



Method Statement

Operating the Oil Fired Boiler

Version			
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Issue History

Version N°	Date of Adoption	Details of Change Made
1	April 2013	Initial version approved and issued.
2	May 2013	Version 1 modified by adding a section on the routine testing of the boiler's external emergency shut down switch (see Sections 5.3 and 3.7)
3	October 2013	Version 2 modified by adding a description of the use of a newly installed alternative water supply system (see Section 4.7), together with other minor changes.



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1. Purpose and Scope

This method statement sets out the instructions that must be followed when starting up, operating and closing down the oil fired steam raising boiler. It does not cover the inspection, testing and maintenance of the boiler.

2. Necessary Tasks Prior to Steaming the Boiler

The instructions in this section must be carried out before the boiler is put in steam.

- 1 Check the log book to determine if the water treatment plant (softener) has been recharged since last the boiler was steamed.
- 2 If not, recharge the unit using the procedure in Section 4.1
 - ◇ This step may only be omitted if it is certain that the necessary recharging has been carried out.
- 3 Check the level in the blow down tank using the supplied cane as a dipstick.
 - a The blow down tank is located below the oil storage tank.
 - b The level needs to be approx 2 inches (50mm) above the inlet pipe from the boiler.
 - c There is no overflow on the blow down tank. If the tank hasn't been drained to a level low enough to accept the water from the boiler at the end of the day (see Section 3.7) it must be drained at a convenient time during the steaming day
 - ◇ The tank must not be drained
 - ⇒ If the water is hot
 - ⇒ To a level insufficient to cool the steam released during the blow down.

3. Operating the Boiler

3.1. General

- 1 **Ensure that the boiler house doors are anchored wide open whenever the boiler is in use.**
 - ◇ This is a vital safety issue since this is the only way of ensuring that there is an adequate flow of air to the boiler
- 2 Whenever the boiler doors are open and there may be members of the public on site the Tensator barrier should be stretched across the doors to discourage people from wandering in.
- 3 There is a roof to go across the doors when they are both open.
- 4 **Reminder:** ensure you have a good pair of gloves early on as the valves get too hot to handle without them.
- 5 All entries in the logbook must have a time.
 - ◇ There is a clock on the heat source system controller if required.

3.2. Pre-firing Preparations and Checks

3.2.1. Check the Condition of the By-pass

- 1 See section 4.7 entitled Break tank and pump by-pass

3.2.2. Water Softener

Assuming the water softener has been recharged the unit does not require the power to be switched on when the boiler is in use.

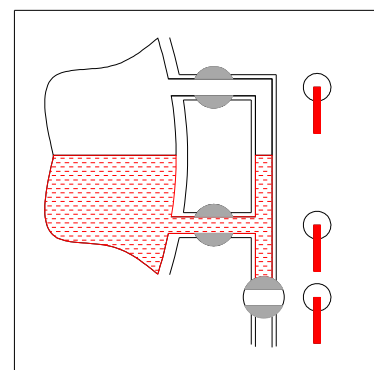
Check the salt level and if necessary top up

- 1 Turn on the water to the unit
- 2 Open the valve from the softener to the boiler make up tank

3.2.3. Water

- 1 Using the log book, confirm the boiler make up tank has been dosed with tannin in the last 2 hours of boiler operation.
- 2 If in doubt dose it anyway
- 3 Enter the dosing into the log book
- 4 Lower the water level in the boiler to the required level
 - ◇ When cold, the boiler is normally kept full of water to minimize the incidence of corrosion.
 - ◇ The required cold level, which allows for expansion on heating, is marked on the sight glass.
- 5 Switch on the main three phase isolator
- 6 On the right hand (Boiler Control) panel:
 - a Turn the *Feed Pump* switch to Off (see Section 4.3)
 - b Switch on the power with one finger on the *alarm mute* button
 - c Reset the *Second Low Water & High Water* warnings and ensure the *Normal Water* light is on,
 - ◇ If the alarms will not reset follow the relevant procedure in Section 4.5
 - d Reset the excess steam pressure switch.

- 7 Ensure the Level gauges are ready to go.
 - ◇ All 3 levers on both gauges should be in the vertical down position.



