INSTALLATION AND OPERATING INSTRUCTIONS

INSTALLATION AND MAINTENANCE MANUAL OF CHANGHONG SOLAR PV NI-IRON STORAGE CELL NF-S

CHANGHONG®

Catalog

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Notice

The following notes should be abided in operating:

1. Fireproofing

This series of battery can generate explosive gas (hydrogen and oxygen). Battery room must contain ventilation devices and keep away from naked fire. Explosive gas is generated when the low capacity cells are doing recovery charging in regular complementary charging.

2. Notes for electrolyte preparing:

Electrolyte Rubber gloves and other protective supplies should be worn before preparing electrolyte. Boric acid solution with 3% density should be prepared at the work site. If electrolyte spills on human body or clothing, please wash it with plentiful clean water. If electrolyte spills into eyes, wash with clean boric acid solution immediately, then wash with plentiful water; go to the hospital if necessary.

3. Notes for installation:

No short circuit at the terminals of the battery. To avoid circuit on both terminals caused by tools and metals, please pay special attention when installing the batteries (especially for the connecting parts). All tools are forbidden to put into battery case.

4. Others

Other notes will be notified in other chapter.

Chapter 1 General Knowledge

1.1 Brief introduction

Compared with lead-acid cell, the NF-S solar PV Ni-Iron cell is much easier to maintain, friendlier to the environment, and the service life is longer. The manual is mainly describing the maintenance and installation of NF-S solar PV Ni-Iron cells, which is also helpful for knowing well about the structure, performance and correct maintenance of Ni-Iron cells. Before operating, please go through the manual carefully.

1.2 Structure

The NF-S solar PV Ni-Iron cells not only have the high mechanical strength pocket plate also dopt the flooded-electrolyte Design, therefore for solar PV and renewalbe energy deep-cycle discahrge, wide temperature variation, electrical abuses and so on. They are specially suitable circumstances

1.2.1 Single cell

1.2.1.1 Plate Assembly

The nickel-Iron cell consists of two groups of plates with same structures; the positive plate contains nickel (II) hydroxide cathode and graphite, while the negative plate contains ferroferric oxide. Theses active materials are pocketed into the doubled perforated steel strips and mechanically linked together to form the rectangular rough plate, which are fixed by the plate flame to be flat ones like coverlets by plate frames. A certain pieces of homopolar plates are assembled according

to a certain distance and welded with the current carrying bars which are connected with terminal poles, to respectively form the positive and negative plate group.

The sequence is "Positive-Negative-Positive" and there is separator between the plates.

1.2.1.2 Container for single cell

Plate groups are assembled in the container which is made of engineering plastic with strong structure.

1.2.1.3 Electrolyte

The electrolyte for pocket type battery is commonly KOH aqueous solution with a little LiOH. More details is specified in Chapter 4.4~4.6 and chapter 5.0.

1.2.1.4 Other parts

A few of spare parts are made of rubber or synthetic resin, while most are nickel plated steel parts. Therefore, the whole structure has higher mechanical strength.

1.2.2 Battery Pack

According to the requirements of operating voltage, two or more single cells are connected with inter-cell connectors, then assembled in the wooden or metal crates to form one battery pack. For the convenience of transportation, handles are usually installed on the crates. The quantity of single cells in the battery pack lies on its basic dimension and weight.

1.3 Characteristics

1.3.1 Rated Capacity

Battery capacity is calculated by Ampere-Hour under 20 ℃±5℃, its capacity can supply the load Hour (Ah) under the ambient temperature of 0.2 I_tA for 5h, after being fully charged by 0.2I_tA for 8 hours, which can meet the National Standard GB/T12725.

1.3.2 Voltage

The open circuit voltage of single cell is 1.3V～1.5V, any changes in this range is normal. The open circuit voltage value not only depends on the open-circuit period after being fully charged, but also has relations with charging condition, discharging current, ambient temperature and internal resistance.

The nominal voltage of single cells is the difference of electrical potential, which generated by nickel and iron ions dissociating in KOH electrolyte. It is 1.2V, and the nominal voltage of battery pack is 1.2× n ("n" indicates the quantity of single cells in series).

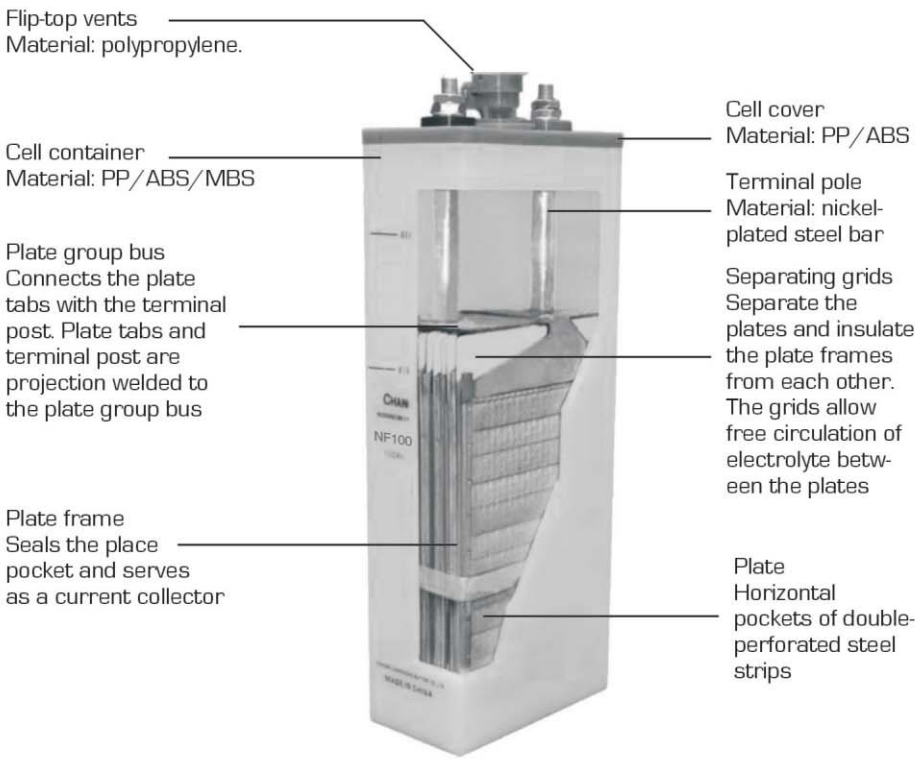
1.3.3 The relation between discharge rate and cell capacity

