

Document #:

Rev: 1.0

型号: **Product Specification of 280Ah Cell**
280Ah 产品规格书

280Ah 产品规格书

Product Specification of 280Ah Cell

电芯型号 Cell Model: CB310电芯容量 Cell Capacity: 280Ah

产品设计准备	产品设计审批	销售审批	项目工程审批	品质保证审批	产品经理审批
Yang Longfei	Zheng Xianfeng				

客 户 确 认	签名	日期
	客户代码:	
	公司印章:	

修改记录

AMENDMENT RECORDS

Rev.	ECN No.	Effective Date	Author	Description of Revision
1.0			Yang Longfei	New release

目录 Content

0 术语定义 Definitions	4
1. 适用范围 Scope of application	5
2. 产品电性能指标 Electrical specification	5
2.1. 概要 General.....	5
2.2. 充电模式/参数 Charging/Parameter.....	7
2.3. 放电模式/参数 Discharging/Parameter	7
2.4. 高低温容量 High/Low temperature capacity	8
2.5 电芯温升 Cell temperature rise	8
2.6. 安全与可靠性 Safety and reliability	8
3. 产品寿命终止管理 Product end of life management.....	9
4. 应用条件 Application conditions	9
5. 安全防范 Safety Precautions	12
6. 免责声明 Disclaimer	14
7. 风险警告 Risk Warning	15
8. 电芯图纸 Mechanical Drawing	17

0 Definitions

Terms	Definition
Product	Means the 280Ah 3.2V rechargeable lithium ion cells produced by CATL
Customer	Means the customer in the 《CATL product sales contract》
CATL	Means Contemporary Amperex Technology Co. Limited
PN	Means the unique part number provided by CATL to identify the product supplied by CATL;
Ambient Temperature	Means the ambient temperature of the environment which the products are exposed to;
Battery Management System(BMS)	Means an active tracking and control system to be developed and implemented by CATL to monitor and record the operating parameters, including but not limited to voltage, current and temperature, of each product in its entire service life, and to control the operation of each product to ensure a safe operation of product.
Cell Temperature	Means the temperature of the cell measured by the temperature sensor connected to the main part of cell.
Fresh State	Means the state within 7 days after customer received the product (domestic only) .
C-Rate	The ratio of charging power to the energy of batteries measured repeatedly by BMS. For example, when the battery energy is 896Wh and the charging power is 224W, the charging rate is 0.25P; when the battery energy fades to 716.8Wh and the charging power is 179.2W, the charging rate is 0.25P.
D-Rate	The ratio of discharging power to the energy of batteries measured repeatedly by BMS. For example, when the battery energy is 896Wh and the discharging power is 224W, the discharging rate is 0.25P.
Cycle	Means a state when a total of charge and discharge according to rules from a cell as recorded by BMS and it may consist of a summation of a few segments of partial charge and discharges.
Production date	Means the production date of the cell marking on the top of the cell by date code.
Standard Charge	Means the default charging method set out in paragraph 2.2.3 titled “Standard Charging method”.

Terms	Definition
Standard Discharge	Means the default discharging method as set out in paragraph 2.3.1 of 0.25P with a discharge cut-off voltage of 2.5 V as set out in paragraph 2.3.5;
(SOC) State of Charge	Means the ratio of the actual battery charge to the full charge, characterizing the state of charge of the battery. The state of charge of 100% SOC indicates that the battery is fully charged to 3.65V, and the state of charge of 0% SOC indicates that the battery is completely discharged to 2.5V.
Temperature Rise	Means the temperature of the cell rises during the conditions specified in this document, such as the charging process or the discharging process.
Units of Measure	“V” (Volt)(V) “A” (Ampere)(A) “W”(Watt)(W) “Ah” (Ampere-Hour) “Wh” (Watt-Hour) “Ω” (Ohm) “mΩ” (MilliOhm) “°C” (Degree Celsius) “mm” (Millimeter) “s” (Second)(s) “Hz” (Hertz)(Hz)

1. Scope of application

The purpose of this document is to specify the specifications of 280Ah 3.2V lithium iron cells for energy storage system with CATL (“Product”) to be supplied by CATL.

