

	PRODUCT SPECIFICATION 产品规格确认书		Form No.: xxxxxx
	Author/Dept.: Yang Meng/EVC	Document #: CTPS-MHH5L9-01	Rev: 1.0
	型号: Sample product Specification of 280Ah Cell		
	280Ah 电芯样品规格确认书		
Confidential: () Level 3 隐私 () Level 2 高密 (V) Level 1 低密			

Product Specification

Definition of Terms	Definition
the term	The "product" in this specification refers to the 280Ah 3.2V rechargeable lithium iron phosphate system energy storage battery produced by CATL.
product	Refers to the buyer in the "CATL EV Product Sales Contract".
client	Refers to the seller in the "CATL EV Product Sales Contract".
CATL	In order to distinguish the battery used in different areas of use or under different application conditions, CATL is the material number defined for 280Ah 3.2V rechargeable lithium batteries.
PN	The ambient temperature where the battery is located. The temperature tolerance is $\pm 2^{\circ}\text{C}$.
Ambient temperature	An effective tracking and control system used by customers to monitor and record the operating parameters of the product throughout the service period. Its tracking and recording parameters 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 meet the requirements of this specification.
Battery Management System (BMS)	The temperature of the battery cell measured by the temperature sensor connected to the battery, the selection of the temperature sensor and the measurement circuit are jointly agreed by CAT L and the customer.
Cell temperature	Refers to the state within 7 days from the date of manufacture of the battery
Fresh battery status	The ratio of the charging power to the energy value of the battery measured multiple times by the battery management system. For example: when the battery energy is 896W h and the charging power is 448W, the charging rate is 0.5P; if the charging rate is 0.25P, the charging power is 224W.
C-Rate charging rate	The battery is charged and discharged in a cycle according to the prescribed charging and discharging standards. The cycle includes short-term normal charging or regenerative charging and discharging. In the charging process, there can be only normal charging without regenerative charging; the discharge can be formed by a combination of partial discharges.
Cycle	The date of manufacture of the battery. The date code marked on the top sticker of each battery is the date of manufacture.
Production Date	The voltage of the battery measured when no load or circuit is connected.
Open circuit voltage (OCV)	After the battery is stored, select the capacity measured according to the standard charging and discharging conditions listed in Article 2.2 and 2.3 of this specification Average of 3 measurements.
Recoverable capacity	The terms of the transaction concerning the products in this specification signed jointly by CATL and the customer.
Product Supply Agreement	The charging mode described in section 2.2 of this specification.
Standard charging	The discharge mode described in section 2.3 of this specification.
Standard discharge	The ratio of the actual charge of the battery to the fully charged charge represents 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 2.5V.
State of Charge (SOC)	Under the conditions specified in this specification, such as the increase in cell temperature during charging or discharging.
The temperature rises	Under the conditions specified in this specification, such as the increase in cell temperature during charging or discharging.

Units of measurement	V (Volt) Volt (V), the unit of voltage
	A ^o (Ampere) Ampere (A), the unit of current
	W (Watt) Watt (W), power unit ^o
	Ah (Ampere-Hour) Ampere-hour (Ah), load unit
	Wh (Watt-Hour) Watt-hour (Wh), energy unit
	Ω (Ohm) ohm (Ω), resistance unit
	M Ω (Milliohm) Milliohm (m Ω), resistance unit
	$^{\circ}$ C (Degree Celsius) Celsius ($^{\circ}$ C), temperature unit
	Mm (Millimeter) Millimeter (mm), the unit of length
	S (Second) second (s), time unit
	Hz (Hertz) Hertz (Hz), frequency unit

1. Scope of application

Entry	Content	Remarks
Product number	001CB310	Limited to energy storage application scenarios
product status	Sample B	

