Steam generator type

ZFQ

恒信锅炉

HENGXIN

Instruction manual for

installation

Henan Hengxin Boiler Manufacturing Co., Ltd

Contents

Dear users:

The equipment shall be operated by the furnace certificate.

Chapter 1 Introduction of equipment specification and structure

1、System overview and scope

This specification is applicable to the ZFQ series fuel-gas steam generator produced by our company.

In order to ensure the safety of the equipment operation and the safety of working people's lives and property, the design, manufacturing, installation, transformation, maintenance, use, inspection and testing of the equipment are carried out in accordance with the corresponding requirements of the state.

The unit installing the equipment shall have the corresponding level of installation license before the installation and construction, and the corresponding inspection record of the unit recording the installation equipment shall be put into use after confirmation, otherwise it shall not be put into use.

2、Structure introduction

ZFQ type fuel gas evaporator adopts the form of (vertical) horizontal internal combustion three-return structure, and the combustion mode adopts micro-positive pressure chamber combustion.The equipment body is composed of pot barrel, recombustion chamber and smoke pipe.The fuel is mixed with the air in the burner and is ignited by the electronic ignition rod, sprayed into the furnace tank and burned. The high temperature flue gas enters the convection pipe from the recombustion chamber, and enters the energy collector through the smoke outlet to meet the exhaust temperature requirements, and finally is discharged into the atmosphere by the chimney.

Structural features:

(1)Rated steam pressure＜0.1Mpa。

(2)The burner adopts the three-return structure located in the front, the flame is burned in micro positive pressure in the furnace, strengthening the heat transfer, thus reducing the convection heating area, small flue gas flow resistance, low operating power consumption, can save the operating cost.

(3)The equipment uses aluminum silicate fiber blanket as the insulation material, its good insulation performance, light weight, less heat dissipation loss.

(4)The whole equipment system is safe and reliable, the feed water directly into the evaporator inlet pipe, equipped with a safety valve and pressure controller, so that the equipment is always in a safe and efficient operation state.

(5)The environmental protection effect is remarkable: the concentration of soot emissions ≤ 120mg/Nm3. Greenman blackness is class I, and the noise ≤ 60 decibels.

(6) Flue gas energy saving device adopts circular regular pressure energy saving condenser, regular pressure use is safe and reliable, the energy saving device is connected with the soft water tank, the middle of the hot water circulation pump uninterrupted circulation, which can reduce the smoke exhaust temperature, increase the water supply temperature to improve the thermal efficiency of the equipment.

3、Performance characteristics

The equipment leaves the factory, equipped with combustion equipment using imported or domestic famous brand burner, can achieve full automatic combustion control.The equipment is equipped with computer control cabinet with thermal parameter display and control button; the equipment has high and low water level alarm and low water level chain protection function.The equipment shall be equipped with a burner to meet the corresponding national technical requirements.

If the user does not choose the burner manufacturer and model recommended by our company, we should confirm whether the selected burner meets the configuration technical requirements of our evaporator.Our company is not responsible for the problems caused by the improper selection of the burner.

Chapter II Installation instructions

1、Preparation before installation

The user should reasonably select the furnace type, quantity and capacity according to the heat load demand and its changing characteristics, so that the equipment can operate under the best energy efficiency conditions. The equipment is completely installed out of the factory, the user unit should entrust a qualified architectural design unit for evaporator room design, the design should be in accordance with GB50041-2020 "Evaporator Room Design Standards" for design.

(1) Determine the installation unit.The installation unit must have the corresponding installation qualification!!

(2) Installation quality section acceptance and hydraulic test, by the equipment installation unit and the user unit together, the overall acceptance should also be the evaporator manufacturer representative to participate in!!

(3) This equipment must have the market supervision and administration department examination of the furnace personnel operation!!

(4) Organize staff to learn installation technical measures, safety technical measures, and be familiar with equipment drawings and related technical documents.

(5) Before equipment installation, the equipment body, combustion equipment, components, auxiliary machines and accessories shall be checked, accepted and counted according to the technical documents, and recorded. If found not to meet the relevant standards, it shall be submitted to the factory in time.

According to the relevant regulations of the state, the evaporator room system is designed, on the premise of ensuring safety performance, fully improve energy utilization efficiency, reduce water, electricity, self-use heat and other consumption, and promote heat energy recovery and cascade utilization.Reduce the length of the pipe, the flue and the number of elbows to reduce the flow resistance.Foundation preparation

(1)Determine the installation location of equipment auxiliaries (including pumps, water treatment equipment, etc.).

(2)Redesign from the local soil, refer to the foundation drawing provided.

(3)The surface of the foundation should be smooth and flat, and the left and right unevenness should not be greater than 3mm/m. The surface unevenness should not be greater than 5mm/m, and the full-length unevenness should not be greater than 10mm/m.

(4)All reserved holes shall be poured with concrete after the auxiliary machine is installed and in place.

(5)After the foundation acceptance, the equipment installation reference line shall be drawn according to the foundation drawing. The base line shall be clearly marked, and the displacement deviation is not greater than 5 mm.

(6)Equipment acceptance: check the parts and parts one by one, and pay attention to whether the large parts are damaged and deformed during transportation, and can be installed only after passing the acceptance.

Precautions:

(1)The installation equipment must have 220/380/50 (V/HZ), sufficient power supply capacity, sufficient operating and maintenance space (the front end is not less than 2.5m, and the evaporator side and rear channels are not less than 1m).

(2)The installation site of equipment shall be ventilated and dry and meet fire fighting conditions; inflammable and explosive items shall not be near; it shall not be installed in wet, open and strong acid and alkali corrosion places.

(3)The equipment installation site shall not have a high pressure strong electric interference source, so as not to cause the wrong action of the control system.

(4)The power inlet line of the equipment shall have sufficient section.

(5)Equipment shall be reliably grounded.

2、Overall installation of equipment

Lift the equipment on the pot tube hanging ear, so that the base of the equipment and the pre-drawn baseline on the foundation overlap.The deviation between the longitudinal center line of the equipment and the foundation is not more than 3 mm, and the inclination of the center of the pan is corrected with a wire hammer to allow the center of the pan to not more than 5 mm, otherwise the cushion iron should be leveled at the junction between the base and the foundation.

Before equipment installation, longitudinal and transverse installation center lines shall be arranged and the two center lines shall be perpendicular to each other.

3、Installation of the combustion system

The installation of the oil or gas circuit is carried out according to the design of the evaporator room.

After the installation of the fuel system, conduct a hydraulic test of 1.25 times the working pressure (the minimum test pressure shall not be less than 0.4MPa).

After the installation of fuel system pipeline, clean water or steam shall be washed, and approved technical measures shall be taken. The washing times shall not be less than twice until the clean medium is blown out. After the washing, dead corners and residue shall be removed.

Whole-system oil cycle test shall be conducted after the installation of the fuel system.

Gas should be sent to the burner in the shortest distance. The diameter of the gas supply pipe must be a certain value larger than the fitting pipe of the burner.

Air tightness test after installation of gas pipeline, with air or Sui gas above 1bar, total test including all pipeline equipment from the main cutting device to the truncation valve on the burner, with air or 1.1 times the working pressure with the electromagnetic valve closed, but at least 50mbar, coated with foam material or material that does not cause corrosion.

The light oil and natural gas burners of this type of equipment are consistent with the fire port flange of the interface of the equipment, so when replacing the burner, only the fuel transmission pipeline needs to be replaced.

4、Installation of the computer control cabinet

The computer control cabinet brings together a variety of control switch buttons of the burner and the feed pump, and the user can first pull the wire to each motor, and then connect the external total power supply. Note: The case should be protectively grounded.

The computer control cabinet should be installed in front of the equipment, and should be close to the wall to facilitate the monitoring of various instruments on the equipment and ensure easy operation.

Warning: Failure of water level, pressure alarm and interlocking protection device may cause the evaporator to explode and must not be withdrawn. Failure to install pipes, valves, and instruments according to regulations will cause the evaporator to explode!!!

5、Installation and commissioning of pipes, valves, instruments and accessories

Before installation, the instrument should be calibrated and the valve should be tested.

When installing pipelines, valves, instruments, in accordance with the requirements of automatic control (or electronic control wiring diagram) and related drawings for installation, the electric pump is fixed in the appropriate position, connected to the power supply and commissioned.

If the alarm, safety valve, and chain protection device are damaged, they should be repaired in time, and the equipment can be operated after repair.

1）.Relief valve

The equipment configured safety valve according to the valve instrument diagram,

Safety valve installation:

⑴The safety valve should be installed after the water pressure test, and should be installed in the highest position of the pot barrel (pot shell), the container, between the safety valve and the pot barrel (pot shell) or between the safety valve and the container, and should not be equipped with pipes and valves for taking steam or hot water;

⑵Several safety valves are jointly installed on a short pipe directly connected to the pot barrel (pot shell), and the flow cross-sectional area of the short tube should not be less than the sum of the flow cross-sectional area of all safety valves.

