生物质热水锅炉使用说明

Biomass Hot Water Boiler Maintenance

CN BOILER ENGINEERING SOLUTION LLC

Thank you very much for using our company's products. In order to make boiler serve you better, please read this manual carefully before use. Please keep it safe for future reference.

1. Biomass Steam Boiler Overview

The boiler uses quick fitting or assembly structure. The 2.8~4.2MW boiler is of quick fitting pipe structure, and exits the ship after completely assembled, the boiler of 4.2~17.5MW is composed of 2 main components; The upper assembled component is the body heat accepting part, and the lower assembled component is of combustion equipment. The former part of the boiler body is arranged as a water-cooling wall, the upper part of it is connected to the boiler drum, and its lower part is connected to the header, so as to form a combustion room and absorb the radiated heat from the furnace; its rear part is arranged with dense convection pipe bundle between upper and lower boiler cylinders; the high temperature smog after combustion shall stand for twice returning flushing transversely to the heat accepting surfaces, and shall be introduced to coal saver singly arranged, and flow into duster and exhausted from chimney in the end. The 20t/h assembled water pipe boiler is composed of front furnace, rear furnace, convection pipe bundle, coal economizer, and chain grate, which are assembled in big components respectively for delivery.

2. Biomass Steam Boiler Features

★ Overhaul platform
·Overhaul platform is safe and reliable, arranged and overhauled conveniently;
· Platform ladder will be fixed by bolt and nut;
· Safe and convenient and primer will not be damaged.

★ Manhole, inspection door
· Manholes are set on the upper and the lower drum. Manhole opens conveniently and is good for overhauling and cleaning;
· Inspection door is set in the furnace for convenient overhauling and maintenance.

★ Sow feeder
· Sow feeder feed fuel equally to avoid flashback.

★ Speed control gear
· Design reasonable rotating speed according to the combustion speed of biomass to make sure the fuel burning out.

★ Secondary air inlet

· Disturb the furnace flue gas to ensure the total combustion of volatile matters.
· Air volume makes up 30% of total air volume. The airspeed is around 50m/s
· Air volume and air pressure of separate secondary fan is easy to be controlled and adjusted.

★ Spring full lift safety valve
· The safety valve discharge capacity is calculated strictly;
· When the system pressure exceeds the rated value, the safety valve will open decompression automatically to make sure that no accident would occur because of high system pressure.

★ Independent air bin
· Set different quantities of independent air bin from front to rear grate according to different steam capacity;
· Distribute air reasonably according to various fuel and combustion conditions to make sure that the fuel is totally fired.

★ Panel
· Cold rolling pressed film forms concave-convex panel which has great rigidity, strength, and beauty.
· Fixed by self-tapping screw and there is no welding spot.
· After the rust is removed, the surface will be printed with corrosion prevention, finishing coat, and primer.

Chain grate

Chain grate is the most widely used mechanical combustion equipment in industrial boiler and its combustion mode is moving fire bed combustion.the chain grate weight is light.Material of grate bar could be selected from normal cast iron,high temperature resistance cast iron and high temperature resistance alloy according to different requirements.

★ chain belt type grate stoker: achieve automatic combustion
★ block porous grate bars and Multiple duct distribute wind design:
Simple structure, well-distributed wind structure, no ash leakage, fully burning
★ seals design at the two sides of grate:
Prevent fuel from falling and thermal insulation to ensure the grate structure not to be burned out, and fuel be fully burned




