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Top-In Technology Co.,Ltd.

TPFT Boiler Maintenance Manual

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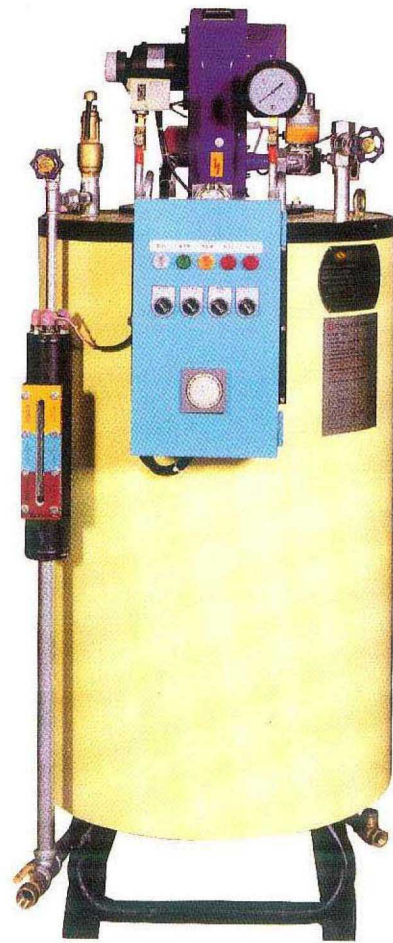
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500-2000 Kg/hr



150-350 Kg/hr

Maintenance Manual

(TPFT Flow Through Steam Boiler 150-2000Kg/hr)

Our company has put years of research and combine the best technologies possible from home and abroad, with our professional boiler manufacturing experience we developed the TPFT-BOILER. It is light weighted, compact and highly efficient. It only takes few minutes from start to creating steam.



(I) TPFT Boiler Configuration & Function:

◎Excellent Performance

1. The heating water pipes are arranged in a circle with the erect water pipes both internal and external, the burning gases (oil) will be formed between these pipes by heat transfer scales.
2. Feed water treatment
Firstly water will be softened by automatic softener, the process are as below.
Feed tank → water pump → water tube, the heated water becomes steam with humidity of 40~50% and it will go into air water separator to purify the water.
The air water separator is specially designed by us, which has an excellent function of separating air and water. The water in the steam can be separated to make the steam to reach higher dryness state, and then the steam is sent out through the main steam valve. (The purity of steam in our boiler can be 99% pure.)

(II) TPFT Boiler Operating Preparation

◎Prepare for operation

1. Water System

- (1) Open the softened water exhaust valve and send water to the feeding tank.
- (2) Open the water exhaust valve on the feeding tank and open the stop valve on the water pump.
- (3) Open the air cock on the water pump to release the air.

2. Fuel gas (oil) system

- (1) Be sure there is no gas (oil) leakage on the gas (oil) pipelines.
- (2) Before the operating test be sure to open the gas (oil) valves.

Remarks: In the case of new boiler test run be sure to check all the gas (oil) pipelines and valves before testing.

3. Steam pressure switch setting

The setting varies by different boiler and actual on-site conditions, if you wish to adjust the steam pressure during test run or commissioning please kindly see the following instruction.

- (1) Please turn the pressure adjustment screw to the boiler stop pressure.
- (2) Please turn the differential pressure adjustment screw to the boiler starting differential pressure point.
- (3) Pressure fixed with the adjustment screw – Pressure fixed with the differential pressure screw = Starting pressure point when the burning begins.

4. Confirm the rotary direction

- (1) When test run the new boiler, the burner, water pump and chemical dosing pump's rotary direction needs to be confirmed.

5. The wind guarding plate's degree of opening

- (1) The degree of opening needs to be appropriate.

◎ Boiler Operation

1. Operation

- (1) Please confirm all the soft water exit valves, water tank valves, water reversing stop valves, and gas (oil) exit valves are opened.
- (2) Confirm whether the switch of control circuit and control panel is off, and turn on the main switch to see if the power light is on.
- (3) Open the boiler emission valve, release the water and make sure all the water has been released then close the emission valve. (For fast release please open the main steam valve.)
- (4) Check the boiler emission valve is off.
- (5) Check if the manual switch for stopping pump is off, and then turn of the control circuit and make sure there is not water in the boiler, the buzzer should sound.
- (6) To turn on the manual pump and check if the water is been fed.
- (7) Check the water level and match with the water meter.
- (8) Confirm the main steam valve is closed.
- (9) Turn the burner to auto mode.
- (10) Press start up button to run the burner.
- (11) Please open the main steam valve gradually when the steam pressure rises to 1 Kg/ CM².
- (12) Open emission valve and make sure only less than 10% of total water has been discharged.

