

Manual for setting up steam boilers

(Bokhar gostar Tabaristan Company)

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Introduction

Steam boilers in sanitary, heating, food, pharmaceutical, fiber, rubber, textile and many other industries that require steam Water is in a production process, it has major uses. Due to the wide use of boilers, the issue of maintenance and cleanliness and prevention of formation Sediments and corrosion are very important for food because lack of proper maintenance will reduce its life and cause its loss and as a result waste. The national capital of the country and also the reduction of the efficiency of the boiler and the productivity of the work will be destroyed, that is why this booklet was prepared and named as the road instructions. Installation and maintenance of the boiler is provided to the respected customers. Steam boilers in Kaveh Karan company with different capacities (according to the request and needs) customers) and different working pressures can be produced and designed according to the English standard (BS2790) or the Iranian national standard number 4231.

The main body of the boiler

The boiler manufactured by Bohar Gostar Tabaristan Company has a main body and front and rear tube plate, furnace and back chamber. It is wet back or dry back, which is subjected to tests after complete assembly and welding. Non-destructive (ndt) is placed according to (NDT MAP) and standard. The mentioned boilers have two tube passes and one furnace pass, and a total of three thermal passes. The first passage includes the furnace, which is attached to the front and back of the air tube. back to the smoke box in front of the boiler and the third passage including pipes connected from the front smoke box to the rear smoke box. The flame formed in the first pass as a mixture of air and materials from combustion at high temperature passes through the second and third pass pipes and into the rear smoke box. It enters and exits from there through the chimney. During this route, the water finds the maximum possible heat from the burning fuel. In the body of steam boilers, there are steam

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valves, hand holes, manholes, and upper layers, each of which It has a movable door and is sealed by a graphite washer. In the price, the front and back doors of the boiler are provided for cleaning the pipes. The three smoke pipes are sealed by expanding the ends of the pipes. After this step, drain the boiler. and is subjected to hydrostatic test.

After closing and sealing the doors, the boiler is filled with water and pressurized to 1.5 times the design



pressure of the boiler. Then Check all the parts of the boiler carefully to make sure there are no leaks in



different parts of the boiler.

Installation of accessories

At this stage, the boiler has been prepared for installation on the base as well as installation of the smoke box, after this process of insulation by stone wool. It is done with a thickness of 70 mm and finally the top of the pot is covered with aluminum or stainless steel sheet. At the end of each section, An inspection certificate is issued by the quality control of the factory. In the next steps, the installation of the valves, the burner of the electrical system and the control of the boiler is done And after the final test and adjustment, the pot is painted and sent to the product warehouse. Due to the sensitivity of the boiler, In its maintenance and repair, the items mentioned in the following sections should be carefully considered, if the buyer uses it If he is not able to fix possible defects from the items mentioned in this booklet, he can contact Bohargostar Tabaristan Company (Metal) for more information. digg) get a call.

Boiler installation location and conditions

The dimensions of the engine house (boiler installation location) should be taken into account with the dimensions of the boiler with open doors and the required equipment such as hardening device and aerator. The water supply, the valve collector, etc., should be designed for the air required for the system. The boiler should be installed in a place that has enough space to clean the pipe. for this reason, there should be a platform suitable for the weight

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and dimensions of the boiler and its accessories at the place of installation of the boiler. This platform should be at least 30 cm longer than the length and width of the boiler and 15 cm higher than the floor of the installation site. around the platform A channel should be considered to direct the water from the engine floor of the house to the sewage well, and also a pond should be prepared near the boiler drain valve. which is always full of water and the upper part of it leads to the well or the outlet of the water and the drain pipe of the steam boiler to suffocate the steam inside The pond should be guided and the pond's door should be movably covered. If the required cabling has been done inside the channel to prevent Any electronic forms, safety tips, the cover on the channel should be light and resistant to possible heavy weights. It is better that The steam boiler should be placed on the relevant platform in such a way that the front of the boiler is facing the entrance door of the boiler installation place (motor house) and the equipment must be There should be a fire extinguisher in the motor house.