The spring-loaded safety valve should have a lift handlebar and a device to prevent the adjustment screw from being twisted casually.

Safety valve exhaust pipe:

⑴The safety valve shall be connected with the exhaust pipe, which shall go directly to the safety place and have sufficient sectional area to ensure the smooth

flow. The exhaust pipe shall be fixed and no external force from the exhaust pipe shall be applied to the safety valve.

⑵ (2) The bottom of the safety valve exhaust pipe should be equipped with a trap pipe that receives a safety location, and a valve should not be installed on the trap pipe.

⑶ The exhaust pipes of two separate safety valves shall not be connected.

⑷ If the safety valve exhaust pipe is equipped with the muffler, its structure shall have sufficient circulation cross-sectional area and reliable drainage device.

⑸ If the exhaust pipe arranged in the open air is equipped with a protective cover, the installation of the protective cover shall not hinder the normal operation and maintenance of the safety valve。

Validation of safety valve:

⑴The safety valve of the equipment should be checked at least once a year, which is generally carried out in the running state of the evaporator. If the check is difficult or after the safety valve is repaired, it can be carried out on the safety valve check table;

⑵ After maintenance and replacement of newly installed equipment or safety valves, the setting pressure and sealing shall be verified;

⑶ After the safety valve is verified, it shall be locked or sealed. The verified safety valve shall be locked or sealed. The verified safety valve shall not fall, smash or collide during the process of handling or installation;

⑷ The inspection results of the setting pressure and sealing of the safety valve shall be recorded in the safety technical files of the equipment。

Use of the safety valve in operation:

⑴ The safety valve in operation of the evaporator shall be subjected to discharge tests on a regular basis;

⑵ The safety valve of the evaporator does not allow to disassemble or raise the setting pressure of the safety valve。

2）. Pressure gauges

Pressure gauge shall be installed at the parts below the evaporator:

⑴ Steam space for the equipment pan (pan shell)。

⑵ Front of water supply control valve。

⑶ Exports of energy-saving devices。

⑷ Between the superheater outlet and the main steam valve。

(5) Inlet (return oil) and outlet of the oil pump for the ignition system of the fuel equipment;

After the gas source inlet (oil return) of the gas equipment ignition system and the gas valve set stabilizing valve (pressure regulating valve);

The selection of pressure gauge shall meet the following provisions:

(1) The pressure gauge shall meet the requirements of the corresponding technical standards

(2) The accuracy level of the pressure gauge shall be of 2.5 level。

(3) The range of the pressure gauge should be selected according to the work pressure, generally 1.5 ~3.0 times of the working pressure, preferably 2 times

(4) The pressure gauge dial size shall ensure that the evaporator operator can clearly see the pressure indication value, and the dial diameter shall not be less than 100mm。

Pressure gauge verification:

The pressure gauge shall be verified before the installation. The red line indicating the working pressure shall be marked on the dial, indicating the date of the next calibration.Lead seal shall be added after the pressure gauge verification。

Pressure gauge installation shall meet the following requirements:

(1) It shall be installed in places convenient for observation and blowing, and shall prevent the effects of high temperature, freezing and vibration。

(2) The pressure gauge set in the steam space shall have water bends or other measures to cool steam, the pressure gauge for hot water evaporator shall also have buffer bends, and the inner diameter of the bend shall not be less than 10mm。

Three-way valves shall be provided between the pressure gauge and the bend to wash the line, discharge and inspect the pressure gauge.

If the pressure gauge, the pressure gauge shall be stopped under any of the following conditions:

(1) When the pressure gauge with the limit gauge is without pressure, the pointer cannot return to the limit gauge; when the pressure gauge without the limit gauge, the zero value of the pointer exceeds the allowable deviation specified by the pressure gauge。

(2) The surface glass is broken or the dial scale is blurred。

(3) The seal is damaged or exceeds the verification period。

(4) In-table leak or pointer call to 0 MPa。

(5) Other defects that affect the accurate indication of the pressure gauge。

In order to ensure the correctness of the pressure gauge, the installation and maintenance of the pressure gauge shall comply with the provisions of the national measurement department.Before installing the pressure gauge, it shall be checked and indicate the next calibration date. Draw a red line on the dial to indicate the working pressure.When the device pressure gauge, the dial surface should be vertical, the red line should be drawn on the pressure gauge dial to show the maximum allowable working pressure of the evaporator, the pressure gauge Corker flexible rotation, no steam leakage, water leakage should be smooth, the pressure gauge pipe is not insulation.

3) .Water level measurement and control device (water level meter)

Each evaporator pan (pot shell) shall be equipped with at least two direct reading water level meters independent from each other, and only one direct reading water level meter may be installed for the equipment that meets one of the following conditions;

(1) Evaporator with rated evaporation amount less than or equal to 0.5t / h;

(2) Evaporator rated less than or equal to 2t / h with a reliable water level control device;

(3) Evaporators are equipped with two separate remote water level measuring devices;

(4) Electric heating evaporator。

The water level gauge shall have water discharge valve and water discharge pipe connected to a safe place.The valve shall be installed on the steam water connection pipe between the water level meter and the pan, and the valve must be in the full open position when the evaporator is running.For evaporators with rated evaporation capacity less than 0.5t / h, no valve may be installed on the steam water pipe between the water level table and the pan (shell).

Water level table shall have obvious signs indicating the highest and lowest safe water level and normal water level.And the highest and minimum safety water level is the distance from the visible edge of the water level table.

Water level meter installation:

(1) The water level meter shall be installed in a place convenient for observation. If the water level meter is higher than 6000mm from the operating ground, a remote water level measuring device or a water level video monitoring system shall be installed;

(2) When monitoring the evaporator water level with a single or multiple remote water level measuring devices, the signals shall be taken out independently; two reliable remote water level measuring devices shall be provided in the control room, and a direct read water level meter shall be guaranteed during operation。

4）. temperature measuring equipment

A temperature measuring point shall be installed in the corresponding part of the evaporator to measure the following temperature:

(1) Water supply temperature of the evaporator (except water supply at room temperature);

(2) Water temperature of energy generator outlet;

(3) Oil burner fuel oil (except light oil) inlet oil temperature;

(4) Air preheater inlet and outlet air temperature;

(5) Air preheater inlet smoke temperature;

(6) Exhaust temperature。

Temperature measuring instrument measuring range:

The temperature measurement range of the dial temperature measuring instrument shall be selected according to the working temperature, which is generally 1.5 times ~2.0 times of the working temperature。

5）.Discharge discharge and water discharge units

(1)The nominal diameter of the discharge valve is 20mm~65mm, and the nominal diameter of horizontal evaporator discharge valve is not less than 40mm。

(2)For the evaporator with rated evaporation flow greater than 1t / h, two series valves are installed on the discharge pipe, at least one of which is installed near the outlet side of the discharge line。

(3)Water discharge valve shall be installed at the minimum container (or pipe) of the energy saving system。

(4)Each evaporator is equipped with an independent sewage pipe, the sewage pipe as far as possible to reduce the elbow, ensure smooth and connected to a safe place or the sewage expansion box (expansion container) if the pressure sewage expansion box is used, the safety valve should be installed on the sewage expansion box。

⑸When multiple evaporators use one discharge main pipe, more than two evaporators need to avoid sewage discharge at the same time。

⑹The discharge pipe of the evaporator should not be threaded and connected。

6）.Steam pipes outside the main steam valve are connected by the operating unit

At least one elbow on the main valve pipe, otherwise the expansion pipe shall be installed and the outer wall of the pipe shall be insulated.The manufacturer is only for some installed parts, the rest of the straight pipe and other users themselves, according to the drawing。

7）.Safety interlock protection device

The equipment has high and low water level alarm and low water level chain protection, overpressure alarm and chain protection functions。

Water level control alarm device

①Output the high water level alarm at + 35mm above the normal water level。

②Output the low water level alarm at a normal water level of-35mm。

① At the normal water level of -50mm, a protective shutdown begins。

⑷Ignition control：

The combustion program controller provides a set of independent start-stop control contacts. Can be formulated with a variety of burners, start-stop control relay circuit string has a 10A fuse, start-stop control relay can be connected to the start-stop control end of the burner, can also directly control the power supply of the burner。

⑸Alarm signal status：

①When the normal water level is + 35mm, a yellow indicator light is on, indicating the high water level state, and an electric bell sound indicating the high water level alarm。

②At the normal water level of-35mm, the red indicator light is on, and the electric bell sound indicates the low water level alarm, and the pump start procedure starts。

③Under-50mm red indicator light indicating very low water level, and electric bell sound indicating very low water level alarm, and start the protective furnace shutdown procedure。

④At normal pressure of 0.1MPa, a red indicator light is lit and an alarm bell is emitted。

①At normal pressure of 0.11MPa, a red indicator indicates over 0.11MPa pressure and level 1 (low fire) fire。

②When the normal pressure exceeds 0.12MPa, output electric bell sound alarm,

cut off the power supply of the burner, and implement emergency shutdown。

⑥When the burner cannot work properly due to various faults, the output failure alarm, red indicator light on, and electric bell sound。

⑹Indicates the state：

①When the pump is running, the "auto" signal light is on when it is in the automatic state, and the "manual" signal light is on when it is in the manual state, indicated by a green indicator light。

②High water level, high fire combustion, small fire combustion and other conditions are indicated by the yellow indicator light。

② Water level, very low water level, overpressure and burner failure shall be indicated by red indicator light。

⑺System control principle：

①After closing the power switch, click the pump control switch open position, after the equipment water supply rises to the normal position, click the burner power switch, click the start button, the control system power on, the burner into the working state, according to the program controller action program, small fire combustion and then enter the fire combustion state, to the evaporator into the normal operation stage。

②When the water level rises to the high water level, the high water level alarm signal indicator is on, accompanied by electric bell sound, and protect the shutdown and cut off the controller power supply。

The water pump stops running when the water level rises to + 35mm and starts again automatically when the water level drops to-35mmm,

When the water level drops to-50mm, the output low water level alarm signal indicator light is on, accompanied by electric bell sound, and it can protect the furnace and cut off the power supply of the controller.