2. Stop

- (1) Press the burner stop button, and turn off the pump.
- (2) Close the emission valve.
- (3) Make sure the steam pressure is lower than 5kg/CM².
- (4) Confirm the water feeding process is finished, open the main steam valve, and turn off the control circuit switch.
- (5) Turn off the soften water exit valve, feed water exit valve, feed water check valve, close gas (oil) tube inlet valve, cut off the main power supply.

3. Running operation and precautions

- (1) Do not let the water pump to run in empty, to avoid the internal part of the pump to be burn out; please don't take off its filter.
- (2) There is a non-floating-ball type switch with electrodes in the water level control tank, please make sure it is not in contact with water and no any substances is attached to avoid short circuit.
- (3) Please make sure the full auto chemical dozing machine is operating well with the dozing pump.
- (4) Pay attention to the emission valve to make sure during boiler operation it continually discharge and release the right amount.

(III) Abnormal operation

1. Burner cannot be started

- (1) Leave it for 30 seconds, the indicator light will be on, and the burner will stop automatically.
- (2) Manually turn the pump switch to “stop” and cut off the power supply.
- (3) Inspect and repair the malfunction
- (4) Press the protective relay and put on the power supply, the burner begin to operate.

2. Fire extinction during combustion

- (1) When the fire vanish during operation, the flame monitor will automatically shut done the gas (oil) electromagnetic valve to cut off the fuel. To start fire again please wait for the air to be released completely first.

3. Low water level alarm

- (1) The buzz alarm will sound when the boiler reach the low water level, the water pump and burner will be stopped.
- (2) Turn the burner manual pump switch to “stop” and cut off the power supply.
- (3) Inspection and repair.
- (4) Put the power supply back on.
- (5) After the water reaches the designed level, the burn begin to operate.

4. Prevent boiler overheated

- To avoid overheating the boiler itself has temperature control.
- (1) The boiler will stop operating if the steam pressure reaches the designed working pressure.

- (2) If the burner automatically stopped ,it could be temperature control setting too low.
- (3) Temperature setting on 200 °C, and the boiler can not have automatic combustion after operation then the internal part of boiler can have water scale, please check the top checking port and lower checking port and inform our company.

5. How to change a fuse

- (1) Cut off the main power supply.
- (2) Take off the small lid on control panel.
- (3) Take up plugs two ends.
- (4) Loosing the fixing piece at the fuse base and take off the old fuse.
- (5) Change a new fuse and tighten up the plug end and put the other things back to its position.

(IV)Malfunction cause and solution

Malfunction	Cause	Solution
Power supply light lost function	Main power supply switch fuse broken	Change fuse
	Fuse of control panel switch broken	Change fuse
	Light failure	New light to be changed
Water light lost function	Electromagnetic switch overload	Press restoration switch
	Switch broken	New light to be changed
	Electrode keeper unclean and attachment with substances	Uninstall and clean it.
Burner motor lost function	Burner electromagnetic switch overloaded	Press the restoring button
	Burner electromagnetic switch broken	New electromagnetic switch is to be restored.
	Steam pressure switch broken	New steam pressure switch is to be restored.
	Over heating prevention temperature controller.	Make sure temperature setting is on ≈ 200 °C and check breaker to ensure it is functional if not please replace it.
	Overheating setting device operating	To check and inspect the boiler thoroughly and fix what cause the boiler to be overheated.
	The protecting relay safety switch	New relay safety switch is to be

	broken.	restored.
	The protecting relay is broken	New protecting relay to be restored.
Unstable fire flame	Insufficient gas (oil) pressure	Check the gas (oil) valve
	Error on burner detection bar	Uninstall it for cleaning
	Gas electromagnetic valve broken	New gas electromagnetic valve to be restored.
	Air plate improper openness	Adjust to the right openness
	Insufficient air in boiler room	Make air feeding hole and gas (oil) exiting hole
Low water alarm sounded and the burner stop function.	Water cannot reach the water pump	Inspect the water tank and valve
	Water filter plugged	Clean the filter
	Feed water pump has air in it.	Open pump air vent to release air.
	Pipeline has holes for air to go in.	Fix the hole or exchange for new pipe.
	Feed water pump's check valve is faulty.	Change the check valve
	Solenoid switch and temperature relay lost function.	Press the reset button.
	Feed water pump is faulty.	Change the pump.
	Solenoid switch is faulty.	Change the switch.
No water detected on the meter, low water alarm sounded.	Electrode connector is too dirty.	Clean and remove water scale and other substances.
	Buzzer alarm broken	Change the buzzer alarm
Discharge valve opened but no water come out.	Water filter blocked	Clean the water filter