2. Electrical specification

2.1. General

No.	Parameter	Specification	Condition
2.1.1	Typical capacity	280 Ah	Refer to 2.2&2.3 standard charge and discharge procedure
2.1.2	Typical Energy	896 Wh	Refer to 2.2&2.3 standard charge and discharge procedure
2.1.3	Operating voltage	2.5~3.65V 2.0~3.65V	T>0°C Cell temperature T>0°C T≤0°C Cell temperature T≤0°C
2.1.4	Impedance (1KHz)	0.17±0.05m Ω	Fresh cell (40%SOC)
2.1.5	Shipping capacity	112±1 Ah	40% SOC

No.	Parameter	Specification	Condition
2.1.6	Residual capacity loss	Per month $\leq 3.0\%$	Fresh cell after 3month, 40%SOC, 25 $\pm$ 2°C storage
2.1.7	Operating temperature (charging)	0~60°C	Reference to paragraph 2.2
2.1.8	Operating temperature (discharge)	-20~60°C	Reference to paragraph 2.3
2.1.9	Cell Weight	5.34 $\pm$ 0.30Kg	N.A.
2.1.10	Storage Temp.	-30~60°C	Storage ambient humidity < 85% ROH, no condensation
2.1.11	Typical dimension (W*H*T)	(Width): 173.9 $\pm$ 0.8mm (Height): 207.2 $\pm$ 0.8mm (Thickness): 71.7 $\pm$ 0.8mm	Thickness with compression force (300 $\pm$ 20Kgf), Height with Terminal, BOL(Reference to item 8)
2.1.12	Rest SOC	$\geq 5\%$	SOC interval without load or charging
2.1.13	Altitude	$\leq 2000\text{m}$	N.A.
2.1.14	Cycle performance	$\geq 8000\text{Cycles}$	25 $\pm$ 2°C, cycle test by the standard charge and discharge method under 300 $\pm$ 20Kgf preload
2.1.15	Cycle fading	$\leq 5\%$	25 $\pm$ 2°C, cycle test by the standard charge and discharge method under 300 $\pm$ 20Kgf preload for 180 cycles
2.1.16	Storage fading	$\leq 5\%$	25 $\pm$ 2°C, standard charging to 100% SOC storage under 300 $\pm$ 20Kgf preload for six month

2.2. Charging/Parameter

No.	Parameter	Specification	Condition
2.2.1	Standard charge Power	0.25P	25±2 °C
2.2.2	Standard charge voltage	Cell max voltage 3.65V	N.A.
2.2.3	Standard charge method	0.25P constant power charge to 3.65 V, rest 5min, 0.1P constant power charge to 3.65V	
2.2.4	Standard charge temperature	25±2 °C	Cell Temperature
2.2.5	Absolute charging temperature (Cell Temperature)	0~60°C	无论电池处在何种充电模式, 一旦发现电池温度超过绝对充电温度范围即停止充电 No matter what charge mode the battery is in, stop charging once the cell temperature exceeds absolute charge temperature range.
2.2.6	Absolute charging voltage	Max 3.65V	No matter what charge mode the battery is in, stop charging once the cell voltage exceeds absolute charge voltage.

2.2.7 C-Rate Other charge Condition (C-Rate)

Cell Temperature/°C		0	5	10	15	20	25	45	50	55	60
Max charge power(P)	0%~<100% SOC	0	0.05	0.10	0.20	0.35	0.5	0.5	0.5	0.5	0

2.3. Discharging/Parameter

No.	Parameter	Specification	Condition
2.3.1	Standard discharge power	0.25P	25±2 °C
2.3.2	Maximum discharge power (continuous)	0.5P	N.A.
2.3.3	Discharge cut-off voltage	2.5V 2.0V	(Temp.) T≤0°C
2.3.4	Standard discharge temperature	25±2 °C	Cell temperature
2.3.5	Absolute discharge temperature	-20~60°C	Stop discharging once cell temperature is outside this range regardless of whether continuous or pulse current is adopted.

