the battery was discharged at 1C and current at 25°C± 3°C until the discharge time reached 90min and observed for 1 hour. |
| 6 | Heavy shock | No fire, no explosion | Ref.: UL 1642-14 After standard charging, a round rod of 15.8mm diameter was placed in the center of the battery, and a 9.1 Kg heavy hammer was dropped vertically from the height of 610mm at the center of the battery. |
| 7 | fall-down test | No fire, no explosion | Reference: GB / T 31485 6.2.5 After standard charging, the positive and negative electrode terminal of the battery sample was freely dropped down from the height of 1.0m to the cement floor and observed for 1 hour. |
| 8 | squeezing test | No fire, no explosion | Reference: GB 38031 8.1.7 After standard charging, the battery is placed between the two extrusion surfaces of the extrusion equipment, the cylindrical battery core shaft is parallel to the extrusion plane, with the extrusion speed of 2mm / s, gradually increase the pressure to the deformation reaches 15% or the extrusion pressure reaches 100kN |

| | | | |
|---|-----------------|-----------------------|---|
| | | | or 1000 times the battery weight, maintain the pressure of 10min, and observe for 1 hour. |
| 9 | Depression test | No fire, no explosion | Ref.: UL1642-19 After standard charging, the battery is stored for 6 hours at an absolute pressure of 11.6Kpa and a temperature of 20 soil of 5°C. |

4. Instructions for use

.14. Temperature gradient charging scheme

| | SOC | temperature gradient | | | | | | |
|-----------------------------|---------|----------------------|-----------|----------|-----------|-----------|-----------|-----------|
| | | -20℃ ~ -10℃ | -10℃ ~ 0℃ | 0℃ ~ 10℃ | 10℃ ~ 25℃ | 25℃ ~ 45℃ | 45℃ ~ 60℃ | 60℃ ~ 80℃ |
| maximum charging multiplier | 100.00% | / | / | 0C.05 | 0C.05 | 0C.05 | / | / |
| | 90.00% | 0C.05 | 0C.10 | 0C.50 | 0C.50 | 0C.50 | / | / |
| | 80.00% | 0C.05 | 0C.20 | 0C.50 | 0C.50 | 0C.50 | / | / |
| | 70.00% | 0C.10 | 0C.20 | 0C.50 | 0C.50 | 0C.50 | / | / |
| | 60.00% | 0C.10 | 0C.20 | 0C.50 | 0C.50 | 0C.50 | / | / |
| | 50.00% | 0C.10 | 0C.20 | 0C.50 | 0C.50 | 0C.50 | / | / |
| | 40.00% | 0C.10 | 0C.20 | 0C.50 | 0C.50 | 0C.50 | / | / |
| | 30.00% | 0C.10 | 0C.20 | 0C.50 | 0C.50 | 0C.50 | / | / |
| | 20.00% | 0C.10 | 0C.20 | 0C.50 | 0C.50 | 0C.50 | / | / |
| | 10.00% | 0C.10 | 0C.20 | 0C.50 | 0C.50 | 0C.50 | / | / |
| | 0.00% | 0C.10 | 0C.20 | 0C.50 | 0C.50 | 0C.50 | / | / |

.24 Battery storage

The storage charge state of the sodium ion battery should be controlled at 20% ~ 30% SOC, and the battery has a charge and discharge cycle every 6 months.

.34 Battery transportation

The battery transport charge state is 20% ~ 30% SOC, the battery packaging into boxes for transportation, in the process of transportation should prevent violent vibration, shock or extrusion, prevent the sun and rain, not inverted. In the process of loading and unloading, the product should be moved lightly, and strictly prevent throwing, rolling and overloading.

.44 Use principle

Sodium ion battery abuse may cause battery damage or personal injury. Please read the following safety rules carefully before using a sodium ion battery:

Note 1: If the customer needs to operate the battery under conditions other than the document, please consult Jiangsu Chuanyi Sodium Power Technology Co., Ltd. for related matters.

Note 2: Jiangsu Chuanyi Na Na Electric Technology Co., Ltd. shall not bear any responsibility for the accident caused by the use of the battery other than the conditions stated in the document.