The cell capacity varies with the discharge rate. The higher the discharge rate is, the smaller the capacity discharged is. The capacity discharged is considered as the 100% of nominal capacity, once the cell is discharged by the standard discharge rate (0.2I_tA) for 5 hours at 20℃.

1.3.4 Internal resistance

The cell internal resistance has some relations with ambient temperature and the state of charge, thus it is hard to define and measure it accurately. Compared with the internal resistant in the fully charge state under normal temperature, the internal resistance is 20% higher when the 50% of the normal capacity is discharged at normal temperature, while it is 80% higher when 90% of normal capacity is discharged at normal temperature. In addition, the internal resistance will be increased when there is a drop of temperature. When the temperature is below 0℃, the internal resistance will be 40% higher than that under normal temperature.

Structure Characteristics



Structure Schematic Diagram of Changhong Pocket Type NF-S Cell

Chapter 2 Installation of the Battery

2.1 Condition of battery room

Battery room should meet the following requirements:

a) The battery room should be separated with other rooms. Acid battery cannot be placed with alkaline battery in the same room;

b) The battery should avoid highlight, and keep away from fire source;

c) Thermostat should be installed in the room, and keep it in the range of 20 ℃±10℃;

d) The battery room should be well ventilated.

2.2 Unpacking and inspection

2.2.1 Unloading

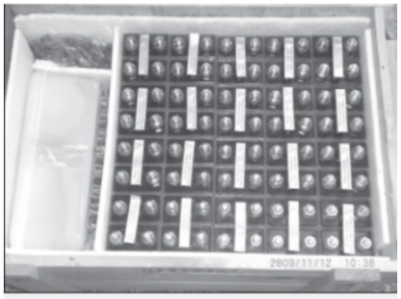
Carefully unload the goods to avoid the impaction loss. It is advisable to unload the batteries near the battery room. Please hold the cell bottom when handing. The cell terminal poles should keep upwards; any sundries cannot be put on the top of the battery.

2.2.2 Checking

Check whether the goods are complete or not according to the list, check whether the containers of the battery are damaged or not. Any problems, please inform the factory or local agency to handle.

2.3 Electrolyte Filling

The batteries are delivered from the factory in dry (unfilled) state. Before operating, the battery should be soaked for about 4 hours after the electrolyte filling,



and then carry out the initial charge in accordance with Article 3.2 in the manual. If the battery is not used for a long period, please store it according to Article 4.7.

2.3.1 Electrolyte filling

Take off the transportation vent plugs before filling electrolyte. Fill the electrolyte into the battery slowly until the electrolyte level is above the Min. line.

2.3.2 Adjust electrolyte level

Inspect the electrolyte level, 30 minutes later after filling. If it falls, please slowly fill the electrolyte close to the Max. line. After completing the initial charge for 2 hours, please refill the electrolyte close to the max. line.

2.4 Installation of the battery

2.4.1 Installation position

The position of the battery installation should meet the requirements in clause 2.1. When the ambient temperature is 20 ℃±5℃ , the battery can show its best electrical property and service life. The battery can be installed on the battery rack, in the battery cabinet, even on the open ground. For the convenience of later maintenance, it is advisable to leave an aisle among the adjacent battery packs for the personnel pass. If the battery is installed in the airtight room, ventilating devices must be installed, so that the gas generated in charging can be vented, or it may cause explosion.

2.4.2 Ventilation

When the battery is installed in small room or closed coach carriage, ventilation devices are always required. At the end of charging, the battery will vent gas (mixed gas of H_2 and O_2). When the reasonable ventilation systems is installed in the battery room, it is necessary to calculate the production rate of H_2, and ensure the density of H_2 generated in the room keeps in a safe range. The theoretic safe limit density of H_2 is 4%.

The exhaust requirement in the battery room can be calculated according to the following methods: 1Ah overcharge can electrolyze 0.366cm^3 water, while 1cm^3 water can produce 1.865L gas, proportionately H_2: O_2=2: 1. So 1Ah overcharge can generate 0.42L H_2.

The H_2 generated by the battery pack in one hour will be: the Qty. of single cell × charging current ×0.42L or the Qty. of single cell × charging current × 0.00042 m^3. The above calculation can be converted as the percentage of H_2 in the battery room, and then we can calculate out the air dose needed in the battery room under a certain H_2 density.

For example:

A battery pack assembled by 98 pcs NF70-S is placed in the room of 2m×2m×3m, for 2 steps, in 2 rows; charge it by the current of 0.2I_tA that is 14A. Then the H_2 release per hour at least is:

98×14×0.00042 m^3=0.58 m^3

The volume of the battery room is 2×2×3=12 m^3

The volume of battery and steps will not over 1 m^3, and then the gas volume in the room is 11 m^3. The produced gas density that charged by the current of 0.2C for1hour is 0.58/11=5.3%

So, if we keep the density of the air is 3%, then the times of changing air is:

5.3/3≈2 times/ hour.