③When the pressure rises to 0.11MPa, the first output over-voltage signal indicator light is on, and cut off the controller combustion condition circuit, the controller stops working and stop the furnace。

When the pressure rises above 0.12MPa, the second overvoltage signal is output, emit the electric bell sound, alarm and cut off the power of the control system to achieve emergency shutdown。

When the pressure exceeds the upper limit of the adjusted pressure, the controller output the low fire signal and open the small fire valve to burn the low fire。

When the pressure drops below the lower limit of the regulating pressure, the controller output fire signal opens the fire valve to fire。

After the burner fails, the combustion controller automatically closes the

air valve to stop the combustion.

⑻Alarm protection:

After the automatic controller is opened, the pressure sensor, water level power supply, fuel and gas pressure set value is constantly detected.Always test the pressure sensor, water level power supply, fuel, gas and its own circuit, immediately alarm and stop the furnace protection, the controller automatically displays the fault point, and issue an alarm sound in the machine.

8). Pressure controller

⑴This series of pressure controllers installed in two forms:

a) Transition installation with mounting plate: During this method, note that the length of the 4 M4 mounting screws used shall not exceed 6 mm (this screw works randomly as accessories)

b) Direct installation with the controller body: When installing this method, it should be noted that between the bottom of the controller housing and the mounting surface, two Φ6 flat washers must be placed on each mounting hole。

⑵In the installation of the connection pipe, the controller should pay attention to use one wrench to directly tighten the takeover nut plate, must use two wrench, respectively at the controller air pipe joint and the receiver nut at the same time, to ensure that the controller is not damage, in addition, the expansion of the copper pipe should be soft (annealing)。

⑶During electrical wiring, the wiring diagram of the controller must be shown clearly to avoid abnormal operation of the controller。

9). Water level control alarm device

Water level control alarm installation:

The sensor is installed between the furnace body and the water level meter, and the drain pipe shall be connected to the lower end.After installation, check whether the insulation resistance between each electrode and the shell is good.The method is: with shake the meter or multimeter measurement, when the electrode leaves the water, its resistance value should not be less than 1 MΩ.If less than this value, be sure to find out the reason, wiring to recognize the length and number of the electrodes on the sensor。

The control circuit is connected to the sensor electrode with the 8 pin plug. When the 8 pin plug is connected, 1,2,3 and 4 feet connect the corresponding electrode of the sensor and connect the 7 pin to the sensor housing.A section of wire leading out from the protection hole of the sensor electrode cover shell is preferably used with high temperature resistant PVC insulated nylon sheath wire.If

ordinary plastic copper core wire is used, a glass fiber casing shall be added. Import and export and places prone to trauma should be protected by a hose。

The wiring of the feed water pump motor open and stop control line shall be connected to realize the selection of "manual" and "automatic" control. When the switch is placed in the automatic position. When the switch is placed in the "manual" position, although the automatic control function of the water pump is lost, the water level display and high and low water level alarm functions are still retained。

10）. Installation of the monitoring instruments

The surface temperature of various thermal equipment, thermal pipes and valves shall not exceed 50℃;

The monitoring instrument installation according to the requirements of automatic control (or electric control cabinet circuit diagram) see the random factory technical documents "valve instrument diagram", such as inlet flow meter, measuring water flow, set thermometer, pressure gauge, measuring steam temperature and pressure, tail industrial double metal temperature, measuring smoke exhaust temperature, such as alarm, chain protection device is damaged, should be repaired in time and the evaporator can run after repair。

6、Installation of energy saving device

Energy saving is non-pressure equipment, pressure operation is strictly prohibited!!!

1、Before the installation of the energy saving device system components leave the factory, check whether the smoke outlet flange bolt hole of the energy saving device pipe matches the evaporator and the chimney receiver respectively;

2、 Energy collector inlet and evaporator outlet, energy collector outlet and chimney inlet pipe bolt connection, but the gasket must be added in the middle。

3、 The energy generator is connected to the soft water tank, and there is a hot water circulation pump in the middle to prevent the energy generator from producing gas with pressure。

7、Insulation and paint

After the installation of the pipeline, the insulation and paint should be carried out according to the corresponding standards and regulations after the pressure test。

8、Chimney installation

Chimney should be perpendicular to the ground, the chimney weight should not directly fall directly on the evaporator, the top of the chimney should be equipped with rain cap, must be equipped with wave rope, and there are lightning protection measures. Install industrial thermometers on beam joints at the root of the chimney to monitor the exhaust temperature。

9、Hydrostatic test

The soda, pressure system and auxiliary devices of the evaporator shall be hydraulic tested after assembly. The pressure for the water pressure test is the working pressure of + 0.4Mpa。

The following work shall be done before the hydrostatic test:

(1) Clean and surface inspection of the tested part。

(2) Check the tube without blockage。

(3) Install pressure gauge qualified by inspection (not less than 2 ones)。

(4) Install the drainage pipe and the vent valve。

(5) Hydrostatic test shall meet the following requirements:

During the hydraulic test, the evaporator shall rise and fall slowly. When the water pressure rises to the working pressure, stop the boost, check for water leakage or abnormal phenomenon, and then rise to the test pressure. The evaporator shall be kept at test pressure for 20 minutes and then lowered to working pressure for inspection. The pressure shall be constant during the inspection。

Hydrostatic test shall be carried out when the ambient temperature is higher than 5℃ and lower than 5℃. The water used for hydrostatic test should be kept higher than the surrounding dew point temperature, to prevent the evaporator surface dew, but also should not be too high to prevent the temperature to cause vaporization and excessive temperature difference stress, generally 20~70℃。

The evaporator conducts hydraulic test and meets the following conditions:

(1) There are no water droplets and water mist on the metal walls and welds of the compression element。

(2) No residual deformation was found after the hydrostatic test。

After the hydraulic test, all the water should be discharged, and the water should not be left in the evaporator body and other parts。

10、Commissioning of fuel oil and gas evaporator

The burner shall have the functions of gas high pressure and low pressure protection (to prevent deignition and tempering), air pressure protection, valve leakage detection, flame detection, flameout protection and so on. In the programming, the burner has the function of starting purge and stopping furnace purge, and must also chain control with the evaporator control system to control and protect the pressure and liquid level of the evaporator.

After installation, the system debugging shall be completed by the evaporator user and the evaporator installer or our company, which shall be guided by the company or its authorized technicians. During the evaporator system and burner debugging, the safety management organization of the equipment user shall ensure that irrelevant personnel shall not gather near the equipment。

Evaporator commissioning must be performed after the hydrostatic test. Before commissioning, comprehensively check whether the accessories of the furnace body, the original electronic control and leads are normal, and whether the water supply and oil road are opened。

（1）According to the oil consumption (gas) size, initially adjust the air valve, oil pressure.

（2）Turn on the power supply, switch on the power switch of the power cabinet, the pump starts to feed water into the furnace body, (if the pump turns, no water enters, open the pump vent valve, discharge the air in the pump)。

（3）Check for normal control of the water level electrodes。

（4）Check that the burner is working properly. When the burner starts to burn when the water level rises to the normal water level, observe whether the starting combustion is normal: no obvious vibration sound, stable combustion, no black smoke, the flame is orange, yellow, bright and clear. Otherwise, make appropriate adjustment (please refer to the burner operating manual). Note: the oil pressure is between 0.8~1.0MPa, after being adjusted, do not change easily, the oil pressure is too high or too low, the oil pressure affects the performance and life of the burner.

（5）Check whether the pressure gauge needle swings smoothly and whether there is a phenomenon of stuck looseness。

（6）Check whether the safety valve is discharged when setting the setting pressure: first adjust the highest working pressure of the pressure controller to 0.05MPa higher than the setting pressure of the safety valve, when the furnace pressure rises to the setting pressure whether the exhaust, if not exhaust, pull

the safety valve several times, try again, if not, the safety valve should be adjusted.The setting pressure of the safety valve is 1.04 times rated working pressure of evaporator and 1.06 times rated working pressure of evaporator。

Note: When adjusting the screw, should be slow, especially when the pointer is close to the end, otherwise, the screw will causes damage.

