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Product Standard

Product Specification

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2019/12/03	C	Battery weight: 1.390±0.015 kg Nominal voltage: 3.65V	Battery weight: 1.388 ±0.015 kg Nominal voltage: 3.68V Update 4.3 Charging Condition Limits	3	Lu Yushuai

Catalogue

1 Terminology Definition

Term	Definition
Product	The term 'product' in this specification re  the 86Ah rechargeable ternary system power battery manufactured by the company.
Downstream	Refers to the downstream end of a company's battery cells, such as the module stage
Material code	The numbering system shall be established according to the cell specification codes of Honeycomb Energy.
Ambient temperature	The ambient temperature surrounding the battery.
Battery Management System (BMS)	A customer utilizes this system as an effective tracking and control mechanism for monitoring and recording operational parameters of products throughout their service life. The tracked parameters include, but are not limited to, voltage, current, and temperature, to regulate product operation and ensure that the operating environment and conditions comply with the specifications outlined in this manual.
Cell temperature	The cell temperature is measured by a temperature sensor connected to the battery, with both the sensor and measurement circuit meeting national standard testing requirements.
New battery status	It refers to the battery's condition within 15 days from the date of its production line release.
C-Rate charging rate	The ratio of charging current to the battery capacity value measured multiple times by the battery management system.
Cycle recurrence	A battery cycle is defined as a single charge-discharge process that complies with specified charging and discharging standards. A cycle consists of a combination of short-duration normal charging or regenerative charging and discharging processes. During charging, there may occasionally be only normal charging without regenerative charging. Discharge can be formed by the combination of partial discharges.
Production information	The manufacturing date of the battery. Established according to the latest national cell traceability coding regulations, it includes information such as production year/month, production line serial number, and extended structure.
Open Circuit Voltage (OCV)	The voltage measured by a normal cell when no load or circuit is connected.
Recoverable capacity	After battery storage, the capacity measured under standard charge-discharge conditions specified in Sections 4.1.1 and 4.4.1 of this specification shall be determined by selecting the maximum values from three measurements conducted according to the respective charge-discharge standards outlined in Sections 4.1.1 and 4.4.1.
Standard charging	The charging mode specified in Clause 4.1.1 of this specification document.
Standard discharge	The discharge pattern specified in Clause 4.4.1 of this specification is complied with.
Charging status (SOC)	The linear relationship between battery charging capacity state and time, measured in ampere-hours or watt-hours, under no-load conditions. A 100% charging state indicates full charging to 4.2V, while a 0% charging state represents complete discharge to 2.8V.
Discharge State (SOC)	All linear relationships of battery discharge capacity state measured in ampere-hours or watt-hours under no-load conditions after full charging, with corresponding static voltage values representing the open-circuit voltage at room temperature after 2 hours of static rest (negotiable).

2 Scope of Application

This specification document provides a detailed description of the product performance indicators, usage conditions, and risk warnings for the 86Ah (CE39E8A0A) rechargeable ternary system power battery manufactured by Honeycomb Energy.

3 Reference File

not have

4 Product Electrical Performance Specifications

4.1 Main Performance

4.1.1 Standard Capacity (Design Capacity)

Under full charging conditions, at 25°C with a discharge current of 28A (1/3C) and a discharge cutoff voltage of 2.8V, the capacity is 87.6Ah.

4.1.2 Minimum Capacity (Nominal Capacity)

Under full charging conditions, at 25°C with a discharge current of 28A (1/3C) and a discharge cutoff voltage of 2.8V, the capacity is 86.0Ah.

4.1.3 Nominal Voltage

Under full charging conditions, at 25°C with a discharge current of 28A (1/3C) and a discharge cutoff voltage of 2.8V, the nominal voltage is approximately 3.68V.

4.1.4 Operating Voltage

Operating voltage range (25°C): 2.8–4.2 V

4.1.5 Battery Internal Resistance

The SOC of newly shipped batteries at 25°C is approximately 40%, with an internal resistance of ≤0.40 mΩ at an AC frequency of 1 kHz.