Generally, for the standard rooms with doors and windows, the self-updating quantity of gas is 2.5%/h. In this way, it is necessary to install forced ventilation devices, at lease open the ventilation devices at hourly interval to exchange the gas in the room. In floating charge, the charge current is much lower than that under normal charge conditions and the gas release is the least. As long as the floating charge current is known, the release quantity of H_2 can be calculated by the same methods.

2.4.3 Installation of battery rack

Battery rack is used for holding the batteries, so it is advisable to install the battery rack before installing the battery. Each rack must be placed horizontally, so that each single cell can be placed vertically, otherwise the battery performance may be influenced. Whether the cells are placed in order or not, which can be seen by the position relations between electrolyte level and label line. When the rack is not flat, a piece of thin PVC board or tiny float materials can be used under the rack to keep it horizontally.

2.4.4 Battery Arrangement

Since the cells with electrolyte are heavy, please carefully move them. When conveying, make sure that the cell terminal poles are always upwards and the cells are put on the rack vertically. Install the batteries carefully according to arrangement drawings, avoiding polarity confusion.

If you are not familiar with the battery arrangement, please read this article carefully, CHANGHONG has decades of

experience on the battery installation and developed a series of standard battery layouts, whether the battery is being installed on the rack, in the cabinet, or on the open ground, the same configuration principles can be applied. In general, there are two ways to configure the battery. The first method is length- length connection; shown in figure A. the second method is width-to-width connection, showing in figure B.

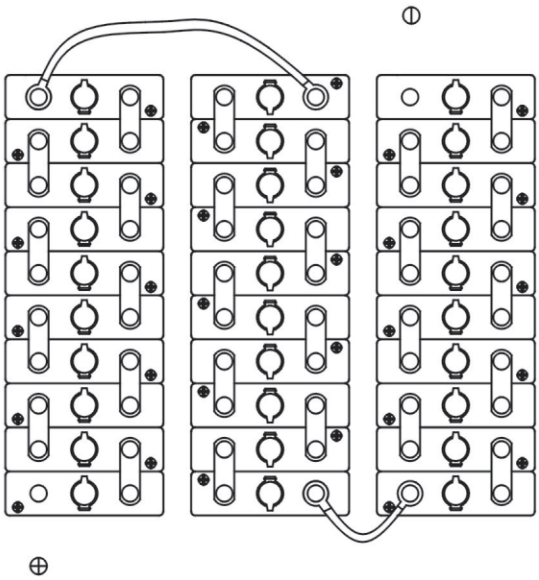


Figure A Length-to Length Connection

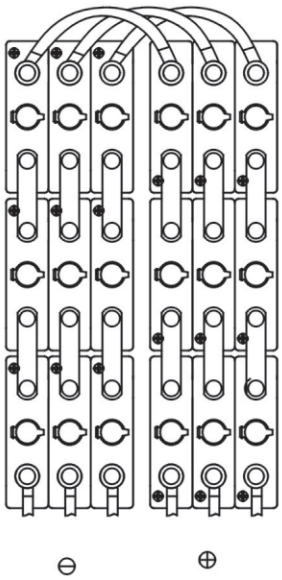


Figure B Width-to Width Connection

When placing the battery, please refer to the following methods, and calculate how to arrange it:

1) Calculate the quantity of battery packs;

2) The length of installation area divided by the length (arranged in Figure A) or the width (arranged in Figure B) of single cells, work out the max. quantity of single cells that can be arranged in a row;

3) The width of installation area divided by the width (arranged in Figure A) or the length (arranged in Figure B) of single cells, work out the rows that can be arranged;

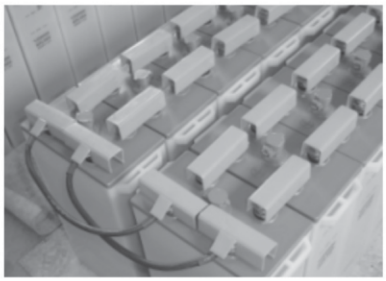
For example:

A 3-tiers cabinet can hold 60 pcs of single cells NF20-S, length (single cell) × width=32× 113 (mm).Length (each tier) width=340× 250(mm). The quantity of single cells arranged in each row=340/32=10 cells; the quantity of rows= 250/113=2 rows; At most 20 cells can be arranged in each tier, so for 3-tiers, 60 cells of NF20-S can be arranged.

This calculation method is not only applicable for cabinet, but also for battery rack.

2.4.5 Connection

Connect single cells with proper



spare parts (inter cell connectors, flexible cables) according to the connection drawings and tighten each nut by spanner. Table 1 Comparison between Nuts and Torque Moment

Table 1 Comparison Between Nuts and Torque Moment

Nuts	Torque Moment (N.m)
M6	10±1
M8	13±1
M10×1	18±2
M16 and M16×1.5	30±3
M20	50±5

Chapter 3 Initial Charge and Storage

3.1 Preparation before initial charge

After installing and connecting, the battery should be fully charged as soon as possible. Before charging, please inspect AC power supply and the charger to ensure their normal operation. Next, measure the voltages of charger and single cells, electrolyte density and temperature to ensure all is no problem, then connect the positive and negative poles correspondingly of the battery and the charger.

3.2 Charging Process

Each cell should be charged with $0.2I_tA$ standard current. Cells of the same model can be charged together, while the different models cannot be charged together. When charging, the temperature of electrolyte is slowly rising. If it rises over 45℃, it will be harmful to the battery, please stop the charging immediately. When the temperature is down below 45℃, continue charging. Fill out the Table of Records indicated as Table 2, and record charging details.