.54 Preventive measures

4.5.1 It is strictly forbidden to immerse the battery in the liquid;

4.5.2 It is forbidden to place the battery beside the high temperature source, such as fire, heater, etc.;

4.5.3 Please choose the special charger for sodium-ion battery when charging;

4.5.4 Do not use the battery after reversing the positive and negative poles;

4.5.5 Do not throw the battery into a fire or heater;

4.5.6 It is forbidden to directly connect the positive and negative electrodes of the battery with metal, causing short circuit;

4.5.7 It is forbidden to transport or store batteries with metals, such as hair clips, necklaces;

4.5.8 No tapping, throwing or trampling on the battery;

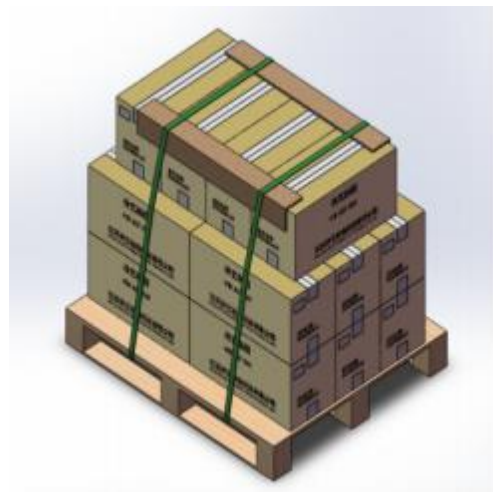
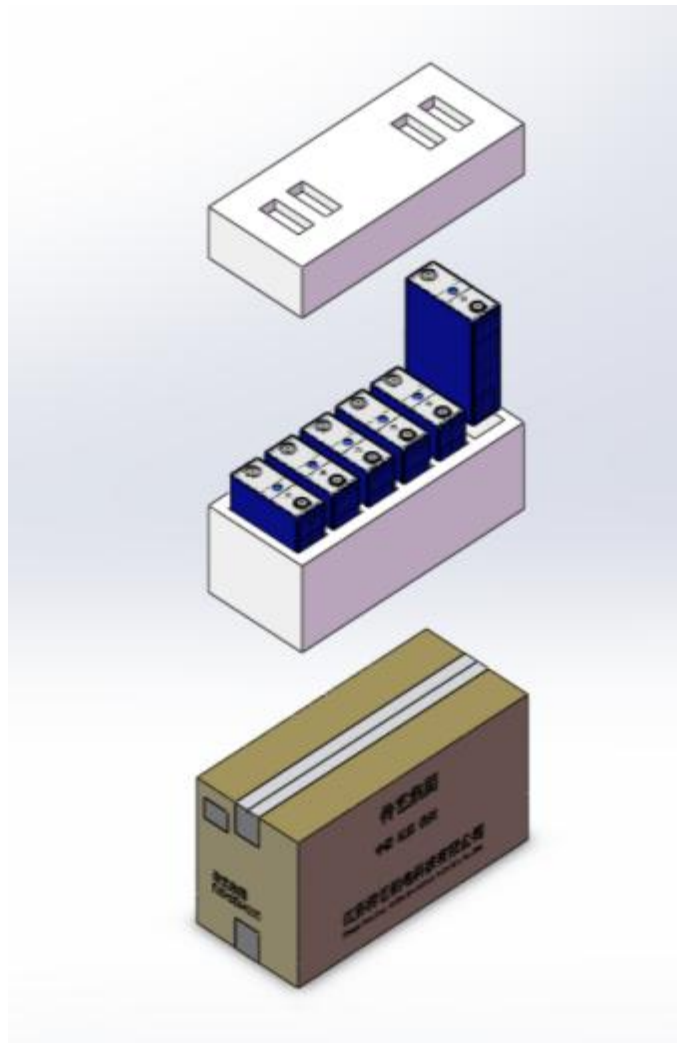
4.5.9 Do not puncture the battery with nails or other sharp tools;

4.5.10 During battery treatment, separate the battery from the products of other electrochemical systems.

5. Packaging and shipment

5.1 Square sodium ion batteries are shipped according to the nominal capacity of 20% ~ 30% SOC or customer requirements, and the remaining capacity before charging of the battery after shipment depends on the storage conditions and storage time.

5.2 Each small box is placed in 6 batteries for each small box, 1 small box is placed in each large box and sealed with label paper, 3 large boxes are placed in each tray, 6 large boxes are placed in 1 and 2 layers, and 4 large boxes are placed in 3 layers. In total, the maximum number of batteries carried by each tray should be controlled within 100.



6. Modification of the declaration

Due to the need to continuously improve the product quality and characteristics, the Company has the right to revise the product specifications and maintenance characteristics, after which the users will not be notified in advance.

7. Modify the records

| serial number | Modify the project | revise content | modifier | date changed |
|---------------|--------------------|----------------------------------|-------------|--------------|
| A 1 | not have | Battery naming rule modification | Feng Linlin | 2023.09.06 |
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8. Other matters

Matters not mentioned in this Specification shall be technically confirmed by the Company, and the Company reserves the right of final interpretation of the contents stated in this Specification.

! 9. Battery pictures

