

Installation & Operation Manual

for

WNS Series horizontal Gas -fired (Oil) Boiler

Zhangjiagang Wilford Thermal Technology Co., Ltd.

- Please read this manual carefully before using this machin;*
- Only qualified workers can operate this machine;*
- If the operation method is not correct, may happen to dangerous accident.*

版本: WNS-0910

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特别提示

Special recommendation

**尊敬的客户，在使用本设备前，请安装
漏电保护器！**

**Well-beloved user, please install a electric
power leakage protector before using this
machine !**

I、General description

→This manual should be used for WNS Series horizontal Gas -fired (Oil) Boiler.

→The adjustment, operation and repairing for the fitting & accessories of this series products, please refer to this installation & operation manual and the relevant manual submitted by the manufacturer of gas -fired (oil) burner.

① Performance characteristics

Boiler has sufficient output and high heat efficiency.

This series boiler has the characteristics of compact structure & high heat efficiency because of completely burning.

This series boiler's operation is very simple, has the function of automatically running and protection.

The installation is very simple, so only need less money for construction investment.

This series boiler can be delivered wholly because of its compact structure and small volume.

The following fuel can be used for this type boiler: 0# light diesel oil, natural gas or manual gas.

② Brief description for ex-works

2.1 While boiler leave factory, it should be divided & packed as following status;

2.2 The large items of boiler, boiler body ,front/back smoke box, installation nozzle ,insulation layer;

2.3 pipeline, valves and instrument;

2.4 Burner.

2.5 controller of boiler.

2.6 Chimney (according to contact requirements).

2.7 Technical documents: main parts drawings of boiler, strength calculation sheet for pressure parts, manual, documents list and appendix list, product quality certificate (one copy).

II、Installation description

① Preparation work before installation

Check the completeness of the boiler accessories according to the packing list and the general drawing of the boiler. Check whether there are any damage and deformation. If need lift the large boiler parts, any damage to the heat insulation layer should be avoided.

1.1 Organization and personnel

Boiler should be in charged by special personnel, boiler operator should join them, also need pipe fitter, fitter, lifting operator, cold worker, qualified welder and assistant.

1.2 Study

In order to let the relevant person know and master the relevant items of installation, lifting, running operation and so on, should organize them to study, let them familiar with the following documents: standard of "Supervision Regulation for the Safety Technology of Steam Boiler", boiler drawings, installation and operation manual.

1.3 Installation place

1.3.1 The best installation place should be close to the location supply steam, so as to shorten steam pipeline, decrease the construction fees, decrease the differential pressure and heat loss.

1.3.2 The equipment of oil storage and transferring should comply with the relevant requirements.

1.3.3 Feeding and draining water should be very convenient.

1.3.4 The path should be very smooth while installation and transporting the boiler.

1.3.5 The arrangement of boiler room should meet the relevant regulations of 《Safety Technical Supervision Regulation for Steam Boiler》 , chapter 8 issued by Labor and Human Ministry of the People's Republic of China.

1.4 Preparation for foundation

According to foundation sketch, well prepare the install foundation for boiler and pre-fabrication plate of ladder.

1.4.1 After boiler arrive in site, check all parts according to the packing list. Re-check the completeness of boiler set according to the general drawing. Check whether there are any damage and deformation during transport the large boiler components.

1.4.2 When unload the boiler large components, can place 8 to 10 piece tubes below the steel plates of two sides of bedplate, pull it with steel rope and make the boiler large component move slowly on the rolled tubes. At this time should pay attention to the location for placing steel rope, insure no any destroy to all boiler parts.

② Install for boiler large components

After the boiler is placed on the two strip foundation, it will has some incline, the fore end of axis centerline will higher than back end for about 10 to 25mm (according to different foundation drawing). It is very convenient for blowing down.

After check the level to boiler, add cement to boiler bed support and two wall foot.

③ Installation for chimney

The chimney height should be according to the user's requirements.

3.1 While assembling chimney, add asbestos rope between flanges, check the perpendicularity of chimney through hanging perpendicular line, if there is error, can adjust it by backing piece at the connecting location of flange.

3.2 If use steel cable, it can be strained by screw. Three pieces of steel cable is uniform distributed around a circle, should pay attention to keep three steel cables have the same strain force roughly.