The transformation and replacement of the burner shall perform the relevant construction notification procedures in accordance with the relevant provisions of the equipment. The modification, replacement and commissioning of the evaporator burner shall be the responsibility of the burner manufacturer or its authorized unit, and the evaporator user unit shall do a good job. After the completion of the burner transformation and replacement, the user unit shall conduct a self-inspection of the safety accessories such as the evaporator safety valve and the safety chain protection device, and form a self-inspection record.

Chapter III Instructions for use

1、Evaporator use management

The user shall establish, improve and implement various systems for the safe operation and energy saving management of the evaporator and its systems。

（1）The evaporator user shall be responsible for the energy saving management and safe operation of the evaporator and its system.Technical personnel engaged in the management of energy conservation shall have relevant professional knowledge of evaporators and be familiar with relevant national laws, regulations, safety technical specifications and their corresponding standards。

（2）The applicable units of evaporator shall establish and improve and implement the relevant systems for the energy conservation management of evaporator and their systems.The relevant system of energy conservation management shall include at least the following contents：

1）Energy conservation target responsibility system and management post responsibility system;

2）The evaporator and its system, and make corresponding inspection records and archiving;

3）Evaporator fuel entry inspection, analysis and management system, and correctly select the fuel according to the design requirements;

4）Measurement instrument calibration and management system;

5）Evaporator and its system maintenance system;

6）Evaporator water (medium) quality treatment management system;

7）Energy-saving training and assessment system for evaporator operators and water treatment operators, education, training and assessment work plan of evaporator economic operation knowledge of evaporator operators, and have training and assessment records.

（3）The evaporator user shall establish a working mechanism for energy efficiency assessment and reward and punishment, actively implement the contract energy management in light of the actual situation of the unit, arrange regular energy efficiency tests, and make timely rectify those that do not meet the requirements for energy conservation.

（4）The evaporator user shall regularly maintain the equipment, instruments, devices, pipes and valves included in the evaporator and its system, and shall timely deal with and record the abnormal conditions when found.

（5）The evaporator user shall conduct daily inspection and monitoring of the energy

efficiency of the evaporator and its systems.Focus on the inspection and monitoring items, including the compliance of the evaporator using fuel and design fuel, fuel consumption, medium outlet temperature and pressure, evaporator supply water and supply water temperature, smoke exhaust temperature, furnace wall surface temperature, and whether the system is running, running, dripping, leakage and other conditions.

（6）Users of evaporators shall strengthen energy testing, measurement and statistics.Where conditions permit, the user shall regularly evaluate the operating energy efficiency of the evaporator and its systems。

（7）The evaporator user shall conduct a regular energy efficiency test on the evaporator in use every two years. The test work shall be carried out by the energy efficiency testing institution determined by the external inspection of the evaporator。

（8）The evaporator operator shall timely dispatch and adjust the operating quantity of the evaporator and the evaporator output of the evaporator according to the change of the steam volume and heat load of the end user. The load automatic modulator device can be installed in the evaporator room where conditions permit.

（9）The normal pollutant discharge rate of the evaporator shall meet the following requirements：

1）No more than 10% of softened water as supply water or simply using dosing treatment;

2)No more than 2% of the supply water。

（10）The water quality treatment of the evaporator shall meet the requirements of the national specifications and its phase response standards。

（11）The evaporator users shall, in accordance with the relevant regulations, establish energy efficiency technical files.Where conditions permit, the user shall manage the energy efficiency technical files of evaporator products, product quality files and equipment use files under centralized and unified management (the archives of the same part can be kept in one copy).The evaporator energy efficiency technical archive includes at least the following：

1)Random factory data of evaporator products (including product energy efficiency test report);

2）Evaporator auxiliary machine, auxiliary equipment and other quality supporting materials;

3）Evaporator installation and commissioning report, energy-saving transformation data;

4) Energy efficiency evaluation or energy efficiency test report of evaporator installation, transformation and maintenance;

5) Regular test report of the energy efficiency of the evaporator and annual operation energy efficiency evaluation report;

6) Daily energy-saving inspection record of the evaporator and its system ;

7) Verification certificate of measuring and testing instrument;

8) Inspection report of water quality treatment of evaporator;

9) Fuel analysis report。

Warning: not according to the prescribed method of oven, will make the furnace wall crack, deformation, collapse, affect the safe operation of the evaporator!

2、oven

(1) The purpose of the oven is to make the furnace wall to achieve a certain degree of drying, to prevent the evaporator operation because of the furnace wall moisture, sudden heat expansion after uneven furnace wall cracking; in addition, the oven of the furnace wall to achieve better strength, provide the furnace wall high temperature resistance.

(2) Preparation work before the oven:

a、The evaporator shall conduct a single trial before ignition the oven。

b、Clean up the furnace and the related parts。

C、Check the work of the water supply system and the water treatment system。

d、Prepare oven fuel。

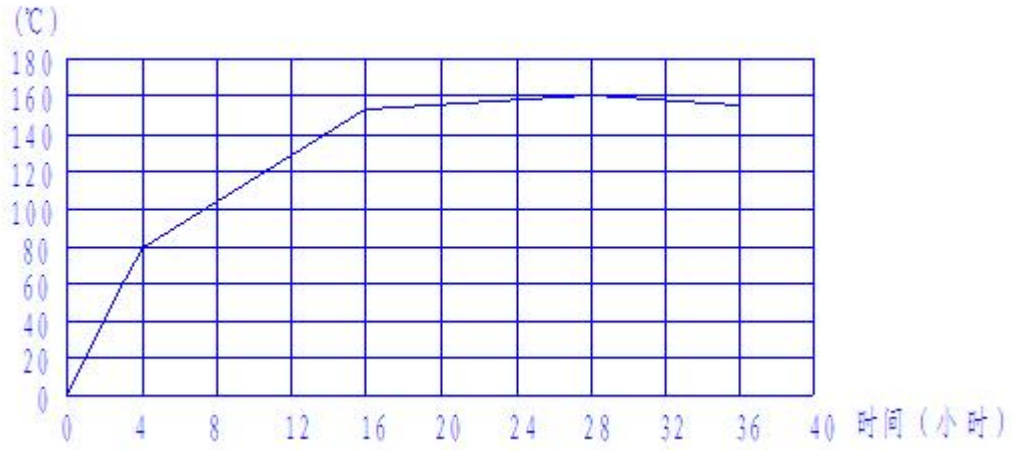
(3) Precautions:

The oven is, the temperature should not be more than 10℃ per hour, the later temperature is not more than 160℃, the maximum temperature range is not less than 24 hours。

(4)For drying the oven according to the determined heating scheme, pay attention to drawing the heating curve and put it in the evaporator technical file.

(5) The oven meets the requirements of the specification, the masonry shall not have deformation and crack, and the refractory concrete shall not collapse. The measured moisture content of the furnace wall shall not be less than 2.5% before the oven can be considered qualified.

Curve chart of oven



3、Cooking oven

Warning: the boiler does not meet the requirements, will deteriorate the steam quality, produce steam coteng, corrosion of pipe fittings and other parts, harm the safe and economic operation of the evaporator, affect the service life of the evaporator!

（1）The purpose of the boiler is to add NaOH and Ha3Po4 to the evaporator for chemical treatment. The alkaline boiler is used to remove the oil and rust in the pot to ensure that the evaporator warms up evenly and runs normally。

（2）The dosage in the boiler shall comply with the provisions of the technical documents of the equipment and, if not, shall comply with the provisions of the following table：

Drug name	Dosage（Kg/m³Water）	
	The rust is thin	The rust is thicker
sodium hydroxide（NaOH）	2～3	3～4
Trisodium phosphate（Ha3Po4）	2～3	2～3

Concentrate：①The drug was calculated at 100% purity。

②In the absence of trisodium phosphate, sodium bicarbonate can be substituted in 1.5 times the amount of trisodium phosphate。

③A separate sodium carbonate cooker can be used in a quantity of 6 kg/m3 water。

（3）When dosing, the furnace water should be at the low water level。

（4）At the end of the boiler, the evaporator pressure should be kept at about 75% of the working pressure, and the boiler time is generally 2-3 days。

（5）During the furnace, take furnace water regularly for testing and analysis.

The alkalinity of furnace water should not be less than 45mmoI / L, otherwise the medicine should be added。

（6）After the boiler is finished, the sediment in the pan and the collecting box should be cleaned, flush the inside of the evaporator and the valve in contact with the medicine liquid, and check that the discharge has no blockage.

（7）After cooking, the following requirements should be met:

①The inner wall of the pan should be free of oil pollution。

②The metal surface shall be free of rust after wiping off the attachments。

（8）The oven work can be carried out simultaneously in the later stage of the oven 。

4、Safety valve adjustment

Warning: Failure to adjust the safety valve according to the regulations will cause the evaporator to explode!!!

（1）After the oven and boiler are qualified, the sealing test shall be carried out.