Table 2 Table of Records (Sample)

Recorder:																		
Battery Model:								Test Date:										
Time			Hour in Total	Charging Current A	Discharging Current A	Ambient Temperature	Electrolyte Temperature	Cell series No.										
Day	Hour	Min.						1	2	3	4	5	6	7	8	9	10

3.3 Treatment after Initial Charge

After initial charge, since the battery needs to do all kinds of performance tests, it will be discharged more or less. Before operation, it should be charged by the current of $0.2I_tA$ for 8h.

Notes: check whether the electrolyte level is normal or not after charging, if it is much lower than the max. line, please fill distilled water or deionized water to the proper level.

3.4 Storage After Initial Charge

If the battery is not used at once after initial charged, the following methods should be done for electrolyte storage.

If the fully charged battery cannot be put into use for more than 1 year, please store it according to Article 4.7.1 in the manual.

If it is less than 1 year, please store it according to Article 4.7.2, and fully charge the battery when you reuse it.

Chapter 4 Maintenance

4.1 charge

In general, the battery is generally charged by DC power. Connect the positive poles and the negative poles of the battery and the charger correspondingly. When the voltage rises to 1.70V/cell～1.80V/ cell constantly for 2.5h～ 3h in charging, it is fully charged. The standard charge, floating charge or equalization charge can be chosen in practical operation. The settings of the 3 charging methods are as follows.

4.1.1 Standard Charging

Under normal situation, we suggest standard charge in battery maintenance that is being charged by the current of 0.2I A for 8h.

4.1.2 Floating charge

When the battery is in parallel connection with charger and load, it keeps a small charging current as an auxiliary power supply, so as to automatically recover the capacity loss owing the self-discharging or other operations in discharging, which called floating charge.

When floating charge, the battery keeps in sufficient charge state, so it can be a standby power supply which supply power to the load, when there is power failure or the voltage is not enough. The floating charge of single cells is always be 1.40V/cell ～ 1.45V/cell, and the current of floating charge is about 1/40 of $0.2I_tA$ ($0.005I_t$ A).

Please note that the charging voltage of nickel iron battery is higher than nickel cadmium battery, so we do not suggest charging the nickel iron battery only by floating charge. The setting of charging voltage should be properly adjusted according to battery types and operation conditions. If the water consumption is excessive, which means the charging voltage is too high. If the battery capacity is not enough, that is the setting of charging voltage is low.

When the battery is in series connection with load as auxiliary standby power supply,

Voltage of floating charge = floating charge voltage of single cell × the quantity of cells connected in series.

4.1.3 Equalizing charge

If the battery is in floating charge state for a long period, or there is an obvious voltage difference, it is suggested to carry out the equalizing charge for 12 hours.

The equalizing charge voltage is related to the battery types, so the settings of charging voltage should be properly adjusted according to the battery types and the operation conditions. For details, please refers to Table 3. After equalizing charge for 12 hours, the voltage of charging devices should be adjusted to the floating charge voltage.

Table 3 CHANGHONG NF-S SOLAR PV NI-IRON STORAGE CELL

Cell Type	Voltage of Equalizing Charge (V/cell)
NF-S	1.70～1.75

Equalizing charge voltage of the battery pack=equalizing charge voltage of single cell× the quantity of single cells in series.

In equalizing charging, the battery voltage should reach the values specified in Table 3 within a short time. If it cannot reach the values after the equalizing charge, please adjust its charging voltage.

4.2 Temperature Influences

Temperature is an important factor to affect the performance of the battery. In charging, the most proper temperature is 20℃ ± 5℃ . Generally, the electrolyte temperature in the battery increases gradually along with charging, when it rises to 45℃ , the service life will be affected, thus it is necessary to avoid the electrolyte temperature over 45℃ . However, if the electrolyte temperature could keep over 45℃ for a short time, and would not destroy the battery, and not cause a fast capacity drop like lead-acid cells.

4.3 Electrolyte refilling

The water electrolysis and evaporation occurred inside the battery lead the reduction of electrolyte level, that is why the electrolyte needs refilling frequently. It is advisable to keep the level between the Min. and the Max.line, or between the top of plates and the Max. line. Being observed by naked eyes from the outside, the electrolyte level must be kept between the max. and the min. Line. Fill distilled water or deionized water, if necessary.

4.4 Preparation of electrolyte and notices for using

For electrolyte preparation, glass, figuline, alkali-resistant plastic, nickel, stainless steel vessels are required; copper, aluminium, colophony or wooden ones are not permitted, or it would be corrupted by lye. The detailed methods of preparation refer to chapter 5. It must be noticed in particular that the electrolyte must be accorded with the technical requirements of the company, or the battery would be destroyed permanently. When preparing electrolyte, the specific gravity should be adjusted according to the electrolyte temperature. When every 1℃ increase over the standard temperature of 20 ℃ , the specific gravity should be reduced by 0.0005, while the specific gravity should be increased by 0.0005 for every 1 ℃ decrease based on 20℃ . Electrolyte can absorb Co_2 in the air easily and generate K_2CO_3, which will lower the capacity of the battery. Therefore, the electrolyte must be stored in airproof pot, avoid absorbing CO_2 in the air and be polluted

The electrolyte is harmful to skin and eyes. When preparing electrolyte, please wear goggles, rubber gloves, rubber overshoes and work clothes to prevent from the heat generated during electrolyte preparation. If one' s skin is touched by alkali, he must at once wash it off with weak acid, such as vinegar or 3% boric acid solution, and seek immediate medical assistance. This is also applicable to any eventual splashes affecting the eyes or mouth.