④ Installation for pipeline, valves and instruments

4.1 Install the pipeline, valves and instruments according to drawings. Water pump is connected with water tank, if user has additional requirements, can provide spare water pump.

4.2 Safety valve must be assembled after hydraulic testing and connected to the tube for dumping steam so as to dump the steam to safety place. The section area of dumping steam pipe should not less than the section area of the outlet of safety valve, the pipeline should be arranged to minimize the resistance of blow down and keep draining water smoothly.

4.3 The blow down pipe should be connected to blowing down tanks or other safety place. In order to avoid happening the accident of moving or scald, the pipeline must be fixed.

4.4 All steam pipeline except for main steam valve should be assembled by user, there is at least one elbow at the main steam pipeline, otherwise should add telescopic tube. The pipeline must be insulated.

4.5 The pipes for draining water at the lower position of water level and water level automatic controller must be connected to safety place. The cock of water level gauge can rotate quickly and has no water leakage. The water level gauge must be assembled with lighting installation.

4.6 The dial panel of pressure gauge should be marked with red line to indicate the highest allowable working pressure. The cock of pressure gauge should rotate quickly and have no water leakage. The drainage of water should be very smooth. The insulation of pressure gauge is forbidden.

⑤ The other parts installation

5.1 The oil pump unit should be installed on the bedplate (if oil-fired pump is installed inside burner, it means oil-transferring pump).

5.2 The electrical control box should be installed at the position that is convenient for observation burner.

5.3 The burner will be connected with electrode nozzle of boiler.

⑥ Hydraulic testing

After finishing the install of boiler pipeline, valves, instrument and so on, check and clean the inside surface of boiler, close manhole and hand-hole, conduct hydraulic testing according

to the stipulation of the item 7 of this operation manual.

III、 Introduction for boiler structure

① Boiler body structure

1.1 The boiler heating surface is arranged as three returns structure. The horizontal and longitudinal furnace is the first return, the front section is corrugated furnace which can decrease the bad influence to the boiler body because of heat expansion. The smoke tube bundle welded between front & back tube plate forms the second and the third return that can reduce the exhaust gas temperature.

1.2 The upper part of boiler drum is steam space. In order to improve steam quality, there are steam-water separating unit inside upper part. The middle and lower part is water space, even at the low water level, also can insure all tubes of the highest heating surface can be immersed into water.

1.3 The boiler front and back smoke box can be disassembled easily, so it is very convenient for cleaning & remove ash, overhauling and maintenance.

1.4 There is fire observe hole at the back end of boiler for the convenience of check the burning status.

1.5 Boiler accessories and its function

- a. Main steam valve ---- on the top of boiler, which can transfer the steam from boiler to steam main pipe or steam cylinder.
- b. Safety valve ---- on the top of boiler, which can discharge all the steam at full load when the boiler is over pressure and can decrease the boiler pressure.
- c. Water level gauge and water level controller ---- on the steam – water interface, which is used for boiler water level indication and for the supervision by boiler operator. The water level controller is used for transmitting the value of boiler water level. The control system will control the running of feeding water pump and burner emergency stop according to the received signals.
- d. Feeding water stop valves and check valves ---- on the shell side for feeding water.
- e. Blow down valve ---- on the bottom of boiler for draining off the boiler's deposition and dirt.
- f. Gauge valve ---- on the top of boiler, to be used for connecting the instruments with steam inside boiler.

1.6 There are necessary manhole and hand-hole on the boiler drum for the convenience of boiler management personnel doing internal inspection.

1.7 The outside surface of boiler shell and smoke box is packed with insulation material and cold-rolled plate.

② Burning system

2.1 Oil-fired system

The actual working pressure should be according to the regulations of burner instruction.

2.2 Gas-fired system

The system working pressure will be confirmed according to different gas source.

2.3 Burner

2.3.1 Oil-fired burner: it is mechanical pressure type burner by the way of direct ignition, consists of ignition transformer, ignition electrode, magnetic valve, oil gun and so on. The wind quantity can be controlled by damper adjustment unit located the inlet position of fan. It is permitted that the inlet oil pressure has some change at the precondition that insure atomizing quality and oil-injection quantity, but in general condition, the oil-inlet pressure should not less than 0.98Mpa.