◎Maintenance check

Checking Time	Checking Items	Checking Points
Everyday	All water to be released from the boiler.	Open the discharge valve before operation and release all the water.
		When it is in operation the discharge valve needs to be set for continuous emissions.
		Check the soft water quality by chemical detection.
	Low water level check	Turn on power, open the discharge valve and lower the water level to check if the alarm is still working.
	Steam pressure switch	When it is in operation check the pressure switch is adjusted to the desired pressure.
Every week	Check the Electrode rod	Please clean it if it has dirt attach on it.
Every Month	Clean burner nozzle	Dismount the burner nozzle, use coal oil to clean the nozzle and its oil filter.
	Flame monitor light-receiving surface	Open the burner checking cover and take out the flame monitor and use soft cloth to clean it.
	Clean wind pressure checking tube and rectification pieces.	If they are attached by dirt please use coal oil to clean it.
	Water filter and gas filter	Dismount the cover, water filter clean by water, gas filter clean by high pressure air.

Every Three Month	Non float type electrode rod cleaning	Dismount it and clean with cloth.
	Clean internal control panel	Clean by dry cloth and pressured air. If the terminals & relay's screws is lose please do tighten them again.
Micro adjustment: For the burner to work, turn the adjustment screw to its best burning position, and tighten the fixing nut. The maximum rotation angle is 60° for rotary type solenoid coil.		

1. Feed water pump

(1) Feed water filter cleaning

Situation: If the filter is blocked the water volume will be less, the pressure will be lowered.

Approach: Loosen the screw bolt and take out the filter. In addition use the water to clean filter.

2. Feed water pump operating precautions

- (1) Do not operate the pump without filter
- (2) Do not run in empty operation, the internal part of the burner will burn out.
- (3) During operation all the feed water valves need to be opened.
- (4) If the feed water pump needs to be shut down for long time please open the air release cock and water discharge cock at the meantime run the pump empty only for few seconds to release water. (Pump run in empty for long time the internal part of pump will burn out.)
- (5) When the pump has been used for years the mechanical seals and shaft will be wear and tear and needs to change for new one.

3. Change water level gauge's glass plate

- (1) If need to change water level gauge's glass plate the boiler need to be shut down and all the water needs to be released and need to wait for the temperature to drop low.
- (2) The bolts need to be loosen.
- (3) Dismount the water level gauge cover and glass plate.
- (4) Check water pass and steam pass.
- (5) Mount the new glass plate.

4. Level control electrode rod maintenance

- (1). If the electrode rod is attach by dirt it will cause error to non float type switch. All the lines needs to be dismounted carefully cannot have any mistake.
- (2). Dismount lines and electrode Holder
- (3). Clean the attached dirt with paper rasp and cloth
- (4). The electrode holder needs to be attached firmly on the water level controller for the wire connection.

5. Furnace refractory & boiler heat transfer surface inspection

- (1). Dismount burner
- (2). Dismount burner fixing plate
- (3). Put light into furnace and check for furnace refractory and boiler heat transfer surface, if it has a lot of dirt on the surface it will need to be washed by water.

6. Furnace internal inspection and clean by water

- (1) Dismount upper & lower checking point and its plug.
- (2) Inspect the internal part of the boiler
- (3) When washing by water please put the water tube in from the upper and lower check point, if the water scale is thicker than 1mm it will needs to be washed by acid.
- (4) After washing mount the boiler again.

7. Washing boiler heat transfer surface

- (1) Dismount water clean releasing port and flue cover
- (2) Use rubber tube and put the water to wash it
- (3) First wash the combustion chamber and from the chamber to second circuit washing port.
- (4) Release water into flue cover to wash the flue exit port.
- (5) The best time to wash the internal part of boiler body is after boiler shut down for 1.5~2 hours, at this time the boiler still has some temperature it will help the dirt to be wash away.

8. Feed water and boiler water management

It is harder to find out if the boiler is been damaged by feed water quality, and it is easier to see if the burner or auto control is not working. The untreated water or mistreated feed water will cause harm to boiler slowly, the water scale can be formed, and it can lead to corrosion, carry over ... etc. These will lower the heat efficiency and even over heat expansion, pipe rupture and cause serious boiler accident and the operation needs to be stopped. To avoid these things happen is boiler operator's duty; please look into the following information carefully.

(1) The feed water and boiler water standard

The raw water needs to be treated to the following standard

Feed water standard: Hardness needs to below 2.0 ppm (0.11Dh)

PH needs to be 7.0 ~ 9.0

Suitable amount of boiler water needs to be released and the release time and amount needs to be calculated.

Boiler water standard: A whole dissolved solids need to be below 2.000 ppm.

PH needs to be 11.0~11.8

(2) Automatic water soften system

The boiler feed water is originally from tap water or underground water, these raw water contains calcium and magnesium compounds which will cause water scales to be formed to remove these compounds the water soften system is required. The auto water softener has salts and resin and with necessary boiler treating agents the water will be soft and safe for boiler to use.