4.5 Electrolyte replacement

During operation, the electrolyte in the battery absorb CO_2 in the air easily, and generate carbonate, increasing internal resistance of the battery, when the content of carbonate is over 60g/L or the capacity is lower

caused by pollution for other reasons, the electrolyte should be replaced in time; in floating charge, check the content of carbonate every 3 years, when it is over the stipulated value, replace the electrolyte in time. The method is: discharge the battery to 1.0V/cell, open the vent plug, upside down and shake the battery, let the dust deposition inside pour out with electrolyte. If the poured electrolyte is too dirty, wash the inside of the battery for 2 ～3 times with the water for electrolyte preparation, then pour it out completely, fill new prepared electrolyte. When the following situations appear, please replace the electrolyte:

1) the electrolyte specific gravity falls below 1.16;

2) the battery cannot be normally operated, when it is discharged according to the standards;

3) the content of impurities in electrolyte (especially heavy metals) is over the max. permitted limit. After replacement, please clean the battery first, then arrange and connect it according to the previous order. Treat it with the following methods, the capacity can be recovered.

a) being charged by 5 hours (0.2I_tA) for 12h, or charged t by 10 hours rate (0.1I_tA) for 24h (charged by 240% of the rated capacity).

b) being discharged by 5 hours rate (0.2I_tA) to 1.0V (the voltage of single cell).

c) being charged according to step 1once again, then it can be operated.

Notes: after all the cells being charged, check whether the electrolyte specific gravity and the levels are proper or not.

4.6 Clean

Keeping the battery clean will make longer service life and better performance. Electrolyte volatilization and gas emission will make the battery moist, and heat-moisture will lead to creepage, so the battery should keep clean and dry. Sand paper or gauze cannot be used to clean nickel plating accessories; it would destroy nickel substrate, leading to rust and resistance increase. Daily maintenance will save much expense in the future.

a) Clean the exterior of the battery every month at least, especially its top and terminal poles smear an adequate amount of rust preventive oil or Vaseline oil on the nickel plated accessories.

b) Screw down terminal poles and other interconnecting parts periodically.

c) Avoid destroying the battery.

4.7 Storage of the Battery

4.7.1 Long-Time Storage For the battery in long-time storage, after normal discharge, spill out the electrolyte and install the vent plug at once, clean its surface, if there is vent hole on the vent plug, seal it with medical plaster, terminal poles and all the metal accessories should be equably spread with a coat of Vaseline oil, stored in the ventilated and dry room without acid, its ambient temperature should not be over 35℃ . And relative humidity should be not more than 75%, when it is reused, fill the electrolyte according to the previous methods, and operate according to the methods of initial charge in Chapter 3.

4.7.2 Short-time Storage

If the storage period of the

battery is not more than 1year, it can be stored with electrolyte in charged or discharged state. However, before storage, adjust the electrolyte level in strict accordance with manufacturer' s instructions, screw down the vent plug, seal it with medical plaster (and plunge a vent hole on it), clean the surface, lay it in the ventilated and dry room without acid mist. The ambient temperature should not be over 35℃.

4.8 Routine Maintenance and Inspection

In proper maintenance, the battery would have better performance and longer service life. Therefore, regular inspection and records for each time are very important. In this way, the problems would be found out in advance, and the reasons would also be found.

4.8.1 Routine Maintenance

In maintenance, standard charge and discharge principles are recommended to do charge and discharge.

The battery in floating charge for a long time should do equalizing charge every 6 months. When the voltage of single cells in the battery pack appears obvious imbalance, equalizing charge should also be done. Operate it according to clause 4.1.3

4.8.2 Regular Inspection

Do inspection in accordance

Table4 Cycle Inspection

Item	Frequency	Inspection methods
Floating charge voltage	Each month	In accordance with clause 4.1.2
End voltage of the battery	Each three months	Measure by voltmeter
Electrolyte level	Each two months	In accordance with clause 4.3
Degree of Tightness for Connecting Parts	Each three months	If bolts and nuts becomes loose, tighten then with spanner
Appearance of Container and Lid for the battery	Each three months	Check whether the container and the lid of the battery are damaged or not, and replace the damage or extremely deformed container or lid at once.
Equalizing Charge	Each six months	In accordance with clause 4.1.3

Chapter 5 Selection,Preparation and Storage of Electrolyte

5.1 Selection,Preparation and Storage of Elctrolyte

For electrolyte selection, density, composition or additives are determined by operating temperature of the battery, detailed requirements refer to Table 5.

Electrolyte Preparation at Different temperature

Serial No.	Ambient Temperature	Density (g/cm^3)	Composition of Electrolyte	Weight Ratio (Alkaline: water)
1	−5～60	1.20±0.01	KOH+20g/LiOH	1:3
2	−20～−5	1.25±0.01	KOH	1:2

Remarks: electrolyte density of the battery is 1.19 g/cm^3～1.21g/cm^3, correspondingly the content of each substance in 1L electrolyte is: KOH 242g～271g、 water 947g～ 939g、 $LiOH \cdot H_2O$ 20g, which can be prepared to get 1 L electrolyte of 1.19 g/cm^3～1.21g/cm^3

5.2 The Technical Requirements of Electrolyte Refer to Table 6

Take the density of 1.20g/cm^3±0.01g/cm^3 as an example:

Table 6 The Technical Requirements of Electrolyte

Item	Technical Requirements	
	New Electrolyte	Limit Value in Operation
Appearance	Colorless, transparent, no suspended substances	
Density (15℃)	1.20±0.01	1.20±0.01
Content (g/L)	KOH: 240～270	KOH: 240～270
Cl^-(g/L)	<0.1	0.2
K_2CO_3(g/L)	<20	60
$Ca^{2+} \cdot Mg^{2+}$(g/L)	<0.19	0.3
Fe/KOH (%)	<0.05	0.05

5.3 Technical requirements of raw materials for preparing electrolyte

KOH: GB2306 chemical pure

LiOH • H_2O: LiOH-1 GB8766 LiOH connot be less than 55%

Water: distilled water, softened water, ion-exchange water, electro osmosis water etc.(its technical requirements refer to Table 7)

Warning: tap water, mineral exchange water and sea water are forbidden from preparing the electrolyte.