4.1.6 Average Internal Resistance of Batteries

The SOC of newly shipped batteries at 25°C is approximately 40%, with an internal resistance of 0.3±0.1 mΩ at an AC frequency of 1 kHz.

4.1.7 Shipped Cargo Charge State

The new shipment voltage is 3.650±0.010V, with a battery SOC of approximately 40% (standard discharge current: 28 A).

4.1.8 Operating Temperature (Charging)

-20°C to 55°C Refer to Section 4.2.

4.1.9 Operating Temperature (Discharge)

-30°C to 55°C Refer to Section 4.3.

4.1.10 Battery Weight

In the shipped state, the weight is 1.388±0.015 kg.

4.1.11 Battery Size

Named according to national standard dimensions, size 39148100.

4.1.12 Cycle Life

≥2300 cycles (25°C, 2C/1C,92%DOD)

4.1.13 HPPC pulse discharge power

Power P≥1500 W (25°C, 50% SOC @ 516A for 10 seconds)

4.2 Charging Mode/Parameters

4.2.1 Standard charging current and voltage

A normally operating single-cell battery was charged at 25±3°C and 84A constant current, with a maximum charging voltage of 4.2V.

Charge the single battery continuously at 84A constant current to its maximum voltage of 4.2V at 25°C, then maintain constant voltage charging at 4.2V under atmospheric pressure until the current approaches 4.2 ±0.3 A.

4.2.2 absolute charging temperature

Regardless of the charging mode, charging will be stopped once the cell temperature exceeds the absolute charging temperature range of-20°C to 55°C.

4.2.3 absolute charging voltage

Regardless of the battery cell's charging mode (including regenerative charging), charging will be stopped immediately if the cell voltage exceeds the maximum absolute charging voltage range of 4.2V.

4.3 Other Charging Conditions (modes)

Cell temperature	Continuous charging conditions (battery cell voltage ≤3.8V)
＜-20 ℃	Charging is not allowed
≥-20℃	Charge at 0.12C to 4.10V,0.06C to 4.15V, and 0.05C to 4.20V
≥-10℃	Charge at 0.30C to 3.85V,0.20C to 4.00V,0.10C to 4.15V, and 0.07C to 4.20V
≥0℃	Charge at 0.80C to 4.00V,0.40C to 4.15V, and 0.20C to 4.20V
≥10℃	Charge at 1.20C to 4.00V,0.60C to 4.15V, and 0.30C to 4.20V
≥20℃	Charge at 1.80C to 4.00V,0.90C to 4.15V, and 0.45C to 4.20V
25℃~35℃	Charge at 2.0C to 4.00V,1.0C to 4.15V, and 0.5C to 4.20V
≤40℃	Charge at 1.50C to 4.00V,0.75C to 4.15V, and 0.40C to 4.20V
≤45℃	Charge at 1.0C to 4.00V,0.50C to 4.15V, and 0.25C to 4.20V
≤50℃	Charge at 0.50C to 4.00V,0.40C to 4.15V, and 0.25C to 4.20V
≤55℃	Charge from 0.10C to 4.20V
＞55℃	Charging is not allowed

4.4 Power Mode Definition

4.4.1 Standard discharge current and voltage

A normally operating single-cell battery was discharged at 25±3°C and 28A constant current, with a minimum discharge voltage of 2.8V.

4.4.2 Maximum continuous discharge current

The normally operating single battery was discharged at 25±3℃ and 168A constant current.

4.4.3 Maximum pulse discharge current (long pulse)

The normally operating single cell battery operates at 25±3°C, with a maximum pulse discharge current of 252A and a maximum discharge duration of 2 minutes.

4.4.4 Maximum pulse discharge current (short pulse)

The normally operating single-cell battery operates at 25±3°C, with a maximum pulse discharge current of 516A, a cell temperature below 50°C, and a maximum discharge duration of 10 seconds.