①When the pressure is raised to the working pressure, the flange, manhole, hand holes and other connecting bolts within the evaporator range are tightened in a single hot state。

②Continue to the boost to the working pressure state for the following checks:

a、Tightness of each person's hole, hand hole, valve, flange and gasket。

b、Expansion of pan, piping and supports 。

（2）The relief valve adjustment pressure should be adjusted at the time of the initial boost。

Concentrate:（1）The set pressure value of the safety valve is shown in the pipe and instrument valve diagram。

（2）A safety valve must be adjusted on the evaporator according to the lower set pressure in the meter。

（3）The working pressure in the table refers to the working pressure of the safety valve installation site。

（4）Safety valve shall be free of air leakage and impact phenomenon。

（5）After the above work is qualified, the evaporator shall run at full load for 4~24 hours. Attention should be paid during the trial operation, and all parts and auxiliary equipment shall be qualified。

5、 steam supply

When the steam pressure in the evaporator is close to the working pressure, the fire should slow when preparing external steam supply, and the water line in the pre-steam supply furnace should not exceed the normal level.

The main steam valve shall be slightly opened when feeding the steam, Let the trace steam to warm the tube, At the same time, open the drain valve on the pipeline, Discharge the condensate water, The warm pipe time is determined according to the length, diameter and steam temperature of the pipe, Generally not less than half an hour, Pay attention to the situation of the pipe support when heating the pipe, Stop the heating pipe if found abnormal, And to eliminate faults and defects, The pipe is hot, After the gradual reduction of the condensate water on the pipeline, The main steam valve can be fully opened, It should be carried out slowly when opening, At the same time, pay attention to whether there is a special noise in all parts of the evaporator, Check immediately if any, After the main steam valve is fully opened, The main valve wheel shall be returned half-round, To prevent thermal expansion can not rotating.After the evaporator should check the auxiliary parts again, the valve and instrument have air leakage, and whether the work is normal。

6、Warm pipe and steam

（1）Warm pipes

The so-called warm pipe, is to use steam to steam under the room temperature steam pipeline, valve, flange and other slow heating, so that its temperature evenly increased, at the same time the condensate water in the pipeline, to prevent steam hit and damage the pipeline, valve and flange.Warm pipe is generally carried out when the steam pressure of the evaporator rises to two-thirds of the rated working pressure, the length of which should be determined according to the pipe length and diameter, steam temperature, seasonal temperature, etc.For the evaporator with a general working pressure below 0.1MPa, the warm pipe time shall not be less than 30min。

①Operation procedure of the heating pipe

For a single-unit evaporator, the range of the heating pipe is the steam pipe before the main steam valve outlet to the steam equipment. Before warming the pipes, open all the traps on the main steam pipes to discharge the condensate accumulated in the steam pipes until the steam supply is officially supplied. Then slowly open the bypass valve on the main steam valve about half a turn, let a small amount

of steam into the pipeline, and after the pipeline is fully preheated, the main steam valve is fully opened。

When several evaporators share one steam bus pipe at the same time, the range of the heating pipe is the pipe and pipe accessories from the main steam valve of the evaporator to the steam bus.For a new evaporator in operation, if there is an isolation valve connecting the main steam valve and the steam bus pipe, the pipe between the isolation valve and the evaporator is also required to warm the pipe.Before the warm pipe, first open the main steam valve and all the drain valve in front of the isolation valve, eliminate the condensate water, slowly open the main steam valve, use the steam generated during the boost process of the evaporator to slowly warm up, the pipeline with the pressure heating of the evaporator, which not only saves the warm pipe time, but also is safe and convenient.After the heating pipe, close the drain valve on the pipe for steam supply and furnace。

②Precautions when warming pipes

When the warm pipe, if the pipeline is expanded or the support hanger has abnormal phenomenon, or the pipe vibration or water hit, it shows that the warm pipe heating up too fast, must slow down the steam supply speed, that is, close the main steam valve to reduce the amount of steam through, extend the warm pipe time.If the vibration sound is too loud, immediately close the main steam valve and open the large drain valve to stop the heating pipe, and continue the heating pipe after finding out the cause of the fault。

Each steam valve should be fully open after turn half circle, to prevent the steam valve stuck due to heat expansion and can not be flexible switch。

（2）Combine the steam

Combined steam is also called parallel furnace, that is, when more evaporators operate at the same time, the new operation evaporator supplies steam to the steam parent pipe that is supplying steam.When the new evaporator put into operation has completed to the steam pipe heating pipe before the isolation valve of the sub-cylinder, the evaporator equipment and steam pipe are normal operation and combustion is stable, steam supply can be prepared。

①Before steam, the evaporator pressure should be slightly lower than the steam bus pressure, so as not to avoid the sudden evaporation of the pot water.

②The evaporator water level shall be kept at the lowest safe water level to avoid steam belt water。

③Analythe steam and the steam quality shall be qualified。

④When combining steam, the bypass valve of the parallel valve shall be opened and opened later.Open the valve to be slow, and open the steam valve and then close the steam valve and steam valve bypass valve, and steam valve front drain valve, superheater drain valve。

⑤In the process of steaming, close attention should be paid to changes in air pressure, air temperature and water level。

Put into operation。

7、Operation and management of the evaporator

（1）The evaporator must maintain the specified normal water level and is not allowed to be below the minimum safety level or above the maximum safety level。

（2）Frequent attention should be paid to the working pressure to maintain the normal steam pressure.The operating pressure specified by the evaporator shall be indicated with a red line on the pressure gauge of the evaporator。

（3）At least do the following work per shift:

①Wash the glass water level table once。

②Check the tightness of the pan, drain valves and drain valves。

③According to the water quality of the evaporator, all the discharge valves are discharged one or twice.

④All pumps intact or not shall be tested in succession, and the operation of each feed pump shall be checked by short-time start operation method.

⑤The straight read water level table is consistent with the glass water level table。

（4）The pressure gauge should be calibrated once every ten days (the pressure gauge must generally be calibrated with the standard pressure gauge once every six months)。

（5）Pay attention to the relationship between the wind pressure and combustion, and must control the negative pressure of the combustion chamber outlet to 20-30Pa, so that the evaporator does not spray flue gas。

（6）Often patrol around the evaporator, if found furnace wall, furnace door leakage, should be immediately repaired, and listen to whether there are special sound, these sounds may be the evaporator leakage, steam leakage, must pay attention to eliminate。

（7）Check the evaporator body, electrical equipment, feed water pump, various valves, various instruments and auxiliary equipment every one hour。

（8）The evaporator shall be checked at least once a month, and the inspection record, monthly inspection is mainly for the evaporator pressure components,

safety accessories and instruments, chain protection device, evaporator use safety and energy saving management system is effectively implemented, whether the operator certificate, regular inspection, whether the water quality regular test analysis, whether according to the water vapor quality changes, and other abnormal conditions。

（9）When opening the valve or plug, stop the sledgehammer or other objects, or lengthen the valve handle。

（10）To prevent the flap and seat adhesion of the safety valve, the manual and automatic steam discharge test of the relief valve shall be conducted regularly。

（11）Operation of the energy saver (when the evaporator is equipped with the energy saver)

（12）The furnace worker should regularly check and test the water level alarm and chain protection device to determine that it can play a normal role。

（13）If the alarm or chain protection device is damaged, it should be repaired in time and the evaporator can be operated。

（14）The evaporator user shall, in accordance with the requirements of the relevant safety technical specifications of the evaporator, daily inspect the burner, evaporator safety accessories and safety chain devices, and make good inspection records.When the burner is required, it shall be made by the evaporator user。

Start the circulating pump (installed at the outlet position of the energy generator), open the water inlet and outlet valve on the energy generator, so that the water circulation in the energy generator is good；

Check the inlet and outlet pressure loss and confirm that the energy generator is working normally；

Energy saving is non-pressure equipment, pressure operation is strictly prohibited!!!Its piping system should be installed separately, and the heated hot water can enter the soft water tank (the soft water tank should be insulated) as an evaporator to replenish the water, and can also be used as other production processes and domestic hot water.

8、Sewage

Warning: not according to the provisions of sewage, will lead to the body drum, water pipe blockage, cause pipe explosion until the evaporator overburned, crack, explosion!!!

（1）Continuous sewage discharge or water release is to make the alkalinity

of the furnace water not exceed a certain concentration, which meets the requirements of the alkalinity of the furnace water. Sewage and water discharge should be controlled according to the results of chemical analysis, adjusting the opening of the sewage valve or drain valve.