Boiler chimney installation conditions

A boiler equipped with a suitable blower can also work without a chimney, but the combustion products must be removed from the boiler in some way. be driven that this action is done by the chimney. The height of the chimney depends on the local regulations, but the conditions of the installation site, such as the building nearby high buildings, wind direction and geographical factors are also effective, the lower the height of the chimney is, the pulling force of the chimney decreases, so The cross-sectional area of the chimney should be considered larger so that the resistance is less. The chimney can be installed on top of the boiler. Combustion, chimney must It should be chosen in such a way that it compensates for the pressure drop caused by the secondary routes. Therefore, in choosing a chimney, the power of the electric motor and the amount of air should be considered. Dehi considered boiler blower propeller. The chimney must be connected to the smoke outlet in a free standing position. The pipe should be upwards to prevent the risk of gas condensation. The cross-sectional area of the chimney should not be less than the cross-sectional area of the smoke outlet of the boiler be

Fuel management system

A valve should be installed in the way of directing the fuel so that it can be shut off in time and quickly in the event of a fire and on the way from the tank to the A one-way valve must be installed in the fuel pump. The

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suction side of the fuel pump must have positive pressure. As a result of the height) in the case of underground fuel sources, the fuel must be pumped to the burner with a maximum pressure of 15 pounds per square inch. Qatar The pipe should not be less than 2" for fuels with gravity of 20 seconds and above. Galvanized pipe should not be used. It is better to use an elbow instead. the pipes must be bent. The fuel pump must be large enough to dispense enough fuel and collect at the lowest point of the tank. be embedded The tank must have the relevant equipment to show the height of the fuel in the tank and the air outlet.

Boiler water supply

The supply water source should be as close as possible to the water pump and direct pipe connections. The water tank should be placed above the pump and the place The water exit from the tank should be higher than the bottom of the tank. If chemicals are injected to treat water only through the feed control valve, A separate small pump should install and inject chemicals at regular intervals. It is recommended to install the sampling valve on the tank and test the water in the tank. The temperature of the water used should be between 80 and 100 degrees. be It is better to install a thermometer and a magnetic water gauge on the water tank so that the person in charge of the boiler can control the volume of water in the tank and its temperature do

Feed water conditions

Natural water is not suitable for feeding the boiler, unless it is properly filtered and hardened and regenerated by adding chemicals. its oxidizing effect has been reduced, oxygen dissolved in water causes rusting of internal metal surfaces, especially smoke pipes The formation of sediments resulting from the solutes causes the destruction of the furnace and smoke pipes and the smoothness of the pipe surface, as well as reducing the transfer rate. It is heated and thus raises the temperature of the metal and lowers the efficiency of the boiler. enough to settle the boiler water solutes and react against dissolved oxygen in it, the daily test should be done regularly To ensure the correct quality of water, and chemicals should be injected appropriately and in sufficient quantity. Oxygen can be dissolved in water It was



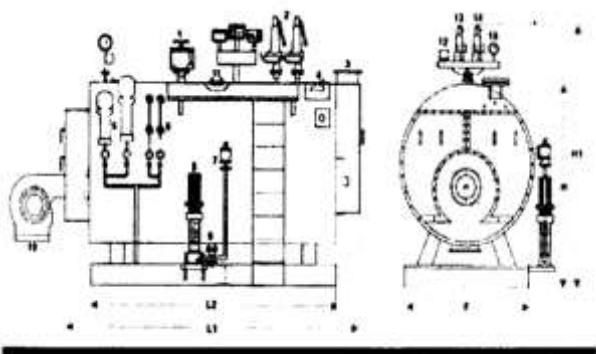
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removed by adding sodium sulfite and hydrazine. In the table below, the specifications of boiler water at , but if the piping has many connections and a long route, the diameter of the pipes should be considered so that the required pressure is provided in the places of consumption.

Steam traps should be used for water in the pipes, and also if the temperature of the pipes To prevent clumping rises due to the passage of steam and the pipes expand. To avoid danger and damage, expansion joints and bends should be used, and there should be a congress between the expansion bends. Pipe diameter In the direction of steam movement, the length of the pipe should be reduced by 1/2" for every 4.5 meters, and retaining clips should be used to restrain the pipes. So that inside the clamps, the pipes can move longitudinally, but their vertical movement is very limited.