4.4.5 Absolute Discharge Temperature

Whether the battery cell is in continuous discharge mode or pulse discharge mode, discharge will be stopped if the cell temperature exceeds the absolute discharge temperature range of-30 to 55°C.

4.5 Pulse Discharge Mode

Pulse discharge refers to the process where battery cells undergo pulsed discharge during product operation. This discharge method must strictly adhere to the charging conditions and cell temperature parameters specified in this specification. The magnitude and duration of pulse current must rigorously comply with all charging states and cell temperature requirements listed in the table below. Failure to meet pulse discharge specifications may result in permanent damage to battery cells.

4.5.1 Minimum pulse discharge cutoff voltage

The discharge cut-off voltage is 2.8V when the battery and ambient temperature T exceeds-5°C, 2.5V when T ranges from-20°C to-5°C, and 2.1V when T is below-20°C.

4.5.2 Permissible pulse discharge power and duration

SOC		Cell temperature							
	<-30℃	≥-30℃	≥-20℃	≥-10℃	≥0℃	≥10℃	≥25℃	≥45℃	55℃
≥20%	Not allow	58.6A/30s	103.9A/30s	132.2A/30s	186.4A/30s	261.4A/30s	413A/30s	413A/30s	20.4A/30s

4.5.3 Post-pulse protection mode

After each pulse discharge, the battery requires a dormant period whose duration should be equal to or longer than the regeneration pulse duration. During the dormant period, the battery may remain in standard discharge state, charging state, or zero-current inactive state. However, pulse discharge is strictly prohibited during the dormant period.

4.6 Regenerative Pulse Charging Mode

Regenerative pulse charging refers to the reverse charging process of battery cells using pulsed current during product operation. This charging method must strictly comply with the charging conditions and cell temperature specifications outlined in this technical specification. The magnitude and duration of pulsed current must rigorously adhere to all charging states and cell temperature parameters listed in the table below. Failure to meet regenerative pulse charging requirements may result in permanent cell damage, thereby exempting Honeycomb Energy Company from product quality liability.

4.6.1 Maximum regenerative pulse charging voltage

The maximum regenerative pulse charging cutoff voltage is 4.2V.

4.6.2 Permissible recharge pulse charging current and duration

SOC	Cell temperature								
	<-20℃	≥-20℃	≥-10℃	≥-5℃	≥0℃	≥10℃	≥25℃	≥45℃	55℃
≤80%	2.1A/10s	6.6A/10s	15.6A/10s	28.3A/10s	41.0A/10s	86.6A/10s	172.0A/10s	196.6A/10s	24.6A/10s

4.6.3 Post-pulse Protection Mode

After each regenerative pulse charging, the battery requires a dormant period whose duration should equal or exceed the regenerative pulse duration. During the dormant period, the battery may remain in a discharged state or a zero-current inactive state, but regenerative pulse charging is prohibited during this period.

4.7 High and Low Temperature Capacity

The capacity at 25°C is ≥ 84Ah. New battery state, standard charge/discharge (1C) at 25°C.

The capacity at 55°C is ≥ 87Ah. New battery state, standard charging at 25°C, standard discharge at 55°C (1C).

The capacity at-20°C is ≥73Ah. New battery state, standard charging at 25°C, standard discharge at-20°C (1C).

4.8 Safety and Reliability

The battery cell has obtained GBT 31485-2015 certification.

5 Temperature Rise (temperature Increase)

Temperature measurements for each battery shall be conducted in the same positioning and placement method as described in the battery diagrams attached to this specification document. Batteries must undergo natural convection cooling in rooms with stable ambient temperatures and adequate space. Temperature measurements for each battery shall utilize calibrated temperature sensors capable of recording time data. Under these conditions, temperature rise is defined as the difference between the post-discharge temperature and pre-discharge temperature.

The temperature rise during continuous discharge is ≤ 10℃. Each battery is discharged at a current of 84 A for 30 minutes.