2. Sample electrical performance index

2.1 Summary

No.	Item	Product specifications	Condition
2.1.1	Cell capacity	$\geq 280\text{Ah}$	$25\pm 2^{\circ}\text{C}$, 0.25P, new battery status
2.1.2	Discharge energy	$\geq 896\text{Wh}$	$25\pm 2^{\circ}\text{C}$, 0.25P, new battery status
2.1.3	Operating voltage range	2.5~3.65V 2.0~3.65V	Temperature $T > 0^{\circ}\text{C}$ Temperature $T \leq 0^{\circ}\text{C}$
2.1.4	Battery internal resistance (1KHz)	$0.17\pm 0.05\text{m}\Omega$	New battery 40% SOC state
2.1.5	Shipping capacity	$112\pm 1\text{Ah}$	New battery 40% SOC state
2.1.6	Working temperature (charging)	$0 - 60^{\circ}\text{C}$	Refer to section 2.2
2.1.7	Working temperature (discharge)	$-20 - 60^{\circ}\text{C}$	Refer to section 2.3
2.1.8	Cycle life	≥ 6000 cycles	$25\pm 2^{\circ}\text{C}$, 0.25P charge and discharge, capacity decays to 224Ah
2.1.9	Storage life	≥ 15 years	$25\pm 2^{\circ}\text{C}$, standard charge to 100% SOC storage, capacity decline to 224Ah
2.1.10	Battery weight	$5.34\pm 0.30\text{Kg}$	N.A.
2.1.11	Cell size	Width: $173.9\pm 0.8\text{mm}$ Height: $207.2\pm 0.8\text{mm}$ Thickness: $71.7\pm 0.8\text{mm}$	Thickness test under 300Kgf pressure
2.1.12	Stand still SOC	$\geq 5\%$	SOC interval without load or charging
2.1.13	Application altitude	$\leq 2000\text{m}$	N.A.

2.2 Charging mode/parameters

2.2.1 Standard charging conditions (mode)

No.	parameter	Product specifications	condition
2.2.1.1	Standard charging power	224W	$25\pm 2^{\circ}\text{C}$
2.2.1.2	Standard charging voltage	Single cell max 3.65V	NA
2.2.1.3	Standard charging mode	224W constant power and continuous charging to the single battery 3.65V, then transfer to 89.6W constant power and continuous charging to the single battery maximum charging voltage of 3.65V	
2.2.1.4	Standard charging temperature	$25\pm 2^{\circ}\text{C}$	Cell temperature

2.2.2 Other charging conditions (modes)

Cell temperature/°C		0	5	10	15	20	25	45	50	55	60
Maximum charging power (P)	0%~<100% SOC	0	0.05	0.1	0.2	0.35	0.5	0.5	0.5	0.5	0

2.3 Discharge mode/parameter

2.3.1 Standard discharge conditions (mode)

No.	Parameter	Product specifications	Condition
2.3.1.1	Standard discharge power	224W	25±2°C
2.3.1.2	Maximum continuous discharge power	448W	N.A.
2.3.1.3	Standard discharge temperature	25 ± 2°C	Cell temperature
2.3.1.4	Discharge temperature range	-20- 60°C	If the cell temperature exceeds the discharge temperature range, the discharge will stop
2.3.1.5	Discharge cut-off voltage	2.5V 2.0V	Temperature T>0°C Temperature T≤0°C

2.3.2 Other discharge conditions (modes)

Cell temperature/°C		-20	-10	0	15	25	35	45	50	55	60
Maximum discharge power (P)	0%~100% SOC	0.25	0.25	0.25	0.5	0.25	0.5	0.5	0.5	0.5	0

2.4 High and low temperature discharge capacity

No.	parameter	Product specifications	Condition (cell surface temperature)
2.4.1	55°C discharge	≥280Ah	New battery status, 55°C, 0.25P, 2.0V~3.65V
2.4.2	-20°C discharge capacity	≥155Ah	New battery status, -20°C, 0.25P, 2.0V~3.65V

2.5 Battery self-discharge performance

No.	parameter	Product specifications	Conditions
2.5.1	Self-discharge rate	≤ 3% /month	The battery cells shipped

3. Battery temperature rise

The temperature rise in this specification refers to the battery surface temperature after discharge minus the battery surface temperature before discharge. The temperature rise of the battery should be measured when the ambient temperature

To be carried out in a stable and large enough room. For each battery temperature measurement, a calibrated temperature sensor that can record time data should be selected.

No.	parameter	Product specifications	condition
3.1	Continuous discharge temperature rise	≤10°C	The battery is discharged in standard discharge mode
3.2	Pulse discharge temperature rise	≤5°C	In any charging state, each battery is discharged at 500A for 10 seconds

4. Safety and reliability

4.1 Projects at risk:

This sample is still in the B-sample development stage, and the process freeze has not been completed yet. The product specifications in the mass production stage need to be redefined and a formal product specification is provided.

This sample is still in the B-sample development stage, and the process reliability verification has not been completed yet, and there is a risk of batch stability. Product specifications at the mass production stage need to be renewed

Definition and provide formal product specifications.