Setup instructions:

After installing the boiler on the platform and performing the installation steps, the commissioning operation must be done:



Check that the front and rear inlet parts and compartments are tight and have not loosened during transportation. Check all the electrical connections. Fully open the vent valve on the top of the steam boiler to let the air out, close the main steam valve and open again. Make sure that the faucets and the water supply valve are closed and the drain valve is closed. The water supply control valve must be open. It should be noted that the valves corresponding to the water level controllers are in the counterclockwise direction The clocks are opened, they must be in the open state. Remove all the fuses and use an ohmmeter to check that they are healthy. Make

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sure, check the connection of the body, that all the keys are off. If the fuses are healthy in the first step Put the control fuse of the steering circuit in its place and connect the main switch of the board, in this case the light related to dehydration is on. (Low Water) and the alarm starts to sound, press the mute button (Mute Alarm) to stop the alarm, then the circuit Check the water pump contactor command, if the circuit is without problems, turn the main switch of the electrical panel to the off position, turn on the electricity. connect It should be noted that the pump switch is off and the pump is vented. Then by turning on the pump for a moment, control its speed. Its direction should be counter-clockwise if the engine speed is correct turn on the pump and draw water from the boiler. To adjust the amount of water, before drawing water, you must measure the water level glass as follows: Mark the middle of the fountain glass, which should be at the same level as the normal water level in the pot, and mark the place 12 mm above it. and put it 12 mm above it at the place where the pump shuts off automatically.

(pump off)

60 mm below the mark (pump off) was considered as low water.

Note: 25 mm below the place of dehydration can be considered as the most place of dehydration. After marking as above We turn on the pump and start drawing water until the water level reaches the limit (pump off). Then the corresponding switch unit that is inside the control Set the water level controller in two modes so that the pump is automatically turned off at that stage. Open the boiler water drain valve until the water level drops and the pump turns on automatically, then turn on the pump with the corresponding key Turn it off and continue draining the water until the water level reaches the low water mark. Immediately close the drain valve, set the switch unit located in the level controller for this mode again until the corresponding light turns on and the alarm starts working, stop the alarm sound by the corresponding key, but the low water warning light remains on, again" Open the drain valve and lower the water level until the water level reaches the mark of maximum dehydration, then close the drain valve of the unit. Set the corresponding switch. At this stage, the light corresponding to the maximum water shortage is on and the alarm starts working, by the corresponding alarm key disable and continue as follows to review the work: Turn on the water pump and turn on the switch to

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automatic mode and drain the boiler when the water level reaches the level of turning off as previously set.

(pump off) has been reached, the pump should be turned off automatically. Open the drain valve and check the above steps if

The operation of the above steps was appropriate, the next step should be done as follows:

Open the fuel return valves and ventilate the fuel pump. About 2 liters of fuel should be removed from the fuel line It should be filled completely. You should never start the burner engine before venting, but you can turn the engine by hand to speed up the work. Check that the photocell (electric eye) is in place correctly. Ensure that the burner door and all connections are tight be achieved After all the fuses are healthy, put it in its place and with a . moment of start, control the engine speed and in If it is correct, turn on the boiler



All the steps required to turn on the boiler at specific times from the timer that is installed inside the electrical panel. they take After putting the burner switch (Burner On-Off) on, the blower motor and the burner start working. how many Seconds later, the blower damper starts to open and works with full air (High) and then the damper returns to low (Low), then The ignition circuit, which is completed by the booster transformer and the corresponding spark plugs and the solenoid valve of the ignition gas, works and creates a proper spark. It seems that then the fuel and the spark work together for a few seconds. After the spark is removed from the circuit, the flame becomes stable, the photocell controls the flame, and if there is no flame, the command to turn off and The warning is issued by the siren and the warning light, which the boiler manager is obliged to take appropriate