Table 7 Technical Requirements of Water

No.	Item	Requirements
1	Physical property	Colorless, tasteless, transparent, and no mechanical substances
2	Resistance (ohm)	⩾20
3	Content (g/L) of Fe	⩽0.00005
4	Content (g/L) of SO_4^{2-}	⩽0.0005
5	Content (g/L) of Cl^-	⩽0.001
6	Content (g/L) of heavy metal (count with Pb)	⩽0.00005
7	Content (g/L) of Ca and Mg (count with Mg)	⩽0.0006
8	Content (g/L) of SiO_3^{2-}	⩽0.0001

5.4 Vessels and tools for preparation

5.4.1 Vessels

The vessels should be plastic, stainless steel, porcelain enamel and alkali-resistant materials, which cannot be used with the ones for preparing electrolyte of acid battery together.

5.4.2 Tools

Dens meter (measuring span is 1.10 ～ 1.30), thermometer, graduated flask, funnel, plastic spoon and platform balance; Stirrer would be used for preparing plentiful electrolyte, while plastic stick is for a few.

5.5 Preparation of electrolyte

5.5.1 Calculate the required gross of electrolyte according to its quantity for each single cell, calculate the required gross of KOH, LiOH and water according to Table 5.

5.5.2 Measure the required KOH and LiOH by platform balance.

5.5.3 Fill appropriate amount of pure water in the vessel first, then put KOH in it, and put LiOH in it at once, stir it continuously till it is completely dissolved, and then refill the required water, stir it evenly, and stand for cooling down.

5.5.4 Measure whether the density of the electrolyte when the electrolyte temperature falls to the room temperature to see if it meets the requirements. If it is lower, refill the KOH in the electrolyte, and measure it again

after dissolving till it is qualified; if it is higher, refill water, and continuously measure it till it is qualified.

5.5.5 Let the prepared electrolyte stand for clarifying, take the supernatant liquor for reservation.

5.6 Storage of electrolyte

The prepared electrolyte should be stored in the alkali-resistant vessels hermetically, preventing impurities entering into, if it is unused temporarily.

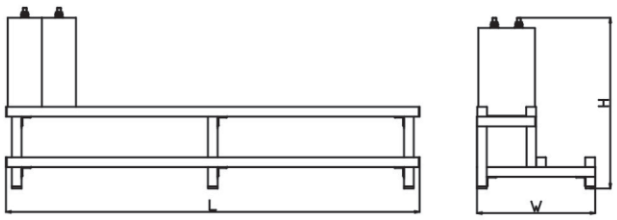
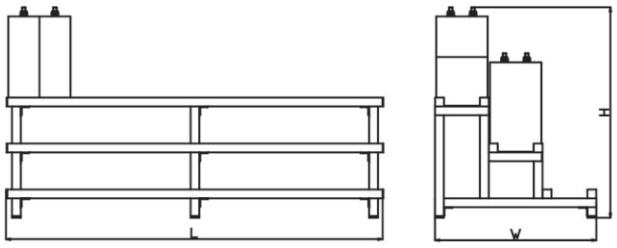
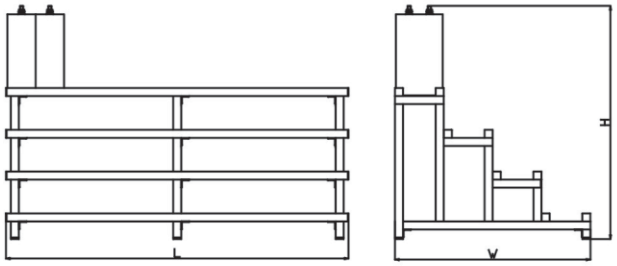
5.7 Notice

5.7.1 For protection, wear working clothes, glasses, rubber apron, rubber gloves and rubber overshoes during electrolyte filling.

5.7.2 There should be boric acid of 3% for reservation. When the electrolyte spills on the skin, clean it with boric acid at once; if the electrolyte spatters into eyes, clean it with plentiful clear water, and obtain immediate medical attention, if necessary.

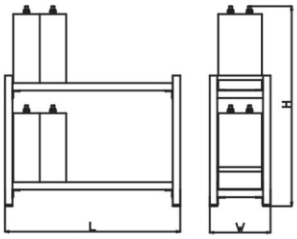
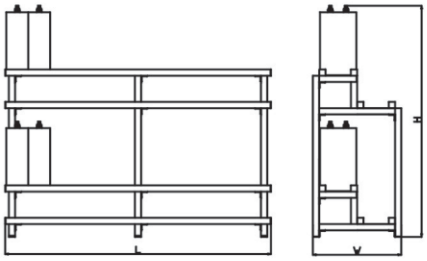
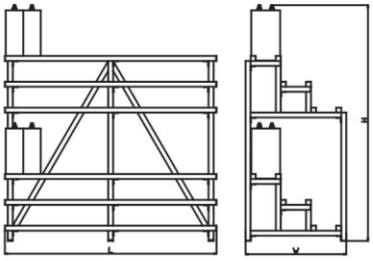
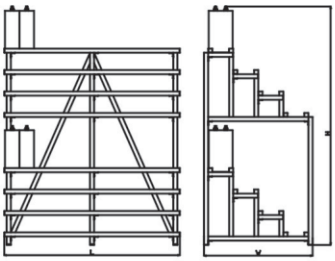
Chapter 6 Battery Rack Dimension

Changhong battery racks are made of alkali-resistant and powder coated steel, which are easily assembled at site.