4.2 Restrictions on use:

This sample is still in the development stage of sample B, and can be tested cyclically under standard charging and discharging conditions. The number of tests is less than 500 cycles. The battery is only for public

Use for reporting, testing, etc., is prohibited from selling to end customers.

5. Product end of life management

5.1 The battery life is limited. The customer should establish an effective tracking system and record the internal resistance and capacity of the battery during each service life. The measurement method and calculation method of internal resistance and capacity require mutual discussion and mutual agreement between the customer and CATL. If the initial internal resistance of this battery is 200% or the capacity is less than or equal to 60% (25°C), you should stop use the battery. Violation of this requirement will exempt CATL from its responsibility for product quality assurance in accordance with the product sales agreement and this specification.

5.2 Battery life judgment conditions refer to 2.1.8 Cycle life.

6. Application conditions

Customers should ensure that the following battery-related application conditions 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 customer shall provide CATL with detailed design plan, system characteristics, framework, system data, format and other relevant information of the battery management system for the

CATL conducts design evaluation of the system and establishes battery management files.

6.3 Without the consent of CATL, customers are not allowed to modify or change the design and framework of the battery management system, so as not to affect the performance of the battery.

6.4 The customer shall keep the complete monitoring data of battery operation as a reference for the division of product quality responsibility. If the battery system does not have complete monitoring data within the service life of the battery system, CATL does not assume the responsibility for product quality assurance.

6.5 The battery management system shall meet the following most basic testing and control requirements:

No.	parameter	Product specifications	Protection action
6.5.1	Charge termination	3.65V	When the battery voltage reaches 3.65V, BMS applies for termination of charging
6.5.2	The first level of overcharge protection	≥3.69V	When the battery voltage reaches 3.69V, BMS forcibly terminates charging
6.5.3	Second level overcharge protection	≥3.8V	When the battery voltage reaches 3.8V, the BMS will forcibly terminate the charging, and the BMS should be locked until the technician solves the problem
6.5.4	Discharge termination	2.6V minimum	When the battery voltage reaches 2.6V, BMS applies to terminate the discharge
6.5.5	The first level of over-discharge protection	2.5V minimum	When the battery voltage reaches 2.5V, BMS forcibly terminates the discharge
6.5.6	Second-level over-discharge protection	2.0V minimum	When the battery voltage is lower than 2.0V, the BMS forcibly terminates the discharge, and it should be recharged to 50% at 0.1C in time, and the BMS should be locked until the technician solves the problem
6.5.7	Short circuit protection	Short circuit is not allowed	When a short circuit occurs, the battery (circuit) is disconnected by the overcurrent device
6.5.8	Overcurrent protection	Refer to section 2.3 discharge requirements	The battery management system controls the discharge current to meet specifications
6.5.9	Overheating protection	Refer to Section 2.2 to 2.3	When the temperature exceeds this specification, the charge/discharge will be terminated
6.5.10	Long charging time protection	Charging time within 8 hours	If the charging time is longer than 8 hours, the charging will be terminated

6.6 Prevent the battery from reaching an over-discharged state. When the battery voltage is lower than 1.8V, the inside of the battery may be permanently damaged. At this time, CATL's product quality assurance responsibility becomes invalid. According to Article 2.3.5 of this specification, when the actual discharge cut-off voltage is lower than the standard discharge cut-off voltage, the internal energy consumption of the system is reduced to a minimum, and the sleep time is extended before recharging. Customers need to train users to recharge in the shortest possible time to prevent the battery from entering an over-discharged state.

6.7 Avoid charging the battery under low temperature conditions prohibited by this specification (including standard charging, fast charging, emergency charging and regenerative charging), otherwise unexpected capacity reduction may occur. The battery management system should be controlled according to the minimum charging and regenerative charging temperature. It is forbidden to charge at a temperature lower than the temperature specified in this specification, otherwise, CATL will not bear the responsibility for quality assurance.

6.8 The heat dissipation of the cells should be fully considered in the design of the electric box. CATL does not assume the responsibility for quality assurance if the cells or batteries are overheated and damaged due to the heat dissipation design of the electric box.

6.9 In the design of the electric box, the water-proof and dust-proof problems of the electric core shall be fully considered. The electric box must meet the waterproof and dust-proof grades stipulated by the relevant national standards. CATL does not assume responsibility for quality assurance due to damage to cells or batteries (corrosion, rust, etc.) caused by water-proof and dust-proof problems.