2.3.2 Gas-fired burner: please refer to instruction.

③ Automatic control

The automatic control system consists of following items: water level control, pressure

control, process control, safety protection and so on. If the automatic system has trouble, can start manual operation mode.

3.1 Water level control

The water level control system consists of electrode, relay, control circuit and so on. There are electrodes with different size (long or short) inside water level controller and water level alarm unit. When water level change, the electrode will contact with water or separate from water to control water pump start or stop running through the relay and control circuit, so as to realize the function of automatic feeding water, shut off water at too high water level, alarm and stop running boiler at too low water level.

3.2 Pressure control

The pressure control consists of many (3 to 4) pressure controller and magnetic valve. Working pressure can be control by multiple way, control the burning status according to the different outside load. Adjust the differential and set point of pressure controller, can change its dynamic property.

Now take rated steam pressure 1.0 Mpa as an example:

- 1.04 Mpa (safety valve open);
- 0.95 Mpa (alarm for high temperature, stop burning);
- 0.9Mpa (stop burning);
- 0.85 Mpa (run at low fire);
- 0.8Mpa (run at low & high fire);
- 0.7 Mpa (start burner).

3.3 Process control

For the process control, please refer to operation manual of burning unit.

3.4 Safely ignition protection

During boiler process controlling period, once finish pre-purging, will enter into ignition process. Continue ignition for five seconds, if still can't establish the flame inside furnace because of some reasons, the photo resistance has no sense of light, stop burning and send out acoustical & light alarm, continue post purging (for gas-fired boiler) then stop running boiler. Check and find out causing reason and remove the trouble then can start boiler again,

3.5 Flameout protection

During running boiler, may suddenly happen to the phenomena of flameout inside furnace because of some reason, the value of photo resistance will become larger, cut off supply oil and gas, and send out acoustical & light alarm, continue post purging (for gas-fired boiler), then stop running boiler. The boiler can start again only after removing the troubles.

3.6 Too low water level protection

During running boiler, while water level drops to the limit too low water level, stop burning and send out acoustical & light alarm.

3.7 High water level protection

When boiler get to too high water level because of some reason, send out acoustical & light alarm, must find out the causing reason in time.

3.8 Too high steam pressure protection

When steam pressure get to 98% rated steam pressure or get to 100% rate steam pressure, should stop burning of boiler and send out acoustical & light alarm.

3.9 Photo resistance failure protection

The photo resistance is one of very important unit of burning control system, its property will directly affect the safety for running boiler. So this control system has safety protection measures.

When the value of photo resistance becomes small or when the photo switch is broken, the relay contact inside control box will be off, burning can't continue normally.

In additional, when stop running boiler or didn't establish flame, if the indication lamp of burning is on, it means that the photo resistance or photo switch has been broken, should

change a new one.

3.10 Loss voltage protection

While normally running boiler, the electric network may have no power or the voltage is dropped suddenly because of one certain reason, boiler will stop running. When electric network is back to normal condition, the boiler unit will not start operation automatically. Now should push the burning start button again, then boiler can continue running again so as to avoid bad result.

3.11 Valve leakage protection

When there are leakages inside gas pipeline, insure the burner no start.

3.12 Low gas pressure protection

When the gas pressure inside pipeline is lower than set point, insure burner no start.

3.13 Low wind pressure protection

When the fan appear too low wind pressure because of a certain reason, will cut off burning automatically or burner no start.

IV、Boiler work principle

The boiler tubes of heating surface and furnace absorb the heat of firing oil, transfer it to the boiler water, and when the water change to steam because of heating, steam will be up and enter into the vapor space because its specific gravity was reduced, and the left space will be made up by the water with more heavy specific gravity, so this process will form a natural steam-water circulation. When the water level become lower because water changed into the steam continuously, the water pump will feed water into the boiler so as to keep it in the normal water level. The above-mentioned process continues, steam will continuously produced by heating the water by absorbing the afterheat of firing oil.

V、Operation Manual of Gas Fired Boiler

Please refer to the Operation Manual of Gas Ffired Boiler that we provide for you.

VI、Operation requirements

① Preparation before operating

Before operating, please check all boiler parts carefully, the detail is as following:

- 1.1 Whether the manhole and hand-hole is sealed, whether the fitting parts is safety.
- 1.2 Whether the fitting parts is safety.
- 1.3 Whether the damper is very agility.
- 1.4 Whether the steam pipeline, feeding water pipeline, fuel oil & gas pipeline is sufficient.
- 1.5 Whether all control switch of control box is set on the location "OK".