(2) Regular discharge or discharge is to eliminate the sediment in the pan and to adjust the salt content of furnace water to meet the requirements of furnace water。

(3) Regular discharge should be carried out at low loads for as short a time as possible so as not to affect the water cycle。

(4) When the evaporator is discharged, the pot water should be discharged at high water level, pay close attention to the water level in the water level in the pan, each time to reduce the water level in the pot by 25-50mm。

(5) The operating procedures for discharging sewage are as follows:

First fully open the second valve (from the direction of the cylinder), and then slightly open the first valve to preheat the sewage pipe, and then open the first valve (at this time there should be no impact sound in the sewage pipe, if there is an impact sound, you should close the first valve until the impact sound disappears, and then slowly open), pay attention to control the amount of sewage.The procedure at closing is opposite to the above。

(6) If two or more evaporators use the same sewage main pipe, and there is no check valve on the sewage pipe, it is forbidden for two or more sets of sewage valves to work at the same time。

(7) No use of a lever to extend the handle to open the drain valve。

(8) If the sewage pipe end is not connected to the discharge box or the discharge well, and there is no protection equipment, it must really know that there is no one near the end of the discharge pipe, so as to avoid accidents in the discharge。

(9) After the discharge, close the discharge valve, check whether the discharge valve is tight.The inspection method is to close the discharge valve, after a period of time, in the pipe leaving the second drain valve by hand to touch whether the cooling, if not cooling, there is leakage at the discharge valve。

9、Water quality requirements

Warning: The water quality does not meet the requirements, which will make the sediment precipitate the bottom of the evaporator and form scale, destroy the water cycle, overheat, deform, burst the pipe, and even overheat the body, resulting in cracks and explosions in the evaporator!!!

The water supply of the evaporator shall be free of sediment, and the water quality shall meet the provisions of GB / T1576 ″ Water Quality of Industrial Boiler standard.

The water quality of natural circulating steam evaporators treated with water outside the furnace shall comply with the provisions of the following table:

Item	Rated steam pressure/MPa		P≤1.0		1.0<P≤1.6		1.6<P≤2.5	
	Supply water type		Soften the water	Desalinate	Soften the water	Desalinate	Soften the water	Desalinate
water supply	turbidity/FTU		≤5.0					
	hardness/(mmmol/L)		≤0.03					
	pH Value（25℃）		7.0～10.5	8.5～10.5	7.0～10.5	8.5～10.5	7.0～10.5	8.5～10.5
	electrical conductivity（25℃）/（μS/cm）		-	-	$\leq 5.5\times10^{2}$	$\leq 1.1\times10^{2}$	$\leq 5.0\times10^{2}$	$\leq 1.0\times10^{2}$
	dissolved oxygen[a](mg/L)		≤0.10	≤0.10	≤0.10	≤0.050	≤0.050	≤0.050
	Oil/（mg/L）		≤2.0	≤2.0	≤2.0	≤2.0	≤2.0	≤2.0
	Iron/（mg/L）		≤0.30	≤0.30	≤0.30	≤0.30	≤0.30	≤0.10
Pot of water	Full alkalinity[b]/（mmol/L）	No overheater	4.0～26.0	≤26.0	4.0～24.0	≤24.0	4.0～16.0	≤16.0
		Superheater	-	-	≤14.0	≤14.0	≤12.0	≤12.0
	phenolphthalein alkalinity /（mmol/L）	No overheater	2.0～18.0	≤18.0	2.0～16.0	≤16.0	2.0～12.0	≤12.0
		Superheater	-	-	≤10.0	≤10.0	≤10.0	≤10.0
	pH Value（25℃）		10.0～12.0	10.0～12.0	10.0～12.0	10.0～12.0	10.0～12.0	10.0～12.0
	electrical conductivity（25℃）/（μS/cm）	No overheater	$\leq 6.4\times10^{3}$	$\leq 6.4\times10^{3}$	$\leq 5.6\times10^{3}$	$\leq 5.6\times10^{3}$	$\leq 4.8\times10^{3}$	$\leq 4.8\times10^{3}$
		Superheater	-	-	$\leq 4.8\times10^{3}$	$\leq 4.8\times10^{3}$	$\leq 4.0\times10^{3}$	$\leq 4.0\times10^{3}$
	Dissolve the solid/（mg/L）	No overheater	$\leq 4.0\times10^{3}$	$\leq 4.0\times10^{3}$	$\leq 3.5\times10^{3}$	$\leq 3.5\times10^{3}$	$\leq 3.0\times10^{3}$	$\leq 3.0\times10^{3}$
		Superheater	-	-	$\leq 3.0\times10^{3}$	$\leq 3.0\times10^{3}$	$\leq 2.5\times10^{3}$	$\leq 2.5\times10^{3}$

	phosphate radical (mg/L)	-	10.0～30.0	10.0～30.0	10.0～30.0	10.0～30.0	10.0～30.0
	Sulfite root (mg/L)	-	-	10.0～30.0	10.0～30.0	10.0～30.0	10.0～30.0
	Relative alkalinity	＜0.20	＜0.20	＜0.20	＜0.20	＜0.20	＜0.20

Note 1: For evaporators with a rated evaporation capacity of less than or equal to 4 t/h and a rated vapor pressure of less than or equal to 1.0 MPa, the conductivity and dissolved solids indicators can be performed in Table 2.

Note 2: For steam evaporators with a rated steam pressure of less than or equal to 2.5MPa, the make-up water is desalinized, and the conductivity of the feedwater is less than 10 μS/cm, the lower limit of the pH value (25 ° C) of the pot water can be controlled not less than 9.0, and the lower limit of phosphate is not less than 5 mg/L.

a The dissolved oxygen in the feed water of the evaporator for steam supplying steam turbines should be less than or equal to 0.050 mg/L.

b For the evaporator without high steam quality requirements and without superheater, the upper limit of pot water can be relaxed appropriately, but the pH value of pot water is 25℃) should not exceed the upper limit。

10、Economic operation of the evaporator

（1）Users should reasonably choose the furnace type, quantity and capacity of the evaporator according to the timely changing characteristics of the heat load demand, so that the evaporator can operate under the optimal energy efficiency conditions。

（2）In the process of operation, the evaporator furnace wall, flue duct, various thermal equipment, thermal pipes and mana should have good sealing and thermal insulation performance. When the ambient temperature is 25 ° C, the external surface temperature of the furnace body other than 300 mm from the door (hole) shall not exceed 50 ° C, the furnace roof shall not exceed 70 ° C, and the surface temperature of various thermal equipment, heat pipes and valves shall not exceed 50 ° C。

（3）Evaporator shall be managed and operated according to relevant regulations.The evaporator should be selected, and the air should be reasonable, and the pressure, temperature and water level should be stable.The evaporator shall be operated within the range of safe and stable operation, and shall be controlled within 80%~100% of the rated working condition.In order to ensure economic operation, the evaporator heating surface should be regularly cleaned and keep clean.Safety and effectiveness must be ensured when using ash remover or power purge.During the operation of evaporator, the tightness of flue, furnace wall and furnace equipment should be checked frequently, and the leakage should be repaired in time.Also should be easy to accumulate ash to clear ash in time.The pipeline, valve, instrument and thermal insulation structure should be regularly checked

to ensure that its strict, intact, timely eliminate running, running, dripping, leakage and other phenomena.The fuel evaporator meter, steam, water flow meter, pressure gauge, thermometer and other instruments and instruments of the reaction evaporator must be used within the verification cycle, and should be checked, corrected and repaired regularly according to the regulations。

11、Shut down the furnace

The evaporator shutdown is generally divided into two situations

11.1、Automatic stop furnace：

(1) When the steam pressure rises to the first overpressure protection value, the burner shuts down automatically. At this time, the evaporator is still in operation and still starts automatically. (There are also those that are set to turn from large fire to small fire)

(2) When the steam pressure rises to the second overpressure protection value, the burner automatically shuts down. At this time, the burner will not start automatically, and it must be reset。

11.2、Manual stop furnace

During the operation of the evaporator, in any of the following situations, emergency furnace should be stopped and the relevant departments shall be notified.

⑴ The evaporator water level is below the bottom visible edge of the water level table;

⑵ Increasing water supply and other measures have been taken, but the water level has continued to fall;

⑶ The water level of the evaporator exceeds the highest visible water level (full water), and the water level still cannot be seen after water release;

⑷ The water supply pump all fails or the water supply system fails to feed water into the evaporator;

⑸ The water level gauge or the safety valve will all fail;

⑹ All the pressure gauge set in the steam space fails;

⑺ The evaporator element is damaged and critical to the operator;

⑻ The collapse of the furnace wall or the red evaporator frame seriously threatens the safe operation of the evaporator;

(9)Other abnormal conditions endanger the safe operation of the evaporator;

Emergency manual shutdown should focus on preventing accident expansion, the

specific steps are "manual", "small fire" and "shutdown"。

12、Maintenance

The following points should be noted to the evaporator during operation:

⑴Evaporator supply water and furnace water monitoring

The feed water quality and furnace water of the evaporator shall comply with the provisions of GB / T1576 Industrial Boiler Water Quality standard.And regular sampling and testing.The quantity and number of pollutant discharge are determined by the laboratory personnel.Laboratory tests and sewage discharge shall be recorded in detail.