3. Biomass Steam Boiler Control System

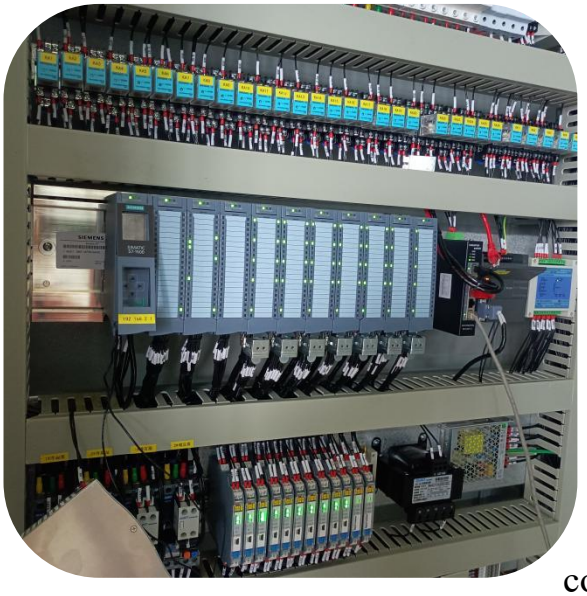
According to the customer's demand for steam capacity,temperature,pressure \fuel and equipment configuration,the steam boiler control system is developed and designed to achieve the purpose of monitoring the parameters and status of the boiler,and realize the intelligent of boiler control.

How to Control Different Types of Boilers

The method of controlling a boiler system depends on the exact design.
For example:
Commercial boilers can be controlled through on/off cycle, high-fire/low-fire, or modulating control systems.
Automatic on/off controls switch boiler on or off based on heat demand.
High-fire/low-fire controls alter the level of the burners—which provide the heat input—to maintain a specific working pressure based on steam demand.
Modulating controls improve boiler efficiency by monitoring and automatically altering fuel input according to the load demand.
Multiple boiler systems can be connected together for greater functionality. Controlling this type of system is much the same as a single-boiler system; it can be controlled with automatic on/off cycle, high-fire/low-fire, or modulating controls.

Modular boilers accommodate a wide range of loads by connecting several boilers together. Each of the boilers turns on when needed and turns off when it is not. For example, if the load exceeds the capacity of a single boiler, an additional one turns on to take up the excess hot water or steam demands.

The Core Control Mode of the steam boiler system:MCU control(Microcontroller unit), Integrated controller (All-in-one PLC,not programmable),PLC control(programmable),PLC+PC control,DCS control.



1).Main Control:liquid level control of boiler,water tank and oil tank;steam pressure control;boiler system pressure control;temperature control,etc.Manual/automatic control of burners, pump valves and other equipment,master and backup switching.Water pump start and delay shutdown, water pump running status detection and burner interlock.
2).Anti-freezing Functions:Make the boiler run safely and stably at night when unattended, and make the system work in an energy-saving state to prevent the pipeline from freezing.
3).Self-inspection Functions of the control system: continuous inspection.To alarm and interlock protection when abnormal.
4).It collects,records,saves and manages important information and data function.

The Remote Instrument Valves used in the Control System Include: temperature sensor,liquid level gauge,pressure transmitter,pressure controllers,flow meters,electric regulators etc.

4. Biomass Steam Boiler Maintenance

4.1 Maintenance

★ Operation period notes
1) Boiler room should be clean and tidy. Other sundries shouldn't be put in boiler room.
2) Pay attention to indoor lighting, water gauge and pressure gauge should have good lighting, and stoker can see clearly. Often patrol around the boiler, and check if the boiler and auxiliary parts are normal.
3) There can't be pounding water on the ground of boiler foundation in case of foundation corrosion caused by moisture.

★ Daily maintenance
In boiler daily use, inspection, testing, measurement and record job should be done well to know and master the equipment state and timely solve existing problems.

1) Daily inspection
Daily inspection items see below:

Contents	Requirements
Valve instrument system: Including pressure gauge, water level gauge, safety valve, blowdown device, steam valve, water valve,etc.	Performance meets the requirements and the valve switch is in good condition.
Automatic control system: Including test, control, alarm and interlock of combustion, water level and pressure	Performance status meets the requirements.
Water supply system: including water level of soft water tank, feed water temperature, water softener equipment, etc	In the normal state.
Combustion system: Inclding equipment like feeding device, grate, furnace wall, slag extractor,etc	See our Daily maintenance
Ventilation system: Including FD fan, ID fan,air damper, flue gas duct,etc.	Fan operation, damper opening, smooth air duct flow, no air leakage.