② Boiling out for boiler

After finishing install & inspection for all boiler parts, confirm they are safety, then can do boiling out for boiler.

2.1 In general, the boiling out for new boiler should be performed before starting the unit. It is mainly remove the impurity and oil dirt inside boiler. While boiling out for boiler, should add some suitable chemical medicine, make boiler water become alkaline water and remove oil dirt and impurity.

2.2 Boiling out for boiler can use the chemical medicine of Na_2CO_3 or $\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$, compound the above medicine with water as the uniform solution with concentration of 20%. It is not permitted that add the solid medicine into boiler directly.

Medicine name	Medicine quantity (kg/m^3)	
	The rust is very thin	The rust is very thick
NaOH	2~3	3~4

$\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$	2~3	3~4
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Note:

- a. The medicine quantity is calculated according to 100% purity.
 - b. If no $\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$, can use Na_3PO_4 , but the quantity should be 1.5 times.
 - c. Boiling out for boiler only use Na_3PO_4 , should add 6kg Na_3PO_4 inside every 1m^3 water.
- 2.3 Before adding medicine, keep water level at limit low water level. The chemical medicines should completely solved in the water prior entering into the boiler, then add into boiler through feeding water pump, keep it close to high water level while boiling out for boiler.
 - 2.4 At the early time of boiling out, start the burner, burning it at low load, keep the steam pressure up to 0.35Mpa, the time is about 12hours. At the end time of boiling out, keep boiler pressure at the 75% working pressure, the time is about 12hours.
 - 2.5 Keep the alkaline of boiler water, analyze the boiler water periodically, if the alkaline is less than 1.5mol/C, should add medicine. If the alkaline has no change for two times to analyze sampling boiler water, can finish the boiling out for boiler.
 - 2.6 Drain water under pressure status after finish boiling out for boiler. Wash the water vent vale that contact with the medicine, keep no plugging for blown down valve.
 - 2.7 After finish above-mentioned process, inlet water and blow down by turns until get qualified water quality, then stop running boiler, open blown down valve, drain off boiler water.
 - 2.8 After the boiler become cold, open manhole, hand-hole, wash the inside surface of boiler with clean water, check it again, if find still exist oil and dirt, should boiling out for boiler again according to above-mentioned way.
- ③ Running boiler
- 3.1 Start and running boiler normally.
 - 3.1.1 Open the air vent valve on the top of boiler or lift the valve core of safety valve.
 - 3.1.2 Start burner, start running boiler unit according to the requirements of operation manual of control box.
 - 3.1.3 Check the water level gauge, if the water level is too high because of heat expansion, can drain water through blown valve to the normal water level.
 - 3.1.4 When steam spurt from the air valve, close this valve, make boiler up pressure slowly.
 - 3.1.5 Check the feeding water valve, blow down valve, water level gauge, external connecting pipeline of drain off valve of water level controller, if they are cold means there are no leakage.
 - 3.1.6 Open the main steam valve step by step and supply steam.
 - 3.1.7 In order to keep normal running and safety for boiler unit, boiler operator should often observe and see whether the boiler pressure, water level and burning is in normal condition during run boiler.
 - 3.1.8 If boiler unit happens to failure, should stop running immediately and check it. Only after remove all failures then can re-start boiler.
 - 3.2 Stop running boiler
 - 3.2.1 Push the button of “burning stop”, boiler stop burning, make all control switch to the position of “stop”.
 - 3.2.2 Cut off power switch on the control box.
 - 3.2.3 Close all the relevant inlet & outlet valves of water pump, oil pump.
 - 3.2.4 Close steam valve.
 - 3.3 Adjustment for the quantity of wind and air
 - 3.3.1 The axis of the air damper at burner air suction side is connected through one piece of rod, so as to make air damper run at the same direction and step driven by servo-motor. The span of air damper is adjusted through servo-motor.
 - 3.3.2 The span of gas butterfly valve should be same step with air damper, its micro-adjustment

can be realized through changing the curvature radius.