- 8 Check the level in the blow down tank (it should be approx. 2 inches above the inlet from the boiler)



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- 9 If it hasn't been drained to a level low enough to accept the water from the boiler at the end of the day it must be drained at a convenient time (see Section 2)

3.2.4. Oil

The padlock combination on the oil tank door is 0030

- 1 Turn the oil supply on by opening the valves
 - a by the tank
 - b In the boiler house
- 2 Purge the donkey bottle of air
- 3 If no oil appears at the donkey bottle see suggestions in Section 4.2

3.2.5. Setting the Steam Valves

- 1 Ensure the following steam valves are shut:
 - a Blue valve on top of the boiler
 - b Blue boiler make up tank steam valve (pre-heater)
 - c Blue valve before the pressure reducer by the beam engine
 - d Quarter turn valve that controls the supply to the small engines.
- 2 Open the small green relief valve on the top of the boiler.
- 3 Remove the drain plug on the back of the boiler.

3.3. Igniting the Boiler

- 1 On the left hand (Burner Control) panel:
 - a Check the Burner switch is in the Partial Load position (2)
 - b Check the *Burner On* switch is set to Off
 - c Switch on the power (Main Switch → 1)
 - d Turn the *Burner On* switch to On
 - ◇ After a delay, the burner fan should start up. A minute or so later the cams will move and boiler light
 - ◇ If the boiler doesn't light, when it should, check the emergency stop switch (located on the back wall outside the boiler house). If it's pushed in the power will be off.
- 2 Make a 'Boiler lit' entry in the log book

3.4. Preparing to Supply Steam

- 1 When steam is issuing strongly from the green relief valve, close it
 - ◇ This typically occurs 10-15 minutes after the burner ignites.
- 2 Wait for several minutes until pressure shows on the gauge: when a pressure shows take the following actions:
 - a If steam is required within 15 minutes turn the burner switch to Automatic (1), otherwise leave as is (position 2)
 - b Replace the Drain plug on the back of the boiler



- ◇ This will require a maximum of a couple of turns.

3.5. Ready to Supply Steam

- 1 Observe when the pressure gauge reads approximately 80psi then:
 - a Switch the *Boiler Pump* to Automatic (2)
 - b Switch the *Burner switch* to Automatic (1) if not already done
 - ◇ The boiler can be left in this state until steam is required.

3.6. Supplying Steam to the Building's Plant

3.6.1. Turning on the Steam Supply

- 1 Confirm that the Blue valve before the pressure reducer by the beam engine and the Quarter turn valve that controls the supply to the small engines are closed.
 - a **Warnings:** Be aware that:
 - ◇ Under no circumstances must the steam supply be turned on (Item 2 immediately below) until these closures have been confirmed.
 - ◇ If for any reason, when plant is being operated, it proves necessary to isolate the steam supply at the boiler it is essential to carry out this step before the supply is restored.
- 2 Open the blue valve on the top of the boiler
- 3 Crack the make-up tank steam valve (pre-heater)
 - a Look into the boiler make-up tank and confirm that a small number of bubbles are visible at the water surface.
 - b If there is too much steam, the water will bubble over the top of the tank
 - c Adjust the steam flow as necessary
- 4 Inform the Beam engine they have steam.

3.6.2. Ongoing Actions

- 1 Ensure the Tensator barrier is stretched across the doors at all times to discourage people from wandering in.
- 2 Every two hours: pour a (coffee) cup of tannin into the boiler makeup tank and make a 'Tannin added' entry in the log book.

3.7. Boiler Shutdown

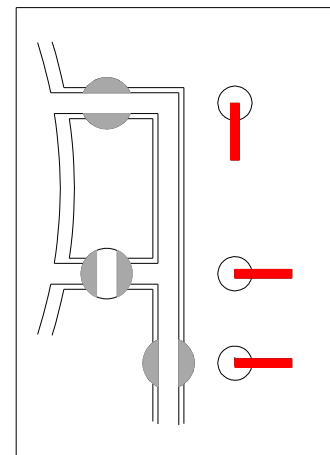
3.7.1. Initial Shutdown

- 1 About 30 minutes before the planned end of steaming take the following actions
 - a On public steaming days, test the external emergency shut down control for correct operation using the procedure in Section 5
 - ◇ Be aware that whilst it is not obligatory to carry out this test when the boiler is steamed on other occasions, the emergency switch:
 - ⇒ May be tested, at any time, at the discretion of a properly qualified and approved boiler operator

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- ⇒ Must be tested, on receipt of a request from the Head of the Boiler Task Area or his/her deputy or the Director responsible for Safety.
- b Turn off the *Main Switch* on the left hand panel (Burner Control)
- c Turn the *Burner On* switch to off
- d Turn off the *Main Switch* on the right hand panel (Boiler Control)
- e Turn the *Feed Pump* switch to off
- f Make a 'Boiler shutdown' entry in the logbook
- g Switch off the main three phase isolator.
 - ◇ Be aware that actions a -g immediately above are taken approximately 30 minutes before the planned end of steaming because the water contains sufficient heat to continue to generate steam over that period.
- 2 Once the engines have stopped, close the main steam valve and the make-up tank steam valve (pre-heater).
- 3 Confirm the level in the blow down tank is such that a satisfactory blow down can be carried out.
 - ◇ **Warning:** If the water level in the blow down tank is not at a satisfactory level it must be adjusted before a blow down is carried out. (See Section 2)
- 4 Using the procedure in Section 4.6, blow down the sight glasses and leave the valves in the positions shown.