2) Test, measurement and recording
a. Test: Regularly do water level measurement and test of alarm interlocking device, automatic water supply equipment and other devices to ensure that automatic control equipment work well.
b. Measurements: SZL biomass fired boiler standard equipment has testing items like hot water temperature, furnace pressure load, air damper opening or fan rotate speed, furnace temperature and flue gas temperature,and be regularly checked and maintained the correctness of these measuring instrument.
c. Record: Record boiler daily operation and analyze and solve the problems.
3) Daily maintenance
a. Grate speed governor and the guide rail place of chain wheel bearing should be kept clean to prevent sundry entering parts internal which may influences its normal work. Speed governor belt pulley tension should be moderate and the dislocation of the belt wheel end should control within 1mm. Speed governor crosshead coupling is full filled with steel calcium grease. After installation and use of three months, machine oil should be replaced for the first time and then replaced once half a year. Each shift should check lubricating oil in grate speed governor and ID fan bearing box to keep it within the change scope and be filled oil timely if oil is shallow. Oil leakage should be eliminated in time. If the grate needs to be tightened or loosened, bolts on gearbox lower shell and

movable supporting plate should be loosened in advance. Chain wheel shaft in front of grate and grease cup of rear roller should be
fastened and filled with beef tallow each shift.
b. Blowing smoke of pressure firing is not allowed because coal door, fire view door and arc tube plate are easy to be burnt out. If it is found that the front arch bricks are broken off, stop furnace for replacement within 24 hours, otherwise the arch board will be burned out and gas will leak.
c. If there is severe vibration of ID fan, fan should be stopped and checked. Generally, it's caused by impeller abrasion and the impeller should be changed timely.
d. When using the spiral slag extractor, if mortar leakage is found, compact packing timely or temporary stop for replacing new padding to stop the leakage. Check if the mortar leaks into the bearing. If there is, disassemble and clean it.
e. Whether dust collector will be failure because of leakage of connecting interface and dust discharge valve.
4) The stoker should regularly check and test the temperature and pressure safety alarm interlock protection device to confirm that it can work. If the alarm and interlock protection device is damaged, it should be repaired in time. The boiler can only be operated after the repair.

★ Periodic maintenance and overhaul

1) If problems that need to be solved in daily maintenance and cannot be handled immediately are found but the boiler can keep running, confirm annual, quarterly or monthly maintenance plan to make regular maintenance.
2) Boiler runs for 2-3 weeks and following aspects should be checked once:
a. Carry out a comprehensive inspection and measurement of automatic control system equipment and instruments and important test instruments like water level and pressure and automatic control equipment should work normally.
b. Check convection tubes and economizer. If dust is found, it should be cleared. If there is no dust, extend the time of inspection and inspect once a month. If there is still no dust, time can be extended to 2 or 3 months. Meanwhile check if there is any leakage in welding joints of pipe ends. If there is leakage, it shall be repaired timely.
c. Make chain grate no-load rotate and check line by line if there are broken grate bars in front of sprocket shafts. If there are, the broken grate bars should be changed.
d.Check if the fan bearing oil level is normal and the cooling water pipe should be unblocked.

e. Check if front arch bricks are broken and fall off.
f. If there's leakage at water level gauges, vaves and piping flanges, it should be repaired.
3) Boiler should be comprehensively inspected and maintained after running for 3~6 months. In addition to do the various above-mentioned jobs, the following work should be done:
a. Water level electrodes of electrode type water level controller should be cleaned and after using for 6 months, pressure gauges should be re-inspected.
b. Open the top cover of the economizer, remove the ash outside the pipe, remove the elbow, and clean inner dirt.