The temperature rise during pulse discharge is ≤ 5°C under any charging condition, with each battery discharging at 516A current for 10 seconds.

6 Storage Performance

Restorable capacity ≥ 84.5Ah, standard charging to 100% state, and storage at 25°C for 30 days.

7 Product Life Termination Management

The service life of batteries is limited. Effective tracking systems should be established to monitor and record the internal resistance and capacity of batteries during each service life period. The measurement methods and calculation methods for internal resistance and capacity require joint discussion and mutual agreement between downstream users and battery manufacturers.

8 Application Conditions

8.1 Battery Application Requirements

When in use, strict compliance with the following battery-related application conditions must be ensured:

1. The downstream end should be equipped with a battery management system to closely monitor, manage, and protect each battery.

2. The downstream end should provide the battery end with detailed design specifications, system features, framework, system data, formats, and other relevant information for the battery management system. The power cell end shall conduct design evaluation of the system and establish a battery management profile.

3. Without the battery manufacturer's consent, downstream partners must not modify or alter the design and framework of the battery management system to avoid compromising battery performance.

4. The downstream end shall retain complete monitoring data of battery operation for reference in product quality liability allocation. If complete monitoring data within the service life of the battery system is unavailable, the battery end shall not bear corresponding design responsibilities.

5. The battery management system must meet the following fundamental detection and control requirements:

The charging process terminates when the battery voltage reaches 4.2V.

Charging stops when the battery voltage reaches 4.3V, and the battery management system remains locked until technicians resolve the issue.

When the battery voltage reaches 2.8V, terminate the discharge process and reduce the current to its minimum level.

When the battery voltage reaches 2.5V, terminate the discharge process and reduce the current to the minimum.

The battery management system will remain locked when the battery voltage drops below 2.1V until technicians resolve the issue.

During a short circuit, the overcurrent device disconnects the battery (circuit).

The battery management system controls discharge current to comply with specifications. When temperatures exceed those specified in this specification,

Stop charging/discharging If the charging time exceeds 8 hours, the charging process will be terminated.

Note: The above constitutes warning clauses. Please note that when the battery reaches any of the specified performance indicators or parameter thresholds outlined herein, it indicates that the battery has exceeded the operational conditions defined in this specification. The downstream system must implement protective measures for the battery in accordance with the 'Protection Action' protocol and other relevant provisions of this specification.

8.2 Prevent Batteries from Reaching Over-Discharge State

When the battery voltage drops below 2.0V, permanent damage may occur inside the battery, and it must not be used.

8.3 Short Term Storage

If battery storage is expected to exceed 30 days, the shipment SOC shall be jointly discussed and mutually agreed upon by both downstream partners and battery manufacturers.

8.4 Long-Term Storage

If the interval between two battery charges exceeds 2 months, the standard charging mode should be used first before applying the fast charging mode at the specified rate.

8.5 Low Temperature Charging Protection

The battery must not be charged under low-temperature conditions prohibited by this specification (including standard charging, fast charging, emergency charging, and regenerative charging), as this may result in unintended capacity reduction. The battery management system (BMS) should operate at the minimum charging and regenerative charging temperatures. Charging under temperatures below those specified in this specification is strictly prohibited.

8.6 Heat Protection

The heat dissipation of battery cells must be thoroughly considered during electrical box design. Any overheating damage to cells or batteries caused by inadequate heat dissipation design in the electrical box shall be the responsibility of the system.

8.7 Dustproof and Waterproof Protection

In the design of electrical boxes, adequate consideration must be given to the waterproofing and dustproofing of battery cells. The electrical boxes must meet the waterproofing and dustproofing standards specified by relevant national standards. Any damage to battery cells or batteries caused by waterproofing or dustproofing issues (such as corrosion or rusting) shall be the responsibility of the system.

9 Security Protection

Do not immerse the battery in water.