⑵Monitoring of rotating machinery

For water pumps, fans, oil pumps, etc., it is necessary to use the method of one look, two listens and three touches to monitor. When abnormal phenomena are found, measures are taken to deal with them. If necessary, the furnace should be stopped for maintenance, and it should not be careless。

⑶Oil level monitoring of daily fuel tanks

若 No oil level automatic control device, should check the oil level regularly, if the oil level is too low for 2 hours, please inform the fuel personnel in advance to inject new fuel。

⑷Water level control of the soft water tank

Automatic control is generally used

⑸Operating status of the water treatment equipment

Periodic inspection of ion exchangers in water treatment equipment is not effective, or periodic backwashing。

⑹Smoke exhaust temperature monitoring

Under normal circumstances, the new evaporator generally has a low smoke exhaust temperature, and gradually rises with the increase of running time.If this change is found to be too large and exceeds 20℃ (the difference), choose the appropriate time to stop the ash.If this happens frequently, check if the combustion system is normal.If the oil pressure is too low, the oil temperature is too low due to poor atomization, or the air oil ratio is wrong, resulting in poor oil and gas mixing and hypoxia combustion and carbon analysis。

In addition, for the dry back evaporator, if the exhaust temperature increases sharply, it is possible to leak smoke in the partition wall between the second return trip of the rear smoke box, and it needs to stop the furnace for repair。

The evaporator shall be run for 2~3 weeks and shall be checked once.Main check the valve, pipeline flange and other places, if there is leakage should be

repaired. After the evaporator runs every 3 to 6 months, the furnace shall be stopped for comprehensive inspection and maintenance. In addition to the above 2 work, the following work shall be carried out:

(1) Remove the scale and sludge inside the pan and wash it with clean water。

(2) Check the inside and outside of the evaporator, such as the pressure part of the weld, inside and outside the steel plate without corrosion phenomenon. Serious defects should be repaired early if found. If the defect is not serious, it can also be repaired for the next furnace shutdown. If suspicious is found but does not affect safety production, records shall be made for future reference。

(3) After the inspection, the evaporator paint can be applied to the water surface to prevent corrosion. The evaporator base shall be painted at least once a year.

Evaporator long-term unused maintenance method: there are two dry and wet methods, stop furnace for more than a month should use dry maintenance method, stop furnace for a month below can use wet maintenance method。

(1) Dry maintenance method:

After the evaporator stops the furnace, put the furnace water, completely remove the internal dirt, rinse it, dry it on a low heat in the furnace chamber (pay attention to not to fire), and then install the 10~30mm block quicklime sub-plate, place it in the pot barrel, do not make the quicklime in contact with the metal, the weight of the quicklime powder, calculated by the volume of the pot barrel per cubic meter of 8kg, and then all the manholes, hand holes, pipeline valves are closed, checked every three months, such as quicklime crushed into powder must be replaced, the evaporator should be taken out of the quicklime and the disk when it is re-run.。

(2) Wet care method:

After the evaporator stops the furnace, put the baked water, completely remove the internal dirt, rinse, reinject the treated water to full, heat the furnace water to 100℃, let the gas out of the water, and then close all valves. Wet maintenance method should not be used in cold places to avoid damage to the evaporator after water freezing。

Chapter IV: Common fault handling

（一）Cause and troubleshooting method of the fuel burner fault

In case of failure, first check whether the correct operation requirements are met:

1、Check the wire for electricity;

2、Check for oil supply;

3、Check that all controllers are tuned。

If it is not caused by the above reasons, check as shown in the table below。

Obstacles	Cause	Exclusion measures
1、No ignition	The ignition electrode gap is too large	Adjust
	Ignition electrodes are contaminated or wet	Clean and adjust
	Wrong with the burner controllerInsulator cracking	Change
	Burndown of ignition cable	Change Replace, find out the cause, repair
2、The burner motor cannot start up	Overload buckle	Check the given value
	There is a problem with the contactor	Change
	Wrong with the burner motor	Change
3、oil pump Do not supply oil	The gear is damaged	Change
	Inhalation valve leakage	Remove for cleaning or replace
	There is leakage of the oil pipe	Tighten the joint
	The cut-off valve is closed	Open it
	filter stoppage	Wash
	There is a problem with the pressure control valve	Replace the pump
	Traffic reduction	Replace the pump
There is mechanical noise	There is air in the pump	Tighten the joint
	The vacuum in the pump tubing is too high	Clean the filter and have all valves are open

4、The nozzle atomization is uneven	The flow disk is loose	Remove the nozzle and tighten the winding disc
	The hole plate (nozzle) is partially blocked	Remove the cleaning
	filter stoppage	Remove the cleaning
No oil flow	worn out	Change
The nozzle leak	The nozzle is blocked	Remove the cleaning
	There is wrong with the nozzle closing mechanism	Change
5、Burner controller with flame sensor is not responsive to flame	Flame receptors are blackened	Clean
		Change
Interrupt in the running order	The temperature is too high and the overload is damaged	Check the wiring and the voltage
The lock light is bright	There is something wrong with the flame	reset
6、The combustion head is stained with oil or seriously accumulates carbon		Revise
		Change
		Change
	The given value is incorrect	Reign the burner
	The burning head is not correct	Vaporator room ventilation must be done through permanent openings. The cross section area of openings must be equal to more than 50% of the chimney cross section area of the device
	The nozzle size is wrong	
	Wrong burning amount of air	
	The evaporator room is not well ventilated	

（二）Causes and troubleshooting methods of gas burner faults

In case of failure, you must first check whether the preconditions for normal operation are met:

1、Whether there is electricity;

2、Whether the gas pressure on the gas supply network is correct, and whether the ball valve is open;

3、Whether all the regulators are adjusted correctly;

4、Whether the air volume and gas passage volume are changed during combustion。

If it is determined that the failure is not caused by the above causes, the functions related to the burner must be tested. To find out the fault, remove the interlock and turn on the burner. The work process must be accurately observed, and most of the possible problems can be quickly identified and eliminated (see the table below). Connect the microampere meter and the U-tube barometer during

the inspection。

Obstacles		failure cause	Exclusion method
generic failure rate	Burner motor does not turn	No voltage The fuse is damaged Zero line interruption Motor failure Control circuit interruption Gas delivery is interrupted The ball valve is closed Controller failure	Connect the circuit Change fix Change Find the off point, turn on or off the regulator or monitor Open the ball valve and inform the gas management agency to replace it in the case of insufficient gas volume for a long time
Insufficient air volume	The burner motor is running, but stops after a pre-purge Burner motor running but stops after about 20 seconds (only for equipment with seal inspection) The burner motor is running, but stops in the pre-purge state after 10 seconds	The air pressure switch has failed Pressure switch is dirty and pipe is blocked The solenoid valve is not sealed Pressure switch contacts not connected to operation (air pressure is too low) The blower is contaminated The burner motor rotates in the wrong direction	Change Clean Exclude seals Adjust the pressure switch properly, and replace it, if required Clean Power supply for pole
Ignition failed	The burner motor is running, the voltage is applied to the controller terminal 16 without ignition and fault shutdown later	The distance between the ignition electrodes is too large Ignition electrode or circuit is ground Ignition transformer fails	Adjust the electrode spacing Remove ground and replace damaged electrodes or cables Replace the ignition transformer
The flame did not form	The motor is running, the ignition is normal, but it fails later In equipment with sealing inspection device Burner motor is running, the ignition is normal, but stops later (No fault display)	The solenoid valve is not open because the solenoid line valve is damaged or the cable is brokenThe solenoid valve is not sealed filter stoppage	Replace the solenoid valve or remove the current Exclude seals Clean or replace
Stop after the flame forms	Flame formed but stopped at high operation of rated load	The filter is contaminated Gas meter failure or deep pipe water	Clean the filter Notify the gas management authority

Flame monitoring fault during ionization	The burner motor is running, the ignition can be heard, and the flame forms normally, but then fails	The ionizing current is unstable and is too low Improper adjustment of the gas / air mix Ignition sparks affect the ionizing current The UV probe is contaminated The light is too weak The UV probe fails	Change ionizing electrode position; remove high ambient resistance in ionization circuit and terminal (tighten the terminal) Reconadjustment (see commissioning) Ignition transformer primary coil replacement phase line and midline Cleaning (degrease) Detection of combustion regulation renewal

（三）Common faults and troubleshooting methods for safety accessories and valves

1、Common faults and troubleshooting methods of the pressure gauge

The common faults of the pressure gauge are the pointer, the pointer back to zero, pointer jitter, surface blur or water drops.