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action to solve. After the flame stabilizes and the command to continue working by the photocell, the flame will be normal. At this stage, because the boiler is cold, it should not be heated. high or high flame works and it must be checked that the adjustment key is on manual mode and the potentiometer is on low mode (necessary to mention is that the potentiometer is installed on boilers with a capacity of more than 4 tons per hour) so that the body and water of the boiler are heated with a low flame and the steam It comes out from the vent valve on the top of the boiler and the pressure rises to at least 2 atmospheres. When the boiler is completely emptied of air, the air valve can be removed closed the So there is no problem if the flame is high. (It is recommended not to operate the steam boiler with a high flame for the first time) due to the heating of the water inside the steam boiler, the volume of water increases, which By opening the drain valve, the boiler water can be kept at normal level. (In order to control the water level, you can observe and control the water level by looking at the magnetic water column and changing its color) If the boiler works with a high flame and the pressure increases, the corresponding pressure switch (High/Low pressure switch) is adjusted. to change the flame from low to low, and if the pressure increases, the on/off switch will automatically turn off the boiler. The pressure difference between turning off and turning on the boiler can be adjusted. For some reason, the boiler adjusts the pressure automatically. Do not shut off, the safety valve operates at a pressure of 1.1 times the working pressure and discharges the excess steam, thus preventing the explosion of the boiler. will be Explanation that the safety valve of the boiler in the Tabarstal boiler factory is adjusted based on the working pressure desired by the customer.

An operation must be done in every work shift: (daily schedule) ✓

1. Close the water inlet valve into the water-view glass and open the drain valve. The steam should quickly pass through the glass for a few seconds. Let the steam escape. Close the drain valve and open the inlet valve. Water should enter the waterproof glasses quickly If this operation is done slowly, one of the ducts is blocked and the problem should be fixed as soon as possible. } 2. Open the boiler drain valve and allow the drain to be done for a few seconds (this action is to reduce the solutes in the water) } 3. The flame inspection glass at the back of the boiler should be cleaned if it is dirty. } 4. Visit low flame and high flame. } 5- Clean the burner cup daily with paraffin or diesel and cloth. } 6- It is strictly forbidden to clean the cup or fuel pulverizer with a sharp edge or pointed tool, and if repeated, the cup will be out of balance and must be replaced. } 7-Keep the burner parts of the steam boiler clean and clean the leaking oils daily and seal the leaking area.

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Weekly boiler program ✓

- 1- When the burner is on, in the presence of the person in charge (supervisor) of the steam boiler, turn off the feed pump switch and let it work. Evaporation, the water level of the boiler will drop. When the water level reaches the low water mark on the magnetic plate, the burner should be turned off. And the light related to dehydration will turn on and the alarm will start working. Turn off the alarm by the alarm stop button and allow the steam to escape. When the water level reaches the sign of very low water level, at this moment the light corresponding to very low water level will light up and the warning alarm will start working again. again, turn off the volume by the key. After the above steps are well controlled, turn on the pump and fill the boiler with water and Turn on the torch. These steps are done to ensure the operation of the water control system. The boiler should not be left on for a long time. Remain very dehydrated.
- 2- Check boiler warning signs such as bells and lamps.
- 3- If a problem is observed in the above steps, immediately take action to fix it and in case of failure, Use the service of an expert.
- 4- Check the filter on the way to the filter of the feeding pump and clean it if necessary.
- 5- When the burner of the boiler is working, remove the electronic eye, the flame should be cut off immediately and the warning light should be on and the siren should start working. In this way, the flame control circuit is checked. Wipe the electronic eye with a clean soft cloth and put it back.
- 6- Check the ignition electrodes and the fuel cup and clean them if you see deposits.
- 7- If you have an oil gearbox on the burner, check the oil level and if it is dirty, clean it after turning off the burner.

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8- Check the air and fuel damper connections.

