

SIB-P46145-13Ah

Product Specification

Product Preparation	Product Approval	Sales Approval	Project Approval	Quality Approval
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Customer Confirmation	Sign	Dates

Edit a record

Releases	Descriptive	Dates	Recognition status
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Definition of terms

Nomenclature	Define
Offerings	The term "product" in this specification refers to 13.0Ah rechargeable sodium-ion system cells manufactured by PORFFOR.
Our customers	The buyer of the product.
PORFFOR	Seller of the product.
PN	In order to differentiate between batteries used in different areas of use or under different application conditions, PORFFOR has defined material designations for 13.0Ah rechargeable sodium-ion system cells.
Ambient temperature	The ambient temperature at which the battery is located, with a tolerance of $\pm 2^{\circ}\text{C}$.
Battery Management System BMS	An effective tracking and control system used to monitor and record the operating parameters of the product throughout its service life. The parameters tracked and recorded include, but are not limited to, voltage, current, temperature, etc., to control the operation of the product and ensure that the product's operating environment and operating conditions are in accordance with the provisions of this specification.
Cell temperature	The temperature of the cell is measured by a temperature sensor plugged into the battery, the selection of the temperature sensor and the measuring line is agreed upon between PORFFOR and the customer.
BOL	Status within 7 days from the date of manufacture of the cell.
C-Rate	The ratio of the current to the capacity value of the battery measured several times by the battery management system. For example, when the battery capacity is 13.0Ah and the charging current is 13.0A, then the charging multiplier is 1C; when the battery capacity decays to 10Ah and the charging current is 10A, then the charging multiplier is 1C.
Cycle	The battery is charged and discharged once according to the specified charging and discharging standards as a cycle. The cycle includes a short period of normal charging or regenerative charging and discharging process, in the charging process can be only normal charging without regenerative charging; discharge can be formed by a combination of some parts of the discharge.
Date of manufacture	Battery manufacturing date. The date code indicated on the top sticker of each battery is the date of manufacture.
OCV	The voltage of the battery measured without any load or circuit connected.
SOC	The ratio of the actual battery charge to the full charge amount characterizes the state of charge of the battery. A state of charge of 100%SOC means that the battery is fully charged to 3.65V, and a state of charge of 0%SOC means that the battery is fully discharged to 2.0V (refer to the standard charging and discharging process).
Product Delivery Agreement	The terms of the transaction between PORFFOR and the Customer concerning the products of this specification.
Unit of measure	V: Volts, unit of voltage A: Ampere, unit of current Ah: ampere-hour, unit of capacity Wh: watt-hour, unit of energy Ω : ohm, unit of resistance $\text{m}\Omega$: milliohm, unit of resistance $^{\circ}\text{C}$: degrees Celsius, unit of temperature mm: millimeter, unit of length

s: second, unit of time
 Hz: Hertz, unit of frequency

1. Scope of application

Sports event	Element	Note
Product Model	SIB-P46145-13Ah	N. A
Product status	MP	N. A

2. Normative references

Where the cited document is not dated, its latest version is applicable to this standard.

GB/T 2900.41 Electric Vehicle Terminology

Gb/T 19596 Terminology for electric vehicles

GB/T 38031 Safety requirements for power storage batteries for electric vehicles

GB/T 31484 Requirements and test methods for cycle life of power storage batteries for electric vehicles GB/T

31486 Requirements and test methods for electrical performance of power storage batteries for electric vehicles

GB/T 36276 Lithium-ion batteries for battery energy storage

3. Product electrical performance index

3.1 Outline

No.	Parameters	Product Specification	Prerequisite
1	Cell Size	Please refer to Section 8 of this specification	N. A
2	Cell Capacity	≥ 13.0 Ah	New battery condition, refer to standard charge/discharge mode test in clause 3.2 and 3.3.
3	Discharging energy	≥ 40.5 Wh	New battery condition, refer to standard charge/discharge mode test in clause 3.2 and 3.3.
4	Operating Voltage Range	2.0~3.65V 1.8~3.65V	Temperature $T > -5^{\circ}\text{C}$ Temperature $T \leq -5^{\circ}\text{C}$
5	Internal Resistance	≤ 1.0 m Ω	BOL 70% SoC Status
6	Operating temperature	-40~80 $^{\circ}\text{C}$	N. A
7	Storage temperature	-40~80 $^{\circ}\text{C}$	N. A