④ Adjustment for safety valve

The safety valve should be adjusted for first time use, for the detail, can according to the requirements stipulated on the table 7-2, No. 143 of the standard 《Safety & Technical Supervision Regulation for Steam Boiler》.

4.1 Safety valve open pressure

Rated steam pressure	Safety valve open pressure	
0.7Mpa	0.73Mpa	0.75Mpa
1.0Mpa	1.04Mpa	1.06Mpa
1.25Mpa	1.3Mpa	1.325Mpa

4.2 Safety valve adjustment method

Disassemble the pin, remove top cover, loose the hexagon nut, screw the regulating rod, make the spring loose or tight and get the required discharging pressure for safety valve. After finishing adjustment, tight the hexagon nut and the other parts. 4.1 All safety valves can't be moved freely after adjustment.

4.3 All safety valves can't be moved freely after adjustment.

4.4 Do not knock the any part of safety valve. Only use control rod to open safety valve, no other way.

4.5 It is not permitted to run boiler no calibration for safety valve.

4.6 After calibrated for safety valve, it should be locked or sealed with lead.

⑤ Supply steam

When the steam pressure inside boiler is close to working pressure, can supply steam to outside. Before supply steam, the water level inside boiler can't be over than normal water level. While supply steam, should open main steam valve slightly, let a little steam to warm tube, at the same time open the drain valve on the pipeline and drain condensed water. The time for warming tube should be according to the length & diameter of pipeline, steam temperature and so on. In generally, it should not less than ten minutes. After the tube is heated, open the main steam valve slowly, at the same time note all parts whether have some abnormal sound. After finishing supply steam, check all fitting parts, valve, instrument once again to see whether have some abnormal phenomena of water & steam leakage, to see whether all parts are in normal working condition. In order to avoid water existing inside steam, keep water level never over than glass board.

⑥ Boiler daily maintenance

In order to insure boiler safely & economical running, should well do daily maintenance.

6.1 Feeding water requirements

It should be make some treatment for boiler feeding water, the water quality should comply with the regulation of the standard of GB1576 《Water Quality for Low Pressure Boiler》.

6.2 Boiler water level

Pay attention to observe the boiler water level all the time, boiler water level can't be higher than limit high water level and limit low water level. In general, the water level inside water level gauge should has some slight shaking, if find the water surface has no any change, it possibly is plugged, must wash it immediately.

6.3 Water level gauge

Every shift should at least wash water level gauge for one time. If find there is steam or water leakage, should add packing material. If the glass board is not clear, or the water level line is not clear, also it is still not good after washing, should change a new one.

6.4 Feeding water equipment

During change shift, should start machine and check it to see whether all feeding water equipments are in normal condition, if find any failure should repair it immediately.

6.5 Steam pressure

Do attention to the change of pressure, insure the steam pressure is lower than the allowable highest working pressure.

6.6 Pressure gauge

The bending tube of pressure gauge should be washed for one time every shift. Check to whether the pressure is in normal condition. If find the broken pressure gauge, should stop running boiler to repair it or change with a new one immediately. The pressure gauge should be at least calibrated for one time every half year to assure the correctness of pressure gauge. If the error is over than regulated allowable error, should repair it or change with a new pressure gauge.

6.7 Safety valve

Pay attention and keep the safety valve normal function. In order to prevent the sticking between valve disk and valve seat, should pull the lifting handle of safety valve to do discharging steam test. This kind of testing can be done one time every 2~4 week for checking safety valve.

6.8 Atomizing plate

The atomizing plate inside oil injector only can be cleaned by soft cloth, it is not permitted to clean it with hard things. Otherwise, it may destroy the precision of atomizing plate and affect it quality.

6.9 The photoresistance should be removed for examination & testing every three month, measure the values of resistance of bright & dark.