1）The pointer does not move

analysis of causes	Exclusion method
⑴The plug is forgotten or positioned incorrectly。 ⑵The passage of rotary plug, pressure gauge steam connection pipe or water storage bend pipe is blocked。 ⑶Pointers are loose with the center axis or they are stuck。 ⑷Leakage of spring bends and gauge seats。 ⑸The fan gear and pinion gear are loose and detached。	⑴Unscrew the plug or adjust to the correct position。 ⑵清 Wash pressure gauge, blow channel, replace plug or pressure gauge if necessary。 ⑶Fighten the pointer to the central axis or eliminate the stuck。 ⑷Repair welding and leakage。 ⑸Repair the fan gear and pinion gear to mesh。

2）The pointer does not return to the zero bit

analysis of causes	Exclusion method
⑴The spring bend produces permanent deformation and loss of elasticity。 ⑵The gossamer on the center wheel loses its	⑴Replace the pressure gauge. ⑵Replace or reinstall。 ⑶Clean the pressure gauge, blow the channel,

elasticity or falls off。 ⑶The channel of plug, pressure gauge connection or retaining bend is blocked。 ⑷The pointer is loose with the center axis, or the pointer is stuck。	and replace the cock or pressure gauge if necessary。 ⑷Fighten the pointer to the central axis or eliminate the stuck。

3）Pointer jitter

analysis of causes	Exclusion method
⑴Wire damage。 ⑵The binding bolt of the free end of the spring bend and the link rod, or the binding bolt activity of the link and the fan gear is affected, and the fan gear shakes when the bend expands and moves。 ⑶The two ends of the central shaft are bent, and the two ends of the shaft will rotate at different centers。 ⑷The passage of the plug or storage bend is locally blocked。 ⑸There is dirt or rust in the transmission mechanism of small gear, fan gear or shaft。 ⑹Affected by the surrounding vibration。	⑴Maintenance swim silk。 ⑵Repair and combine bolts。 ⑶Replace the pressure gauge。 ⑷Blow the channel。 ⑸Clean the pressure gauge。 ⑹Clean the pressure gauge。

4）Water drops appear on the inner surface of the glass

analysis of causes	Exclusion method
⑴There is no rubber gasket at the junction of the glass surface and the shell, or the gasket is damaged, so that the binding surface is not sealed。 ⑵There is leakage at the welding joints of the spring bends and the watch seat。 ⑶The spring bending pipe has cracked。	⑴Add or replace a rubber washer。 ⑵Repair welding leakage。 ⑶Replace the pressure gauge。

2、Common faults and troubleshooting methods of the water level table

The common faults in the water level table are plug leakage, stagnant water level, and the water level in the glass plate (pipe) is higher than the actual water level and the glass pipe burst。

1）Cyclone leakage

analysis of causes	Exclusion method
⑴Pluock material or machining。 ⑵Wear or corrosion on the contact surface。 ⑶Filler is insufficient or deteriorated, and the filling pressure is uneven。	⑴Replace the plug。 ⑵Grind or replace the rotary plug。 ⑶Add or replace the packing and tighten the packing cover。

2）The water level is sluggish

analysis of causes	Exclusion method
⑴Water connecting pipe or water plug is blocked by scale, filler, etc。 ⑵The water plug was closed by mistake。	⑴Wash the water pipe and water plug, or dredge with thin wire。 ⑵Twist boiling water to plug。

3）The water level in the glass plate (pipe) is higher than the actual water level

analysis of causes	Exclusion method
⑴The steam cock is blocked by the packing。 ⑵The steam cock was mistakenly closed。 ⑶The furnace water foams due to the high alkalinity。	⑴Rinse the steam plug。 ⑵Unscrew the steam plug。 ⑶Strengthen sewage discharge。

4）Fry the glass tube

analysis of causes	Exclusion method
⑴Poor quality of the glass, or cause pipe end cracks when cutting the tube。 ⑵Centrenterline deviation of upper and lower pipe seat of water level table。 ⑶No preheat after replacing the new glass tube。 ⑷The heated glass pipe was suddenly splashed with cold water or the pipe surface was contaminated with oil。 ⑸No expansion clearance or excessive packing pressure during installation。	⑴Replace the glass tube。 ⑵Make a straight center line between the upper and lower seats。 ⑶Follow the rules。 ⑷Prevent the glass pipe from sudden cold and remove the oil pollution。 ⑸Reserve the expansion gap and press the packing properly。

3、Common faults and troubleshooting methods of the safety valve

The common faults of the safety valve are long-term steam leakage (water), open beyond the specified pressure value or before the specified pressure value, and exhaust steam (water) after the valve core does not sit back。

1）Gas leakage (water)

analysis of causes	Exclusion method

⑴The close face with scale, sand or attachments. ⑵Spool and seat wear。 ⑶Curve stem bending deformation or deviation of valve stem and seat support plane。 ⑷The spring-type safety valve spring produces a permanent deformation and loses its original elasticity. ⑸The lever and valve lever defdefto on the valve core and seat。	⑴Blow the safety valve.If the effect is not obvious after blowing and washing, the safety valve should be opened after stopping the furnace to remove the attachments。 ⑵Replace the core and seat, or reprocess。 ⑶Replace the valve stem or readjust the level。 ⑷Replace the spring。 ⑸Correct the lever center line, strictly lead straight。

2）No steam exhaust at the specified pressure (water)

analysis of causes	Exclusion method
⑴The stem and seat are glued or rusted。 ⑵The clearance between the stem and the housing is too small, and the stem is stuck after thermal expansion. ⑶Improper adjustment or maintenance, make the spring safety valve spring contraction is too tight, the distance between the lever safety valve and the fulcrum is too long, the pig iron plate of the static weight safety valve is too heavy。 ⑷The valve channel is blocked by obstacles such as blind plates。	⑴Blow the safety valve.In serious cases, the valve core and valve seat should be ground after furnace shutdown。 ⑵Appropriate increase of the clearance between the valve stem and the housing。 ⑶Readjust the relief valve。 ⑷Remove obstacles。

3）Steam steam (water) without specified pressure

analysis of causes	Exclusion method
⑴Improper adjustment or maintenance, so that the spring safety valve spring tightness is not enough, the distance between the lever safety valve and the fulcrum is too short, the weight of the static weight safety valve is not enough。 ⑵The spring is permanently deformed and elastic	⑴Readjust the relief valve。 ⑵Replace the spring。

4）The rear exhaust steam (water) valve core is not retracted

analysis of causes	Exclusion method
⑴ spring bending 。 ⑵The stem and stem are not installed or stuck。	⑴Replace the spring。 ⑵Reinstall the safety valve。

4、Common failures and handling

1）The valve leakage, the reason is：

①The binding surface of the stem and the seat is corroded, worn, scratched, or dirt bonded。

②The packing is not compacted, uneven, or deteriorated。

③The washkets was not pressed or deteriorated。

④Different bolt tightness causes the pressure tightness between the valve body and the valve cover。

2）The valve stem is not active because of the：

①The packing is pressed too much and too tight。

②Broken screw on valve stem and valve cap。

③The valve stem is bent and deformed, or it is stuck due to corrosion。
④The hand wheel is damaged and cannot drive the valve stem。
⑤The gate card dead。
3） The valve body breaks up, and the cause is that：
①The material is not good, the internal sandholes, pores, or eccentric when casting, to reduce the local strength。
②The valve was collided to produce small cracks, which continued to use after the crack extension。
③The screw too hard, the screw hole was damaged and not found。
④Valve body memory water is frozen after freezing and crack。
⑤The cast iron valves are strongly installed and rupture due to uneven force。
The treatment is to repair or replace it according to the actual reasons。

（四）Possible failure of the water pump and its solution failure

	probable cause	resolvent
1、The pump does not absorb water, and the pointer of the pressure gauge and vacuum gauge beat violently。	Insufficient water into the injection pump, water pipe and instrument leakage。	Fill the water into the pump and tighten the blocked leak。
2、The pump does not absorb water, and the vacuum table indicates a high vacuum。	The bottom valve is not opened or blocked, the suction pipe resistance is too high, the suction height is too high。	Correct or change the bottom valve situation, or change the suction pipe to reduce the water suction height
3、The pressure gauge has a pressure and the water pump still does not produce water。	The outlet pipe resistance is too big, the rotation direction is wrong, the impeller is blocked, and the pump speed is not enough。	Check or shorten the water pipe and check the motor cleaning impeller, increase the speed of the water pump shaft。
4、Flow rate is below the design requirements。	The water pump is blocked, the sealing ring wears too much, and the rotation speed is insufficient	Clean the pump and pipe, replace the sealing ring, and increase the speed of the pump。
5、The water pump consumes too much power。	Filler pressure cover is too tight, impeller wear, water pump water supply increases。	Relax the packing cover, replace the impeller, increase the water pipe resistance to reduce the flow。
6、The sound inside the pump is abnormal and the pump is not on water。	The flow is too large, the resistance in the suction pipe is too large, there is air leakage in the water absorption, the suction liquid temperature is too high。	Increase the resistance in the outlet pipe to reduce the flow rate, check the pump suction pipe, check the bottom valve, reduce

		the water absorption height, block the air leakage place, and reduce the water absorption temperature。
7、Pump vibration。	The pump shaft is not on the same centerline from the motor shaft。	Align the pump out of the shaft center of the motor。
8、 bearing running hot 。	The bearing has no oil and the water pump is not on the same centerline with the motor shaft。	Fuel, align the shaft centerline, check or clean the bearing body。

Description

1、When the user needs to check the technical information about the evaporator, the contract and general drawing number。

2、Query the manufacturing quality of the evaporator, indicate the evaporator number (on the evaporator nameplate)。

3、If the evaporator is transferred, all technical documents must be transferred at the same time。