8	Suggested Scope of SoC Use	0%~100%	N. A
9	Cycle life	3000	25±2°C, 1C/1C 100%DoD cycling @80%SoH
10	Nominal voltage	3.12 V	25±2°C, 1/3C discharge current
11	Cell weight	0.4±0.01 kg	N. A
12	Monthly discharge	≤ 1.5%	25°C, 100% SOC, after 3 months on new batteries

3.2 Charging mode/parameters

No.	Parameters	Product Specification	Prerequisite
1	Standard charging current	1/3C	25±2°C
2	Standard charging voltage	Single cell max. 3.65V	/
3	Standard charging mode	1/3C (4.3A) constant current continuous charge to cell maximum 3.65V, constant voltage continuous charge at 3.65V to current lower limit 0.05C (0.65A)	
4	Standard charging temperature	25±2°C	cell temperature
5	Maximum chargeable continuous current (multiplier)	10C	25±2°C
6	Absolute charging temperature (cell temperature)	-20°C ~ 60°C	Regardless of the charging mode of the battery cell, once the temperature of the battery cell is found to exceed the absolute charging temperature range, charging will be stopped.
7	Absolute charging voltage	3.65V max.	Regardless of the charging mode of the battery cell, once the voltage of the battery cell is found to exceed the absolute charging voltage range, charging will be stopped.

3.3 Discharge mode/parameters

No.	Parameters	Product Specification	Prerequisite
1	Standard discharge current	1/3C	25±2°C
2	Maximum Continuous Discharge Current	200A	25±2°C
3	Discharge cut-off voltage	2.0V 1.8V	Temperature T > -5°C Temperature T ≤ -5°C
4	Standard discharge temperature	25±2°C	Cell temperature
5	Absolute discharge temperature	-40°C ~ 80°C	Regardless of whether the battery cell is in continuous discharge mode or pulse discharge mode, if the temperature of the battery cell exceeds the absolute discharge temperature, it will stop discharging.

4. Safety and Reliability

4.1 safety performance

No.	Parameters	Test Standards	Test results
1	Overcharge	GB 38031	No fire, no explosion
2	Over-discharge	GB 38031	No fire, no explosion
3	Shorts	GB 38031	No fire, no explosion
4	Heater	GB 38031	No fire, no explosion
5	Squeezes	GB 38031	No fire, no explosion
6	Temperature cycling	GB 38031	No fire, no explosion

5. End-of-life management

5.1 Batteries have a limited service life and the Customer shall establish an effective tracking system to monitor and record the internal resistance and capacity of the batteries for each service life. The method of measurement and calculation of the internal resistance and capacity shall be discussed and agreed upon between the Customer and PORFFOR. When the internal resistance of a battery in use exceeds 145% of the original internal resistance of the battery or the capacity is less than or equal to 80% of the nominal capacity (25±2°C), the battery should be taken out of service. Failure to comply with this requirement shall exempt PORFFOR from the product quality warranty obligations under the Product Sales Agreement and these specifications.

5.2 Refer to 3.1.9 Cycle Life for cell life determination.

6. Application condition

The Customer shall ensure that the following application conditions relating to batteries are strictly adhered to:

6.1 The Customer shall configure a battery management system to closely monitor, manage and protect each battery.

6.2 The detailed design of the Battery Management System, system characteristics, framework, system data, format and other contents, as well as changes in the use of the management system, especially those involving the part of the cell safety module, shall provide relevant information to PORFFOR for PORFFOR to design the use of the system and to conduct a safety assessment.

6.3 The Customer shall not modify or change the design and framework of the battery management system without the consent of PORFFOR, so as not to affect the use performance of the battery. 6.4 The complete monitoring data of the battery operation during the warranty period shall be kept for the reference of product quality responsibility. PORFFOR shall not be responsible for the absence of test data for analysis.