Dimensions of Battery Rack(Unit:mm)	Standard Floor Mounted Battery Rack Drawing
L (mm) =cell numbers per step× the cell length+20 W (mm)= [the cell width+15] ×2 H(mm)=the distance from the Min. electrolyte line to the top of cell terminal pillar +150+ the cell height	 1 tier -2 step
L(mm)= cell numbers per step × the cell length+20 W(mm)=[the cell width+15] ×3 H(mm)= the distance from the Min. electrolyte line to the top of cell terminal pillar×2+150+ the cell height	 1 tier -3 step
L(mm)= cell numbers per step ×the cell length+20 W(mm)=[the cell width+15] ×4 H(mm)= the distance from Min. electrolyte line to the top of the cell terminal pillar× 3+150+ the cell height	 1 tier -4 step

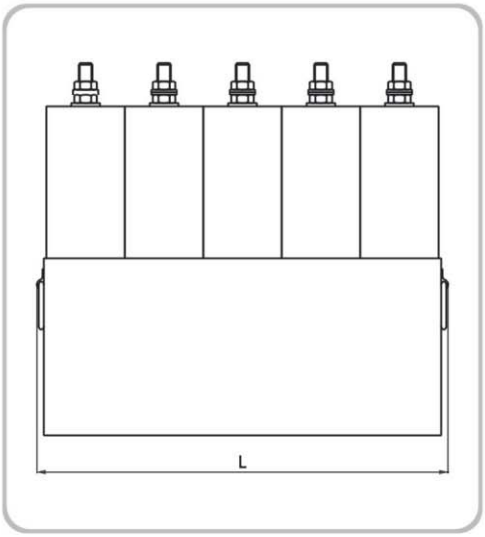
※ **Mark:**

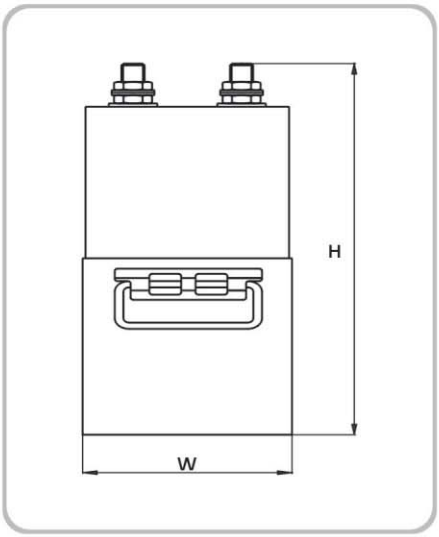
The above battery rack drawings are only a part of Changhong standard models, we could design and develop the steel battery rack according to end-users' special requirements.

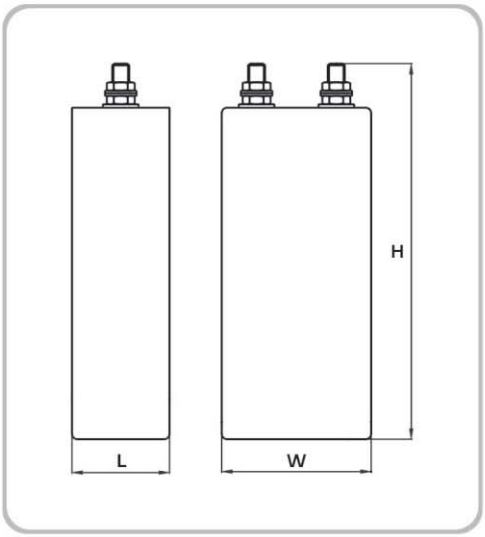
Dimensions of Battery Rack(Unit: mm)	Standard Floor Mounted Battery Rack Drawing
L(mm)= cell numbers per step× the cell length+100 W(mm)=the cell width+150 H(mm)= 500+the cell height	 2 tier -1 step
L(mm)= the cell numbers per step× cell length+20 W(mm)=[the cell width+15] ×2+100 H(mm)=[the distance from Min. electrolyte line to the top of cell terminal pillar + the cell height]×2+400	 2 tier -2 step
L(mm)= the cell numbers per step× cell length+20 W(mm)=[the cell width+15] ×3+100 H(mm)=[the distance from Min. electrolyte line to the top of cell terminal pillar×2+the cell height]×2+400	 2 tier -3 step
L(mm)= the cell numbers per step× cell length+20 W(mm)=[the cell width+15] ×4+100 H(mm)=[t the distance from Min. electrolyte line to the top of cell terminal pillar ×3+the cell height]×2+400	 2 tier -4 step

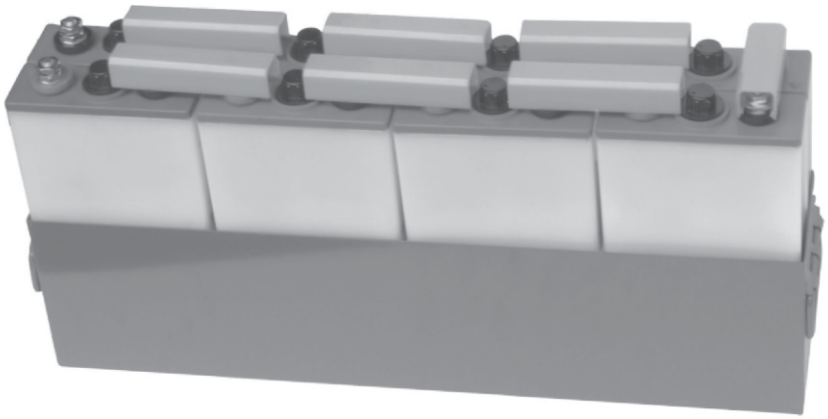
Chapter 7 Battery Crate

Changhong battery crates could hold 2 to 20 individual cells. All battery crates made by Changhong meet the requirements for shock and vibration as specified in international standards.