Monthly boiler inspection schedule ✓

- 1-Grease the bearings of the blower fan. ✓
- 2-Check the feed pump for leaks and noise. ✓
- 3- Inspect the fuel filter and wash it with diesel if necessary ✓
- 4- Open the water pump strainer and if necessary, remove sediments and possible clogging and clean the strainer completely ✓
- 5- Check the connection keys and valves for leaks and fix them if there are any problems. ✓

Seasonal visit program ✓

- 1-Clean the burner of the steam boiler completely and check for leakage.
- 2-Clean the 2nd and 3rd pass pipes with a special brush (if there is soot inside the pipe).
- 3-Open the man-face and hand-face valves and thoroughly inspect the inside of the boiler for deposits and rust. If it is not cleaned for a long time, in addition to the decrease in the nominal capacity of the boiler, the life of the pipes is also reduced, so the maximum cleaning time should be maintained. The pipes should not work for more than three months.

Cleaning methods

By opening the front and back doors, it is possible to access all the pipes from the front of the boiler. Clean it. Sediment and soot usually collect at the back of the boiler. Soot and sediment related to the second pass of pipes in the return chamber and soot pass Third, soot will collect in the back box (room). By removing the round door of the return chamber, you can enter this chamber and soot and Cleaned the soot deposits that have accumulated there. To re-install the front and rear doors, you must pay attention to the sealing of the doors. And every time the doors are opened, if the connections are damaged, they must be repaired or replaced.

Instructions for turning off the boiler for a short time

In order to turn off the boiler for a relatively "short" period, for example, during the night, one of the following two methods can be used: ✓

- 1- Close the steam valve of the boiler and set the boiler and the feeding pump to automatic mode. With this

method, the pressure inside the boiler is maintained throughout the night and It is ready to be used in the

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morning. Although in this case the operation of the steam boiler is done without a supervisor, but this rule must be followed by the company. Discuss the insurance so that they approve your method.

2- Close the steam valve of the boiler, put the pump on the manual control and raise the water level to near the top of the water table. This action is in order Shrinkage compensation is the result of the decrease in temperature and pressure. Turn off the pump and let the burner turn off at the set pressure. Turn off the feed pump switch and the burner switch. When the burner stops, open it and while the cup burns It is hot, clean it. If this is not done while it is hot, the resulting heat and radiation will cause drying and accumulation of carbon deposits on zinc. The cup will burn. Close the water supply valve. So that the pressure of the boiler drops during the night. This will prevent water from entering the boiler. When starting the next work, before turning on the boiler, be sure to open the water supply valve. Clean the electric eye and the flame sight glass at the back of the boiler The recipe for turning off the boiler for a long time .

In order to turn off the boiler for a long time, one of the following methods can be used: ✓

Steam boiler drying method:

When you turn off the boiler, the pipes, the tube plate of the furnace and all the surfaces that are in contact with the heat and combustion gas must be cleaned. He cleaned the combustion soots. After the steam was discharged and the boiler was half heated, he emptied the boiler and opened the valves of the man and the hand and... and the mud And completely clean the sediment and debris outside and inside the boiler. You should try to keep the boiler completely dry and its humidity as high as possible. take out the floats that control the water level and clean and dry their housings from deposits and rust shells and put them back on do it Open the valves of the air outlet and boiler drain and steam drain. Currently, there are a variety of chemicals available in the market, which by using them The boiler can be kept off. During the shutdown of the

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boiler, the engines should be rotated twice or thrice every week It did not stay in one position for long.

- The way the boiler is drained:

When the boiler is filled with water, turn it off and try to make sure that there are no internal bubbles. The boiler should be watered once a week. be tested and reserve chemicals for water treatment should be injected all the time to prevent oxidation. And also one should be every day Open the steam valve and let the pot work for 10 to 15 minutes with high flame.

Defects that may occur in the system ✓

✓

A- The boiler does not collect water ✓

At this stage, the following problems may arise that must be resolved. ✓

- 1- The pump key is not on. ✓
- 2- The water supply of the boiler has been drained. ✓
- 3- The water supply valve installed on the source is closed. ✓
- 4- The water filter is sedimented or dirty. ✓
- 5- The water pump has air. ✓
- 6- The rotation of the pump motor is opposite. ✓
- 7- The connections on the pump outlet are correct or tight. ✓
- 8- The water supply valve to the boiler is closed or has a problem. ✓
- 9- The electrical connections of the water level control device are not correct or possible. ✓
- 10- The water level control device has problems. ✓
- 11- The float is stuck. ✓
- 12- The valve under the water level control device is not open. ✓
- 13- The water pump contactor is defective ✓
- 14- The connections are not correct. ✓
- 15- The relevant overload relay has worked ✓
- 16- The fuse in the power circuit of the pump is burnt ✓