2.2.6 C-Rate Other discharge Condition (C-Rate)

Cell Temperature/°C		0	5	10	15	20	25	45	50	55	60
Max discharge power(P)	0%~<10 0%SOC	0.1	0.1	0.2	0.5	0.5	0.5	0.5	0.5	0.5	0

2.4. 高低温容量 High/Low temperature capacity

No.	Parameter	Specification	Condition
2.4.1	Capacity@55°C	≥280Ah	Fresh cell, 55°C , 0.25P, 2.5V~3.65V
2.4.2	Capacity@-20°C	≥155Ah	Fresh cell, -20°C , 0.25P, 2.0V~3.65V

2.5 Cell temperature rise

The temperature rise refers to the surface temperature of the cell after discharge minus the surface temperature of the cell before discharge. The measurement of the temperature rise of the cell should be carried out in a room where the ambient temperature is relatively stable and the space is large enough. For each cell temperature measurement, a calibrated temperature sensor that records time data should be selected.

No.	Parameter	Specification	Condition
2.5.1	Continuous discharge temperature rise	≤10°C	The cell is discharged in the standard discharge method.
2.5.2	Pulse discharge temperature rise	≤5°C	The cell is discharged at 500A for 10 s under any state of charge.

2.6. Safety and reliability

2.6.1

Description of service conditions: safety test 、 cycle life test and pack design need to add preload force, and the range of preload force of fresh cell is 500N~5000N, the recommended preload tolerance is ±200N.

2.6.2

Risk Project: this sample is still in the development stage, the process freeze has not been completed yet, and the product specifications in the mass production phase need to be redefined to provide formal product specifications.

Due to during the development stage, the process reliability verification of the sample has not been completed yet, and there is a risk of batch stability. Product specifications for the mass production phase need to be redefined to provide formal product specifications.

2.6.3

Restricted use regulations: this sample is still in the development stage and can be used for cycle tested under standard charge and discharge method. Now the cycle number of tests is less than 500 cycles. The cell are only used for announcements, tests, etc., and are prohibited from being sold to customers.

2.6.4

The cell will generate swelling force during attenuation. The swelling force of the cell at 60% SOH under the test condition of 15mm steel plate, which is about 40000N. The customer needs to consider the reliability of structural strength in the product design process.

3. Product end of life management

3.1.

This cell is designed to service with a finite life time. The customer shall develop and implement an active tracking system to monitor and record impedance of each Product in its entire service life. CATL and its customer shall come into agreement about internal resistance and capacity measurement methods, CATL and/or its customer shall stop using any of the products when its resistance exceeds 200% of its internal resistance or it capacity fading to 60% of typical capacity (168Ah) @25°C. Failure to comply with this requirement shall render CATL's warranties under the Contract inapplicable, thereby releasing CATL from any liability in connection therewith.

3.2.

The cell life determination conditions can refer to paragraph 2.1.14 cycle life.

4. Application conditions

Customer shall ensure that the following application conditions in connection with the products are strictly observed:

4.1.

Customer shall procure that each product shall be used under the strict monitor, control and protection by the BMS incorporated by CATL. When the cell is first used, it must be fully charged and discharged for activating it and giving fully capacity.

4.2.

Customer shall provide detailed information of the BMS, including but not limited to its design, features, setting, and data file format to CATL for design review and record keeping.

4.3.

Once the detailed information of the BMS has been reviewed and agreed by CATL, customer shall not modify or change the design, features, setting or data file format of the BMS without the prior written agreement by CATL.

4.4.

Customer shall keep relevant records of the BMS monitoring data throughout the entire service life of each product, including keeping record of number of occurrence of rush charge, which could be used in the determination and judgment of any product warranty and liability claim entitlement. No warranty or liability claim should be considered without BMS diagnosis records (at a regular basis, esp. during maintenance) of the relevant product.

4.5.

The BMS shall include the following monitoring and control features as a minimum requirement.