7. Safety precautions

7.1 It is forbidden to immerse the battery in water.

7.2 It is forbidden to put the battery into a fire or expose it to a high temperature environment exceeding the temperature conditions specified in Article 2.1.6 and Article 2.1.7 of this specification for a long time, otherwise it may cause a fire. In any normal use, the temperature of the battery cell should not exceed 60 degrees Celsius. If the temperature of the battery cell in the battery exceeds 60 degrees Celsius, the battery management system needs to shut down the battery and stop the battery operation.

7.3 It is forbidden to short-circuit the positive and negative poles of the battery, otherwise the high current and high temperature may cause personal injury or fire. Since the positive and negative electrodes of the battery are exposed in the plastic protective cover, there should be sufficient safety protection to avoid short circuits when the battery system is assembled and connected.

7.4 Strictly follow the signs and instructions to connect the positive and negative poles of the battery, and reverse charging is prohibited.

7.5 It is forbidden to overcharge the battery, otherwise, it may cause the battery to overheat and fire accidents. In the battery installation and use, the hardware and software need to implement multiple overcharge failure safety protections. For minimum protection requirements, see Article 6.5.3 and Article 7.11 of this specification.

7.6 After charging according to Article 6.5.9 of this specification, normal charging shall be terminated. When the continuous charging time exceeds the reasonable time limit, the battery will overheat, which may cause thermal runaway and fire. A timer should be installed to protect it. Once the charging current reaches the overcharge state and cannot be terminated, the timer will work to terminate the charging, see Article 7.11 of this specification.

7.7 The customer should securely fix the battery on a solid surface, and securely tie the power cord in a proper position to avoid friction and sparks and sparks.

7.8 It is strictly prohibited to use plastic to encapsulate the battery or use plastic for electrical connection. Incorrect electrical connection may cause overheating during battery use.

7.9 When the electrolyte leaks, avoid skin and eyes contact with the electrolyte. If there is contact, use a lot of clean water to wash the touched area and seek help from a doctor. It is forbidden for any person or animal to swallow any part of the battery or the substance contained in the battery.

7.10 Do your best to protect the battery from mechanical shock, collision and pressure shock, otherwise the battery may short circuit, resulting in high temperature and fire.

7.11 Inappropriate termination of charging may occur during battery charging. Such as: charging beyond the allowable charging time, the charging voltage is too high and the charging is terminated, or the charging current is too strong and the charging is terminated. The above phenomenon is defined as "inappropriate termination of charging". When the above phenomenon occurs, it may mean that the battery system is leaking or some parts are malfunctioning. Continuing to charge the battery before the root cause is found and completely resolved may cause the battery to overheat or cause a fire. When the above phenomenon occurs, the battery management system should use the automatic lock function to prohibit subsequent charging, and remind the user to return the vehicle loaded with the battery to the dealer for system maintenance. The battery has only been fully inspected by certified technicians to ensure that Determine the root cause, solve it thoroughly, and improve it before recharging can be resumed.

8. Disclaimer

8.1 If the sample requesting unit does not use it according to the provisions of this manual, if there is any problem with the battery cell, all the responsibilities shall be borne by the sample requesting unit, and CATL will not bear any responsibility.

8.2 If the sample requesting unit does not use it in accordance with the provisions of this manual, which causes social impact and affects the reputation of CATL, CATL will pursue the responsibility of the sample requesting unit. According to the degree of impact on CATL, the sample requesting unit shall provide compensation to CATL.

8.2 This sample is still in the development stage of sample B. The battery cell is only used for announcements, testing, etc. The specific test items need to be negotiated and determined with CATL, and it is prohibited to sell to end customers

9. Risk Warning

9.1 Warning statement

caveat

The battery is potentially dangerous, and proper protective measures must be taken during operation and maintenance!
Improper operation of the test experiment described in this specification may cause serious personal injury and property damage! The correct tools and protective equipment must be used to operate the battery.

The maintenance of the battery must be performed by a person who has battery expertise and has received safety training.
Failure to comply with the above warnings can cause a variety of disasters.

9.2 Type of danger:

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

9.2.1 The operator may be injured by chemicals, electric shocks or electric arcs during operation. Although the human body reacts differently to direct current and alternating current, DC voltage higher than 50 volts and alternating current are equally harmful to the human body, so customers must take a conservative posture during operation to avoid current damage

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

9.2.3 When operating 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