Batteries must not be placed in flames or exposed to high temperatures exceeding the conditions specified in Sections 2.1.7 and 2.1.8 of this specification, as this may cause fires. Under normal operating conditions, the temperature of battery cells must not exceed 60°C. If the cell temperature exceeds this threshold, the battery management system must shut down the battery and terminate its operation.

Short circuits between the positive and negative terminals of batteries must be prevented, as high currents and elevated temperatures may cause personal injury or fires. Since the positive and negative terminals are exposed within a plastic protective casing, adequate safety measures must be implemented during battery system assembly and connection to avoid short circuits.

Connect the battery terminals strictly according to the markings and instructions; reverse charging is prohibited.

Overcharging of batteries is strictly prohibited, as it may cause battery overheating and fire hazards. During battery installation and operation, both hardware and software must implement multiple overcharge failure safety protections. Minimum protection requirements are specified in Section 6.2.4.3 and Section 7.11 of this specification.

According to Section 6.2.4.10 of this specification, normal charging should be terminated after charging. If continuous charging exceeds the reasonable time limit, the battery may experience overheating, which could lead to thermal runaway and fire. A timer should be installed for protection. Once the charging current reaches an overcurrent state and cannot be terminated, the timer will activate to stop charging, as specified in Section 7.11 of this specification.

Customers should securely mount the battery on a solid surface and properly secure the power cord in an appropriate position to prevent friction-induced arcs and sparks.

It is strictly prohibited to encapsulate batteries with plastic or use plastic for electrical connections. Incorrect electrical connection methods may lead to overheating during battery operation.

In case of electrolyte leakage, avoid contact with skin and eyes. If contact occurs, wash the affected area with large amounts of clean water and seek medical assistance. It is strictly prohibited for any person or animal to ingest any components of the battery or substances contained within the battery.

Make every effort to protect the battery from mechanical vibrations, impacts, and pressure shocks, as these may cause internal short circuits, leading to high temperatures and fires.

During battery charging processes, improper termination of charging may occur. Examples include exceeding permitted charging duration, terminating charging due to excessively high voltage, or stopping charging due to excessive current. These phenomena are collectively termed "improper termination of charging." When such occurrences happen, they may indicate electrical leakage in the battery system or component failures. Continuing charging without identifying and resolving root causes could lead to battery overheating or fire risks. In such cases, the battery management system should automatically disable subsequent charging through its lockout function and notify users to return vehicles containing the faulty battery to dealers for system maintenance. Charging may only be resumed after comprehensive inspection by certified technicians to determine root causes, implement thorough solutions, and ensure safety improvements.

The test experiment described in Section 4.8 of this specification may cause battery fire or explosion if operated improperly. This test experiment can only be conducted by professionals equipped with appropriate protective gear in a professional laboratory. Otherwise, it may result in serious personal injuries and property damage.

10 Risk Warning

10.1 Warning Statement

warn：

Batteries pose potential hazards, and appropriate protective measures must be taken during operation and maintenance! Incorrect operation of the test procedures described in Section 4.8 of this specification may result in severe personal injuries and property damage!

Batteries must be handled using the correct tools and protective equipment. Battery maintenance must be performed by individuals with battery expertise and safety training.

Failure to comply with the above warnings may lead to multiple disasters.

10.2 Risk TYPE

Customers are aware of the following potential hazards during battery use and operation:

Operators may suffer injuries from chemicals, electric shocks, or electric arcs during operation. Although the human body reacts differently to direct current (DC) and alternating current (AC), DC voltages exceeding 50 volts and AC currents pose equally severe hazards to human health. Therefore, operators must adopt conservative postures during operations to avoid electric current injuries.

There are chemical risks from the electrolyte in the battery.

When handling batteries and selecting personal protective equipment, customers and their employees must consider the above potential risks to prevent accidental short circuits that may cause arcs, explosions, or thermal runaway.

11 Attached Map：

Battery exterior dimensions diagram (including insulation film)