Photoresistance type: MG41-100A

Rated power capacity: 100MW

Bright resistance value: <100 K Ω

Dark resistance value: >50 M Ω

6.10 The boiler room should be kept clean, water level gauge and pressure gauge should have good light.

6.11 Well do the relevant work for change shift.

6.12 In order to insure boiler normally running and lengthen boiler using life as long as possible, should do daily management work well & carefully, for detail, please refer to following table:

Daily Management

No	Description	Period						Requirements
		H	D	W	M	S	Y	
1	Abnormal flameout protection			1				During burning period, close shut off valve of oil (gas) injector, stop oil (gas) spraying
2	Test			1				During burning, stop feeding water, open blown valve, decrease water level
3	Protection for unable light fire			1				Before starting boiler automatically, close shut off valve, lighting fire no oil spraying, begin time countering
4	Check	1						According to indication of inlet oil (gas) pressure gauge
5	The quantity of oil spraying and atomizing quality			1				Take out the oil injector, spray oil at cold condition.
6	Inspection for photo resistance	1						According to the indication signal on the control box.
7	Pressure regulator act			1				Check pressure control range

8	Magnetic valve act; see whether there is leakage			1				After stop running boiler to watch whether remains fire inside furnace.
9	The time set point of all sequence		1					Purging time, safely ignition time etc.
10	The fire lighting status		1					Observe the spark strength or take out oil injector to stop oil injection for check
11	Whether there is carbon deposition for burner		1					Include oil injector and flame cover
12	Burning status		1					Observe the color of exhaust smoke
13	Whether there is shedding of refractory		1					Continue with item 11 at the same time
14	Running status of all auxiliary machine and motor							Whether there is oil leakage of oil pump, whether the feeding water pressure is in normal condition (frequently check)
15	Analysis & treatment of boiler water							The times can be confirmed according to requirements; operation method can refer to the relevant manual.
16	Wrap and clean the photo resistance & glass of observer		2					The install location should be correct, remove the dirt and carbon deposit, can continue with item 11 at the same time.
17	Wipe and clean the electrode for lighting fire		1					By means of abrasive paper.
18	Clean all relay, contactor & contact of regulator						1	By means of abrasive paper.
19	Clean the overflow valve						2	After disassembling then clean it with light diesel oil
20	Clean oil filter	1						According to oil quality and experience.

Note: Letter “H” means hour; Letter “D” means day; Letter “W” means week;

Letter “M” means month; Letter “S” means season; Letter “Y” means year;

⑦ Blow down of boiler

In generally the feeding water contains mineral matter, when the water enters into boiler and after being vaporized the mineral matter will be deposited. So in order to avoid destroy boiler because of scale and slag, should keep the quality of boiler water. When the boiler water quality is over qualified valve of the standard, should make blowing down. The blowing down can be continued periodically according to actual condition, in generally, one time every shift is sufficient.

7.1 If two or over two boilers use one same blowing down main pipe and all branch tubes have no non-return valve (if add non-return valve should pay attention to the discharging direction), should be very careful for blowing down. It is not permitted that two boiler continue blowing down at the same time.

7.2 The blowing down should be conducted at the status of low load and high water level. At the same time should much care for boiler water level. It will be suitable to decrease water level for about 25~50mm every time.

7.3 If the blowing down tube end is not connected to the inside space of blown down tank or well, also no any protection equipment, at this time, in order to avoid happening any accident, must confirm no any person close to blowing down tube end then can continue this work.

VII、Maintenance of boiler

① In order to lengthen boiler using life time, every 3 to 6 month, should stop running for overall check and overhauling.

1.1 Stop running boiler method

After boiler stop burning and when the boiler water temperature is lower than 50℃, then

can drain all boiler water, but at this time should open main steam valve and make boiler connect with atmosphere. If need shorten cooling time, can add cold water from feeding water tube and drain off hot water through blowing down pipe at the same time, but the water level should not lower than the normal water level.

1.2 Inspection, cleaning and maintenance

1.2.1 If there are leakages of water level gauge, valves and pipeline flange, do repairing.

1.2.2 Open burner installation nozzle, hand-hole cover on the top of boiler, remove all deposit ash.

1.2.3 Remove the ash deposit and residue oil inside furnace.

1.2.4 Remove the scale and mud, wash it with clean water.

1.2.5 Check the internal & external surface of boiler. For example, check whether there are corrosion phenomena of the weld of pressure part and steel plate. If find serious default should make repairing in time. If the fault I not so serious, can repair it next time while stop running boiler. If find some problems but have no influence to safety, should well make record for later reference.

1.2.6 If necessary, disassemble all outside case and insulation layer to do throughout inspection. If find some serious destroy part, first must repair it then can use it. At the same time, make record for the result of checking & repairing.

② Every year should apply paint to the case of insulation layer and boiler bedplate for at least one time.

③ If necessary, remove all residual ash inside chimney.