6.5 PORFFOR shall not be responsible for any consequences resulting from testing and use beyond the scope of this specification.

6.6 Battery management systems are subject to testing and control requirements:

No.	Parameters	Product Specification	Protection Response
1	Charge termination	3.6V	Charging is terminated when the battery voltage reaches 3.6V.
2	Level 1 overcharge protection	Greater than 3.6V	Charging is terminated when the battery voltage reaches 3.6V.
3	Second level of overcharge protection	Greater than or equal to 3.7V	When the battery voltage reaches 3.7V charging is terminated and the battery management system freezes the data until a technician resolves the issue on site.
4	Discharge termination	2.0V	Discharge terminates when the battery voltage reaches 2.0V, minimizing the current.
5	First stage over-discharge protection	1.8V minimum	Discharge terminates when the battery voltage reaches 1.8V, minimizing the current.
6	Second level of over-discharge protection	Minimum 1.5V	Discharge terminates when the battery voltage reaches 1.5V, and the battery management system freezes the data until a technician resolves the issue on-site
7	Short circuit protection	No short circuit allowed	In the event of a short circuit, the battery circuit is disconnected by an overcurrent device.
8	Overcurrent protection	Refer to Article 3.3.2	Battery management system controls discharge current to meet requirements
9	Overheating protection	Refer to Article 3.3.5	Termination of operation when the temperature exceeds the requirements of this specification

(Remarks: The above No.2, 3, 5, 6, are warning clauses to draw customers' attention, when the battery reaches the state of indicators and parameters described in any of the above clauses, it means that the battery has exceeded the conditions of use of this specification, and the customer needs to take protective measures for the battery in accordance with the "Protective Action" and other relevant provisions of this specification, at the same time, PORFFOR declares that it does not assume any responsibility to guarantee the quality of the above state of use, and will not compensate for any losses caused by this. PORFFOR declares that it is not responsible for the quality of the batteries in the above mentioned conditions of use, and will not compensate for any damages incurred by the customer or third parties as a result of the above mentioned conditions of use.)

6.7 Avoid arriving at an over-discharged state of the battery. If the battery voltage falls below 1.5V, the battery may be permanently damaged internally and the PORFFOR product quality warranty will be void.

6.8 If the battery is expected to be stored for more than 30 days, the SOC should be adjusted to approximately 75%.

6.9 For long term storage, the battery should be charged and discharged every three months, if this is not the case, PORFFOR's product quality warranty will be void.

6.10 Batteries should not be charged at low temperatures as prohibited by this specification, as this may result in an unintended reduction in capacity. The battery management system shall control the charging temperature in accordance with the minimum charging temperature. Charging at temperatures lower than those specified in this specification is prohibited and will not be warranted by PORFFOR.

6.11 The design of the battery system should give full consideration to the heat dissipation of the battery cells, PORFFOR shall not be responsible for the quality assurance of the overheating damage of the cells or batteries due to the design of the heat dissipation of the battery box.

6.12 Battery system design should give full consideration to the waterproof and dustproof problems of the battery cells, and the case must meet the waterproof and dustproof level stipulated in the relevant national standards. PORFFOR shall not be responsible for any damage (such as corrosion, rust, etc.) to the cells or batteries caused by waterproof and dustproof problems.

6.13 It is prohibited to mix different P/N cells in the same battery system (or the whole vehicle), otherwise PORFFOR shall not bear the responsibility of quality assurance.

7. safety precaution

7.1 It is prohibited to immerse the battery in water.

7.2 It is prohibited to put the battery into fire or expose it for a long time to a high temperature environment that exceeds the temperature conditions specified in the operating temperature (charging) and operating temperature (discharging) in 3.1 of this specification, or it may lead to fire.

7.3 Under any normal use, the temperature of the cell must not exceed 80°C. If the temperature of the cell in the battery exceeds 80°C, the battery management system needs to shut down the battery and stop the battery operation.

7.4 It is prohibited to short-circuit the positive and negative terminals of the battery, otherwise strong current and high temperature may cause personal injury or fire. Since the positive and negative terminals of the battery are exposed in the plastic protective sleeve, there should be sufficient safety protection to avoid short-circuiting when the battery system is assembled and connected.