(3) TP-DWCA- Deoxidizing and water cleaning agent

Description: This product is mixture of water cleaning agent and deoxidizing agent, it has both of their functions to protect the boiler. This will prevent the calcium & magnesium to form into solid state and with water discharge it will be released from the boiler, and can also remove dissolved oxygen from the water to prevent corrosion.

(4) Release boiler water

Every day before boiler start operating, release all the boiler water so all the precipitate dirt can be released, during boiler operating the A whole dissolved solids will be too concentrated and cause saponification or carry over, low water alarm could be covered by water scale and the alarm can sound, the PH level could rise all of these could happen, to open discharge valve to conduct continuous emissions for 8~10% of the boiler water is most appropriate action to conduct.

(V) Abnormal operation and troubleshooting

◎ Burner cannot be started

Burner operate → 10 Seconds prior to air delivery → Oil pressure rises (Diesel fuel 8-15KG/CM², Boiler oil 18-20 KG/CM², Heavy oil 19~21KG/CM²) → Ignition → Fail, Gas 180~350 MMAQ → Flameout light on → Burner stop → Alarm sounded → Turn off alarm → Search for problem → Repair → Press burner reset switch → Restart.

◎ Flameout during operation

Flameout → Flameout light on → Burner stop → Alarm sounded → Turn off alarm → Search for problem → Repair → Press burner reset switch → Restart.

◎ Low water level alarm

Low water alarm sounded → Low water level indicator light on → Burner stop → Turn off alarm → Search for problem → Repair → Auto add water to set normal water level → Burner start operating

◎ Furnace overheat protection switch

If the boiler pressure or temperature is too high the burner will shut down automatically.

Burner stop operating → Operating preparation light off → only the operation light is on and all the others stop function → Check overheat protection switch → Search for overheat causes → Repair → Press operating preparation button to restart.

(VI) Burner Troubleshooting

Malfunction	Cause	Solution
Burner cannot be started		
◎No fire spark on ignition rod	The ignition rod is not in the right position or the gap is too wide.	Adjust to right position, gap should be around 3~4 mm.
	The ignition gap has carbon residue.	Clean the carbon residue
	Ignition rod is fixed too close to cyclone	Adjust the distance between cyclone to 0~10mm.
	Ignition rod cracked or damaged	Replace for new one
	Ignition rod transformer malfunction	Replace for new one
◎ Ignition rod has fire spark but the burner cannot be lighted.	Low combustion setting throttle angle set point is too wide; the ignition is stopped by wind.	Adjust the angle point gradually to the suitable position.
	Cyclone ventilation gap is blocked by carbon deposits and cause poor ventilation.	Clean the ash deposits.
	Ignition rod high voltage joints and porcelain section has leakage and the tip do not has electrical discharge.	Power disconnects, clean and inspects the ignition rod carefully and repairs the problems.
◎10 Seconds after ignition the fire extinguished.	Phototube (electric eye or sensor bar) is unclean or broken to cause monitoring failure.	Clean the electric eye or replace for new one.
	Low combustion setting throttle angle set point is too narrow and cause fire extinct.	Check the gas pressure to make sure it is sufficient and adjust the set angle gradually to suitable position.

Flame out during combustion		
◎ No issues when operating in low combustion setting but when adjust to high combustion setting the flame goes out or cause fire flashing and return fire (Has vibration sound of “bon bon”)	High combustion setting throttle angle set point is too wide; the ignition is stopped by wind.	Adjust the angle point gradually to the suitable position.
	High combustion setting oil port angle too wide.	Adjust the oil port angle to suitable position.
◎ Low water level alarm	Water cannot reach feed water pump.	Check water supply
	Air entering feed water pump	Release feed water pump's air release cock.
	The feed water pump's check valve lost function. (The hot water will flow back to soft water tank)	Fix the check valve or replace it.
	Electromagnetic switch overload and shut down.	Press the restart button within the control panel.
◎ Burner motor cannot be started	Boiler overheated, protecting switch set the temperature too low or broken. The operation preparation light will be on.	Set the temperature at 250°C, if the motor or the protecting switch is broken please replace it.
	Burner air fan electromagnetic switch overload and shutdown.	Press the restart button within the control panel.
	Low water level fuel feeder shutdown.	Fix & repair
	Steam pressure switch is damaged	Fix or repair for new one
	Burner heater temperature setting is below ordinary temperature.	Adjust to suitable designed temperature.
◎ Has Black smoke or white smoke		
◎ Black smoke	Throttle angle too narrow, not enough air flow.	Adjust the angle to be wider gradually.
◎ White smoke	Throttle angle too wide.	Adjust the angle to be narrower gradually.



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