④ There are two methods of wet & dry maintenance for long-term protection of boiler. If stop running boiler for over one month should use dry maintenance, if less than one month should use wet maintenance.

4.1 Dry maintenance

Stop running boiler, drain off all boiler water, remove all dirt inside boiler and clean it, bake it by faint fire, close all hand-holes and valves of pipeline.

4.2 Wet maintenance

Stop running boiler then drain off all boiler water, remove all dirt inside boiler and clean it thoroughly, re-add the treated water to full of water, then heat it to 100°C, let the gas inside eater out of furnace, close all valves. The wet maintenance is not permitted to use for cold weather or place for avoid destroy the boiler because of freezing.

VIII、 Inspection & hydraulic testing for pressure parts

① Do periodical inspection to internal space & external surface of boiler according to the stipulation of “Safety & Technical Supervision Regulation for Steam Boiler”. In generally, do internal inspection every two years, do hydraulic testing to boiler for one time every six years.

② Except for above item 1 mentioned periodical inspection, if happen to one of following case, must do internal & external inspection and hydraulic testing:

2.1 New installing, re-installing and move installing boiler.

2.2 Stop running boiler for over one year, before re-start running boiler.

2.3 After repair or change some pressure parts greatly and re-running boiler for one year.

2.4 According to the boiler running status, has doubt to the equipments status.

③ Before inspection, should remove all the internal scale and external smoke dirt thoroughly, if necessary, should disassemble the external cover and insulation layer. The inspection focal point is as following:

3.1 Check the boiler drum, furnace weld and tube-hole to see whether they are in normal status, whether exist leakage.

3.2 Whether the boiler steel plates have corrosion, bulb or deformation.

3.3 Whether there is scale or water slag beside pressure parts.

3.4 Whether there is fault at the connecting position between feeding water pipe, draining water pipe and boiler drum.

④ If find serious corrosion, should check the strength calculation before hydraulic testing.

⑤ Testing pressure

The testing pressure should comply with the requirements of table 10-1 of “Safety & Technical Supervision Regulation for Steam Boiler”.

⑥ Hydraulic testing sequence

6.1 The hydraulic testing should be conducted under the condition of the surrounding temperature upper than 5℃, if the temperature is lower than 5℃, should take some anti-freezing measures. The temperature of testing water should be higher than surrounding dew point temperature so as to prevent dew on the boiler surface; but too high temperature also is not suitable, because it may cause vaporization or too large stress of temperature difference, in generally, it should be 20℃~70℃.

6.2 After the boiler is filled with water, raise the pressure step by step to 0.4Mpa, do tightness inspection one time, if necessary, can tighten the stud of flange, manhole cover and hand-hole cover for one time.

6.3 Hydraulic testing should be continued slowly, when water pressure is up to working pressure, should stop raising pressure, check it to see whether there are eater leakage or abnormal phenomena, and then raise the pressure to testing pressure. Keep it for 20minutes, if the pressure didn't drop, should make inspection after dropping to working pressure. During inspection the pressure should kept no change.

If find any leakage should well make record for later repairing when the pressure drop to atmosphere.

⑦After hydraulic testing, if find the components meet the following requirements, it should be considered as good.

7.1 No any water drop and water fog on the metal wall and weld.

7.2 No any residual deformation can be observed by eyes.

⑧ Safety measures and attention items

8.1 It is not permitted to tighten flange stud when the pressure is over than 0.4 Mpa.

8.2 In order to avoid happening dangers because of crowd, should provide special mark while conducting hydraulic test.

8.3 No stand the opposite of weld hole, flange and valves while exist pressure.

IX、 Attention for users

The pipeline connected with this boiler should comply with the requirements of national standard of 《Safety Supervision Regulation for Special Equipment》 .

①If the customer need look up the relevant technical documents of LSS type full automatic oil (gas)-fired boiler, please indicate the contact no and the general drawing no. If the customer need look up the boiler quality, please indicate the boiler serial no. If need shift boiler, should transfer all relevant documents at the same time.

②Sometime the actual product may have some difference with this operation manual because of continuous improvement and the alteration of national rule & regulation. For the detail, please refer to the submitted operation manual for all parts and the latest edition of national rule & regulation. We are sorry for no additional notice.

The Company reserves the right to improve, without prior notice.