7.5 Connect the positive and negative terminals of the battery in strict accordance with the labeling and instructions, and prohibit reverse charging.

7.6 Prohibit overcharging of the battery, otherwise, it may cause overheating and fire accidents. In battery installation and use, hardware and software should implement multiple overcharge failure safety protection. The protection requirements are described in clauses 6.6 and 7.12 of this specification.

7.7 Normal charging shall be terminated after charging in accordance with clause 3.2 of this specification. When charging is continued beyond a reasonable time limit, the battery will overheat and may cause thermal runaway and fire. A timer should be installed to protect it. Once the charging current reaches a state of overcharge and cannot be terminated, the timer will act to terminate the charge, see clause 7.12 of this specification.

7.8 The Customer shall securely fasten the battery to a solid surface and securely restrain the power cord in a suitable location to avoid arcing and sparking due to friction.

7.9 Avoid encapsulating batteries in plastic or making electrical connections in plastic. Incorrect electrical connections may cause overheating of the battery during use.

7.10 Avoid skin and eye contact with the electrolyte when it is leaking. In case of contact, wash the exposed area with plenty of water and seek medical help. It is prohibited for any person or animal to ingest any part of the battery or substances contained in the battery.

7.11 Make every effort to protect the battery from mechanical shocks, impacts and pressure shocks, otherwise the battery may short circuit internally, generating high temperatures and fire.

7.12 Improper termination of charging may occur during charging of the battery. For example, charging at less than 2A, termination of charging at too high a voltage, or termination of charging at too high a current. The above phenomena are defined as “improper termination of charging”. When these phenomena occur, it may mean that there is a leakage in the battery system or that some components have failed. Continuing to charge the battery without finding the root cause and solving it completely may cause overheating or fire. When the above phenomenon occurs, the battery management system should prohibit subsequent charging through the automatic lockout function and remind the user to return the vehicle with the battery to the dealer for system maintenance. Charging of this battery shall be resumed only after it has been fully inspected by a certified qualified technician to determine the root cause and to thoroughly resolve and improve the situation.

7.13 The test experiments described in this specification may cause the battery to catch fire or explode if not performed properly. The test experiments should only be carried out in a specialized laboratory by professionals equipped with appropriate protective gear, otherwise it may lead to serious personal injury and property damage.

7.14 It is prohibited to continue charging or discharging the battery after the explosion-proof valve has been activated, otherwise the battery may catch fire or explode, and the user should be reminded to return the vehicle with the battery to the dealer for system maintenance or replacement. The battery can only continue to be used after it has been fully inspected by a certified technician to determine the root cause and to thoroughly resolve and improve it.

8. Statement denying or limiting responsibility

PORFFOR will hold the product requesting unit responsible for any impact on society and on PORFFOR's reputation if the product requesting unit does not use the product in accordance with the provisions of this manual. Depending on the extent of the impact on PORFFOR, the product requesting unit will be required to provide compensation to PORFFOR.

9. Risk warning

9.1 warning statement

Warnings

Batteries are potentially hazardous and must be operated and maintained with proper precautions! Improper operation of the test experiments described in this datasheet can result in serious personal injury and property damage!

Batteries must be operated with the correct tools and protective equipment
 Battery maintenance must be carried out by persons with specialized knowledge of batteries and safety training
 Failure to observe the above warnings can result in a variety of disasters!

9.2 Hazard type

The customer is aware of the following potential hazards in the use and operation of the battery:

The customer is aware of the following potential hazards in the use and operation of the battery:

9.2.1 Operators may be injured by chemicals, electric shock, or electric arcs during operation.

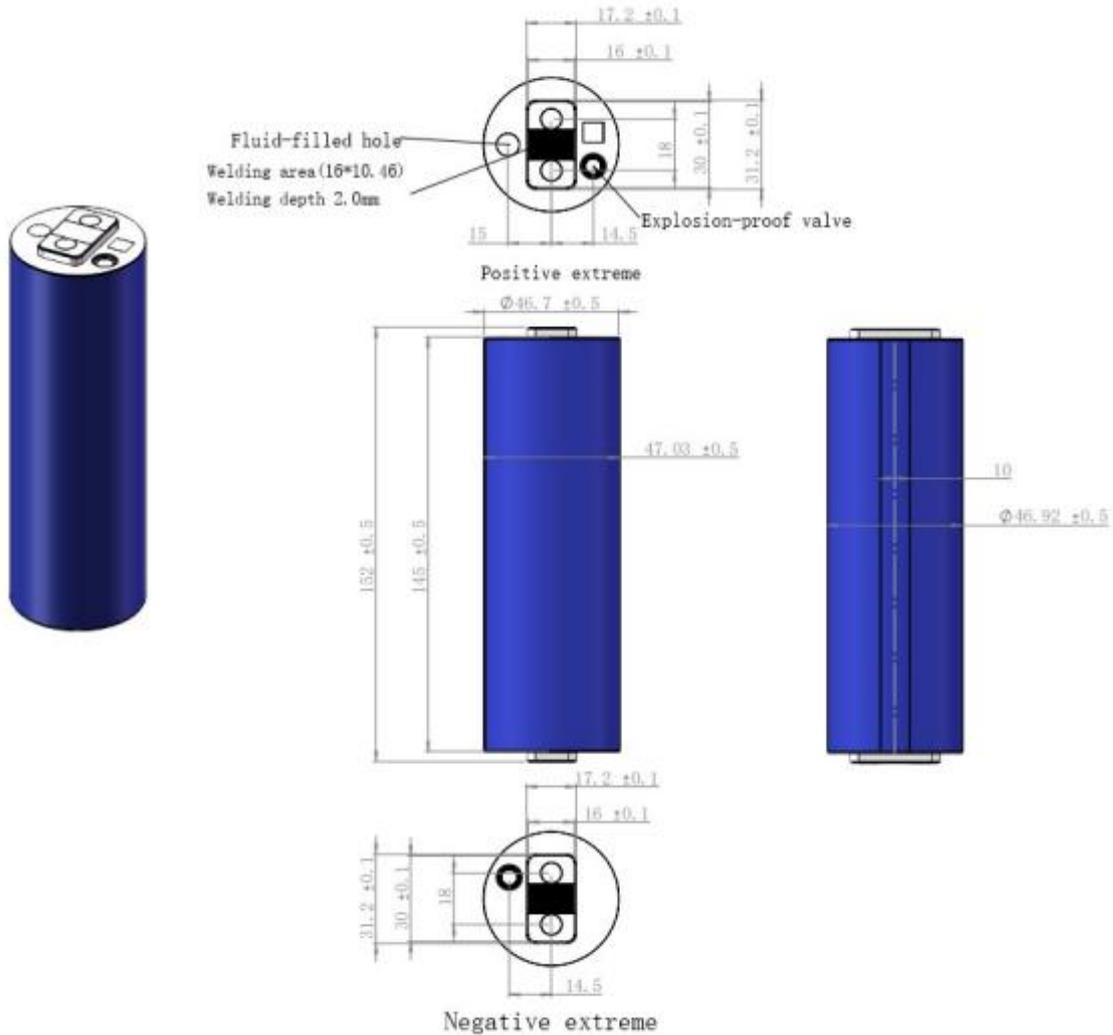
Although the human body reacts differently to being exposed to direct current than to alternating current, direct current voltages above 50V are just as damaging as alternating current, and the customer must adopt a conservative posture during operation to avoid injury from electric current.

9.2.2 The operator may be injured by chemicals, electric shock, or arcing during operation. Although the human body reacts differently to being exposed to direct current than to alternating current, direct current voltages above 50V are just as harmful as alternating current, and the customer must adopt a conservative posture during operation to avoid injury from electric current.

9.2.3 There is a chemical risk from the electrolyte in the battery.

9.2.4 When handling batteries and selecting personal protective equipment, customers and their employees must consider the above potential risks to prevent accidental short circuits that could result in arcing, explosions, or thermal runaway.

10. Cell drawings



11.other

Matters not covered in this note shall be determined by agreement between the parties.