B- The torch does not start working. ✓

If the burner does not start working, the following problems may have occurred, which must be solved. ✓

- 1- The burner key is not on. ✓
- 2- The fuse in the circuit is burnt. ✓
- 3- The corresponding contactor has a problem. ✓
- 4- The steam boiler is locked out. ✓
- 5- The electric eye is exposed to light. ✓

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- 6- The relevant overload relay has worked. ✓
- 7- Connections are generally not strong. ✓
- 8- The burner door is not closed tightly. ✓
- 9- There is a problem with the electrical circuit. ✓

C- The burner and blower motors are working and no flame is created. ✓

- 1- The connections are not correct and firm.
- 2- The air pressure switches did not work.
- 3- The micro switches of the air and fuel damper path have not worked.
- 4- The fuel source is drained.
- 5- The thermostat is broken or the fuel is cold (when the boiler is working with diesel)
- 6- The rotation of the burner engine or fuel pump or blower engine is the opposite.
- 7- The purity of the fuel is dirty
- 8- The valves of the fuel line are closed.
- 9- Spark is not produced.
- 10- Spark electrodes are dirty.
- 11- Spark electrodes are broken.
- 12- Setting the electrodes is wrong.
- 13- The connections are not complete.
- 14- Transfer of spark motor is broken.
- 15- The air damper is stuck.
- 16- The ratio of air to fuel is not suitable.

D- The lit torch will be turned off immediately. ✓

- 1- The electric eye is dirty. ✓
- 2- There is an obstacle in the path of the light of the flame and the electric eye ✓
- 3- The electrical connections are not strong. ✓
- 4- The electrical connections in the circuit of the electric eye are reversed. ✓
- 5- The current received by the electric eye is low. ✓
- 6- The ratio of fuel and air is not suitable and a complete flame is not created. ✓

E- The torch is turned off during work. ✓

- 1- The fuel has run out ✓
- 2- There is a problem in the fuel line. ✓
- 3- The fuel pump is out of order. ✓
- 4- Water has penetrated into the fuel ✓
- 5- If using diesel fuel, the fuel is cooled ✓
- 6- The electrical connections are loose ✓
- 7- The fuel pump has drawn air. ✓

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- 8- There is a problem with the fuel solenoid valve. ✓
- 9- There is a problem in the ratio of fuel and air ✓
- 10- The electric eye is defective ✓
- 11- The electricity has been cut off ✓
- 12- The control fuse of the steering circuit is burnt. ✓

F-the flame smokes ✓

- 1- Fuel and air ratio is not suitable ✓
- 2- If fuel oil is used, the fuel temperature is low ✓
- 3- The fuel pressure is high. ✓
- 4- Pass pipes two and three are dirty. ✓
- 5- There is a problem in the path of the chimney ✓

G- The torch turns on and off constantly ✓

- 1- The load of the boiler is small compared to its size and capacity ✓
- 2- The push buttons are defective ✓
- 3- The burner door is not closed tightly ✓

Causes of defects in boilers ✓

The main causes of defects and damage in steam boilers (which sometimes cause irreparable damage) are as follows:

- 1- Less understanding of the operation of the automatic system of steam boilers, along with complete trust in the automatic control systems that are intended to prevent overpressure.
- 2- Procrastination in testing safety valves regularly.
- 3- Procrastination in properly maintaining the boiler and auxiliary equipment. This item also includes a fuel flow cut-off device for dehydration.
- 4- Interfering in the work of the automatic system or blocking the safety control.
- 5- Rapid combustion with suspended fuel in the furnace space The remarkable thing about the explosion is that a small boiler can cause irreparable damage. In fact, small steam boilers are more exposed to the lack of care and

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attention due to their small size. However, following the regulations to build and improve the quality of maintenance and inspection reduces the possibility of such incidents .

Thank you - Technical Unit of BoKhar gostar Company