No.	Parameter	Specification	Action
4.5.1	Stop charging	3.65V	Stop charging when cell voltage reaches 3.65 V
4.5.2	First overcharge protection	$\geq 3.69V$	Stop charging when cell voltage reaches 3.69 V
4.5.3	Second overcharge protection	$\geq 3.8V$	When the battery voltage reaches 3.8V, the BMS is forced to terminate charging, and the BMS should be locked until technicians solve the problem.
4.5.4	Stop discharge	Minimum 2.6V	Minimize the discharging current when cell voltage reaches 2.6 V.
4.5.5	First over discharge protection	Minimum 2.5V	Stop discharging when cell voltage reaches 2.5V
4.5.6	Second over discharge protection	Minimum 2.0V	When the cell voltage is less than 2.0V, the cell should be charged back to 50% SOC at 0.1C in time, and the BMS should be locked until technicians solve the problem.
4.5.7	Short circuit protection	No short circuit allowed	When a short circuit occurs, the battery (cell) is disconnected by the overcurrent protection device.
4.5.8	Over current protection	See paragraph 2.2&2.3	Control discharge current by BMS to values within specification

4.5.9	Over temperature protection	See paragraph 2.2&2.3	Stop charging and discharging when temperature exceeds specification
4.5.10	Charging time out limit	Charging completes within 8 hours	Stop charging if charging time exceeds specification

Note: The above No. 4.5.2, 4.5.3, 4.5.5, 4.5.6 are the warning clause, draw the attention of customers: When the battery reaches any of the terms described in the above, means that the battery has been used beyond the specifications, the customer shall take protective measures on the battery in accordance with the "protection action" and other relevant provisions of this specification. At the same time, the CATL shall not take any responsibility for the damage in connection therewith.

4.6.

Prevent draining any product down to over discharge state. A product may be permanently damaged internally when the cell voltage is lower than 2.0 V and which shall be strictly prohibited, failing what CATL's warranties under the contract shall cease to apply, thereby releasing the CATL from any liability in connection therewith. After discharge cut-off in accordance with paragraph 2.3.3, internal power consumption of the system should be reduced to a minimum to prolong the idle time before recharge. Customer undertakes to educate the users of the products or other parties who may come to handle the products to recharge the cells at minimum time intervals to prevent reaching the over-discharge state.

4.7.

When the Products are intended to be stored for a prolonged period of time (more than one month), the SOC of cells should be adjusted to around 50% periodically(every three months is recommended).

4.8.

Batteries should avoid charging at low temperatures prohibited by this Technical Agreement (including standard charging, fast charging and emergency charging), otherwise accidental capacity reduction may occur. Battery management system should be controlled according to the minimum charging temperature. It is forbidden to charge under the temperature stipulated in this technical agreement. Otherwise, CATL will not undertake the

responsibility of quality assurance.

4.9.

The design of the electric box must fully consider the heat dissipation problem of the cell. CATL does not take the responsibility due to the overheating of the cell or batteries caused by the thermal design problem of the electric box.

4.10.

The design of the electric box must fully consider the waterproof and dustproof problems of the cells. The electric box must meet the waterproof and dustproof grade stipulated by the relevant national standards. The CATL does not take the responsibility due to damage to the cell or batteries (such as corrosion, rust, etc.) caused by water and dust.

4.11.

It is forbidden to mix different P/N batteries in the same battery system, otherwise, CATL will not be responsible for quality assurance.

5. Safety Precautions

5.1.

Do not immerse cells into water.

5.2.

Do not drop cells into fire or expose them to any high temperature environment exceeding operation temperature as set out in paragraphs 2.1.7、2.1.8&2.1.10, otherwise it may cause fire. At all use time, cell temperature should not exceed 60 °C, shut down system by BMS when it occurs.

5.3.

Do not short circuit cell terminals, otherwise high current and temperature may cause body injury or fire hazards. Metallic cell terminals exposed from plastic packaging and ample safety precautions should be implemented to avoid short circuiting them during system integration or connections.

5.4.

Always connect cell terminals according to its label(s) in right polarity. Reverse charging is strictly prohibited.

5.5.

It is extremely dangerous to overcharge a cell which may cause overheating and fire hazards. Multiple level of fail-safe overcharge protection should be implemented by hardware and software. See paragraph 4.5.1、4.5.2、4.5.3、4.5.9 for minimum requirement to be adopted by the BMS for protection.