Unit: mm

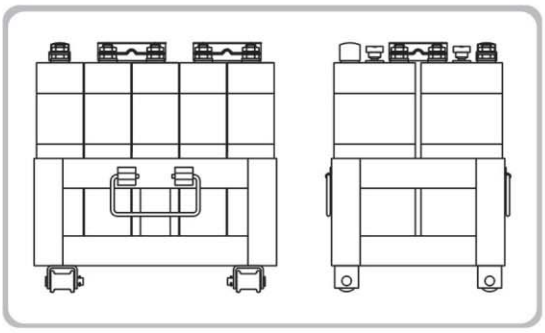
Numbers of cells = numbers of horizontal row × numbers of vertical row

Crate Length= numbers of Vertical row × cell length + thickness of metal plate × 2+ crate handle thickness(16～30)

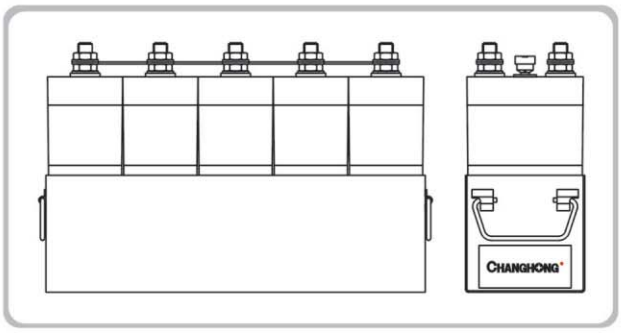
Crate width= numbers of horizontal row × cell width + thickness of metal plate × 2

Crate Height=cell height+ thickness of metal plate + thickness of crate cushion

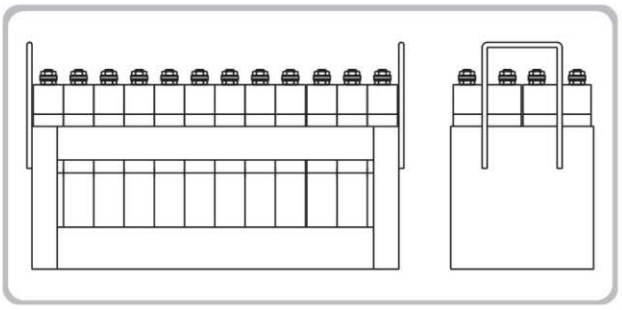
Remark: The above formula is just for crate sizing reference



No.1 Crate Drawing



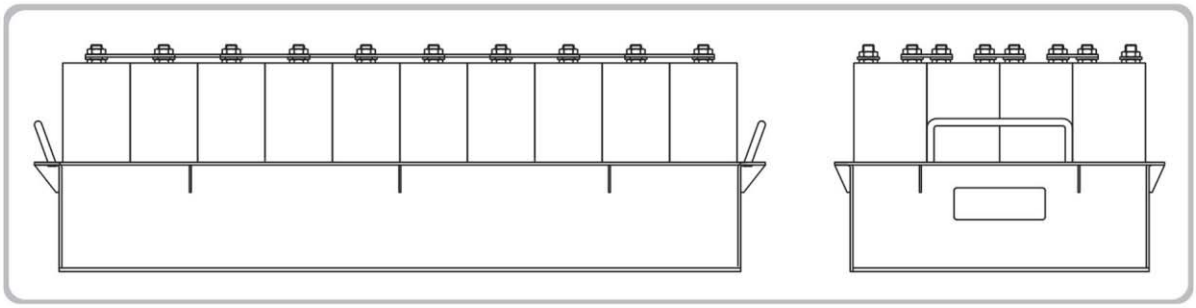
No.2 Crate Drawing



No.3 Crate Drawing

Remark:

The listed battery crate configurations are only a part of Changhong standard models, we could design and develop the battery crates according to end-user's special requirements.



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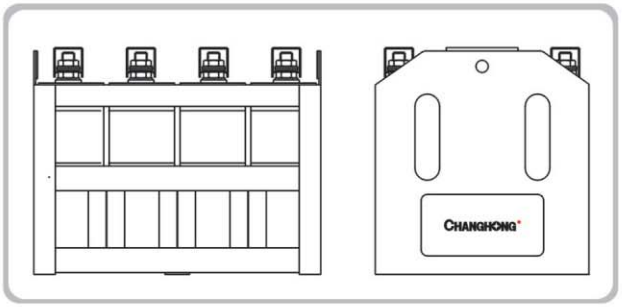

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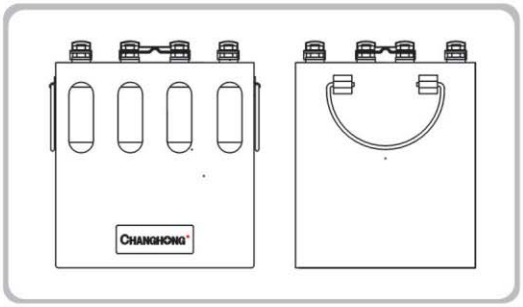

No.6 Crate Drawing

CHANGHONG®

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