c. Eliminate scale and sludge in drum, water-cooled wall tube and in two headers, and flush with clean water. Eliminate soot and furnace ash on water-cooled wall tube and drum fire surface.
d. Check the boiler internal and external like welding joint of pressure parts. If there's corrosion phenomenon of steel plate internal and external, serious defects should be repaired immediately if found. If the defects are not serious, they could be left to the next boiler stop and got repaired. If suspicious points are found, but they will not affect safety production, take notes for future reference.
e. Check if rolling bearing of ID fan is normal and check the wear degree of impeller and shell.
f. Clean dust in dust collector and wear condition. Each interface should be tight and no leakage after installed.
g. If necessary, furnace wall, its shell and insulation layer can be disassembled for thoroughly checking. If serious damages are found in certain parts, these parts should be repaired. At the same time, fill the inspection results and repair status into boiler safety and technology register book.
4) The following inspection maintenance work should be done for boiler operating over a year:
a. Speed control gear, reducer casing of slag extractor, bearing box of ID fan and so on should be discharged and washed, and be changed lubricating oil. If there's sanding at tooth surface of safety clutch, the sanding should be repaired and grease seal should be replaced if it's broken.
b. Replacement of slag extractor wearing accessories
c. Check the wearing condition of dust collector and sealing condition of discharge valve. If wear-out phenomenon is found, collector can be sealed by welding similar shape iron plate on it, and then it can still use or paint wear proof coating in inner wall to make it more durable.
d. Disassemble chain grate, check wear conditions of sprocket, grate bars, grate pin shaft, friction plate on the rear roller flange shaft support and bottom plate. If serious, they should be replaced. During pulling grate, pull back from the upper head according to the rotation direction of operation. Unloading clip can't be used at wire rope angle place to avoid bottom get stuck. Roller assembly should strictly pay attention to the axis parallelism to avoid grate running deviation when roller is assembled.
e. Boiler insulation cover and boiler base should be painted at least once a year.

★ Boiler stop for maintenance

Maintenance method for boiler not used for a long time: There are dry method and wet method. If boiler does not use more than one month, dry preservation should be used to maintain. If it is less than one month, wet preservation can be use to maintain.
1) Dry preservation
Drain boiler water after boiler stop, eliminate internal dirt thoroughly and flush clean. Use micro fire for furnace drying (note not to use big fire), put 10-30mm lump quick lime or anhydrous calcium chloride desiccant in disks separately, evenly put into the drum and its quantity is that: quick lime according to drum volume is 1-2kg/m3, anhydrous calcium chloride is 1-2kg/m3. Then close all manholes, hand holes and pipe valves and check

once every two months. If it is found that desiccant is failure, it should be replaced. When boiler puts into operation again, desiccant and disks shall be taken out.
Boiler furnace and flue can also be put in some desiccant and close furnace door and the other doors and holes.
2)Wet preservation (suitable for short maintenance)
Drain boiler water after boiler stop, eliminate internal dirt thoroughly and flush clean. Re-inject treated alkaline water to the full, heat the boiler water to 105 ℃, let all air out of boiler, and then close all valves.
After boiler internal flushed clean, fill in alkaline solution to make metal surface formed alkaline protective film to prevent moisture. Wet preservation is suitable for short term furnace stop and its alkaline solution is sodium hydroxide or trisodium phosphate, or also can be the mixed solution of sodium hydroxide, trisodium phosphate and sodium sulfite. The dosage of sodium hydroxide or trisodium phosphate is different from putting condensate
water or softened water, and its dosage per ton is as below.
In wet preservation, boiler water alkalinity maintains between 5 mg/L and 12mg/L and check one time every 5 days. If alkalinity is lower than lower limit, then add alkalinity water. During wet preservation, remove ash in flue gas side of heating receiving surface and keep dry to prevent moisture condensation and corrosion. In winter, please do not carry out wet preservation in the place with no anti-freezing measures.

The dosage of wet maintenance method alkaline solution (kg/t)

Alkaline solution	When condensed water is put into boiler	When softened water is put into boiler
Sodium hydroxide (NaOH)	2	8~10
Trisodium phosphate (Na3PO4·12H2O)	5	20

To keep heating receiving surface dry, furnace should be dried by low fire periodically during maintenance. Open pumps periodically for water circulation to keep solution concentration is consistent.
Wet preservation can not be used in cold site to prevent boiler damage caused by freezing furnace water.

CN BOILER ENGINEERING SOLUTION LLC
ADD: Building 7, No.16 Jinzhan Street, High&New Technology Development Zone, Zhengzhou City
Tell: 0371-56520101 17638563962
Technical Service: 17638562515 17638569108
Email: heidyhan89@cnboilersolution.com