5.6.

After charging according to article 4.5.9 of this technical agreement, 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 implemented in the charger circuit and set up properly. In case charging does not terminate normally within charging time out limit, ensure that the timer will intervene and stop the charging. See also paragraph 5.11.

5.7.

Products should be securely fixed to solid platform, and power cables should be securely attached by fastener to avoid intermittent contact which may cause arcing and sparks.

5.8.

Do not service cells and electrical connections within plastic package of cell. Improper electrical connection within a cell may cause overheating in service.

5.9.

When the electrolyte leaks, skin and eye contact with the electrolyte should be avoided. In case of contact, a large amount of clean water should be used to clean the contact area and seek help from the doctor. It is forbidden for any person or animal to swallow any part or substance contained in the battery.

5.10.

Protect cells from mechanical shock, impact and pressure. Internal electrical circuit may short circuit to generate high temperature and fire hazards.

5.11.

When cells charging is terminated improperly for reasons such as exceeding allowable charging time, cut-off due to exceeding charging voltage or cut-off due to exceeding charging current, all these events are defined as “improper charge termination”. Such event may indicate that there is current leaking within a cell system or some components have started to malfunction and subsequent charging of such cell system without finding and fixing root cause of problem may cause potential overheat or fire hazards. When such event occurs, the BMS should lock itself up to prevent subsequent charging and notice should be given to the user to return the vehicle to dealer for servicing. Subsequent charging should only be resumed after the system has been thoroughly checked by qualified technician who can identify and fix root cause attributed to the “improper charge termination”.

5.12.

Battery fire or explosion may be caused by improper operation during abuse test. The test can only be carried out in a professional laboratory by professionals equipped with appropriate protective equipment. Otherwise, it may lead to serious personal injury and property loss.

6. Disclaimer

6.1.

If the product demand unit does not use the product according to the provisions of this specification, causing social impact and affecting the reputation of CATL, CATL will investigate the responsibility of the product demand unit. According to the degree of impact on CATL, the product demander should provide compensation to CATL.

6.2.

CATL reserves the right to modify the specifications and performance parameters of the product. Before ordering CATL products, the buyer needs to confirm the latest status of the products in advance with CATL.

6.3.

This sample is still in development stage. The cell is only used for announcement, testing, etc. The specific test items need to be negotiated with CATL and prohibited from being sold to the customer.

6.4.

English specifications are for reference only. Please refer to the technical specifications of the Chinese version.

7. Risk Warning

7.1. Waring statement

Warning

CELLS ARE POTENTIALLY DANGEROUS AND PROPER PRECAUTIONS MUST BE OBSERVED IN HANDLING AND MAINTENANCE.

RUNNING TESTS ON THE CELLS IMPROPERLY MAY RESULT IN SEVERE PERSONAL BODY INJURY OR PROPERTY DAMAGES.

WORK ON CELLS MUST BE PERFORMED ONLY WITH PROPER TOOLS AND PROTECTIVE EQUIPMENT MUST BE USED.

CELL MAINTENANCE MUST BE CARRIED OUT BY PERSONNEL KNOWLEDGEABLE OF CELLS AND TRAINED IN THE SAFETY PRECAUTIONS INVOLVED.

FAILURE TO OBSERVE THE ABOVE MAY CAUSE VARIOUS HAZARDS.

7.2Types of Hazards

Customer acknowledges the following potential hazards in connection with the usage and handling of the Products: Working with battery can expose the handler to chemical, shock and/or arcing hazards. Although a person's body might react to contact with direct current voltage differently than from contact with alternate current voltage, Customer shall take a conservative position and consider the risk of shock or electrocution to be the same for both alternate current and direct current exposures greater than 50 V.

7.1.1

Cells expose its handler to chemical hazards associated with the electrolyte used in the cell.

When selecting work practices and personal protective equipment, customer and its employees should consider potential exposure to these hazards and therefore prevent accidental short-circuit that can result in electrical arcing, explosion, and/or “thermal runaway” of the cells.

8. 电芯图纸 Mechanical Drawing