- ◇ The top valve (steam) open (vertical down)
- ◇ The middle valve (water) shut (horizontal)
- ◇ The bottom valve (drain) open.(horizontal)



- 5 Blow down the boiler for 10 seconds
- 6 Leave the boiler so that the pressure and the temperature drop naturally.
- 7 Close the 2 oil valves
- 8 Using the remote indicator, read the oil level in the tank and record the level in the logbook.
- 9 Close the valve from the softener to the boiler make up tank
- 10 The boiler house doors need to be left open overnight while the boiler cools.
 - a The boiler room must be secured as soon as possible after this time
- 11 Before leaving the site secure the oil store using the locks provided.
- 12 Return any keys to the key press in the Mill.



3.7.2. Actions to be taken on the following day

- 13 Return on the following day and carry out the following actions:
 - a Open the green relief valve
 - b Using manual control fill the boiler with water until it flows out through the relief valve.
 - c Turn off the water supply as soon as water flows out of the valve.
 - ◇ The valve must be watched at all times whilst this operation is being carried out since the water flow must be manually turned off.
 - ⇒ The flow cannot be stopped automatically because this operation requires the overriding of the high level alarm.
 - d Confirm by visual inspection the boiler house and its contents have suffered no deleterious effects as a result of doors being left open overnight.
 - e Close and lock the doors'.
 - f Return any keys to the key press in the Mill.

4. Miscellaneous Supporting Activities

4.1. Water Softener Recharge Procedure

- 1 Check salt level against the marks on the side of the container
- 2 Connect hose to softener and run to the head race
- 3 Turn water supply to the softener on
- 4 Turn power on
- 5 Ensure the current time (hour) is greater than 2
- 6 Press the Manual Regeneration button
 - ◇ After a few minutes the button will pop back out and start to rotate slowly.
 - ◇ The regeneration process takes about an hour. When it has finished the slot in the Regeneration button will have rotated 360° and will once again be pointing vertically downwards.
- 7 On completion of the regeneration:
 - a Make an entry in the log book (including the date)
 - b Power off
 - ◇ If this is not done, the regeneration cycle will happen automatically at some point and the boiler room will be filled with water.
 - c Water off
 - d Disconnect hose

4.2. No oil at the Donkey bottle

- 1 Confirm that both oil valves have been opened.
- 2 If both the valves have been opened, check the safely valve has not closed.
 - ◇ This valve is kept open by a temperature sensitive fusible link on the front of the boiler and a wire that connects the two.
- 3 Check the oil level at the remote indicator

4.3. Feed Pump Switch (boiler)

- 1 The *Feed Pump* switch has 3 positions:
 - a 0 (Off)
 - b 1 (Manual)
 - ◇ The pump is on and will fill the boiler until its switched to another position
 - c 2 (Automatic)
 - ◇ The boiler will switch the pump on and off as required to keep the level in the normal range
 - ◇ If the boiler is filled automatically before it is up to pressure the level will end up being too high. The heating of the boiler will cause the level to rise even further and trigger the high water alarm. It will then have to be drained through the blow down tank.

4.4. Boiler will not fill

- 1 Check the water level in the in the boiler make up tank.
 - ◇ If this falls below the outlet pipe the pump will contain air which will need to be bled.
- 2 Bleed the pump. To do this:
 - a Ensure the *Feed Pump* is switched on
 - b Loosen the nut on the pump to allow the air to escape.
 - c Continue until no more air is being expelled, then retighten the nut



4.5. 'Normal Water' light is not on

4.5.1. Level too low

- 1 If either of the *Low Water* lights are on then the boiler needs topping up. To top up the boiler:
 - a Ensure the water softener is operational (see Section 3.2.1)
 - b Ensure the power to the Right hand panel (Boiler Control) is on
 - c Turn the *Feed pump* switch to 1 (Manual).
 - ◇ This will start to fill the boiler from the boiler make up tank, which should in turn be automatically topped up from the 1st make up tank.
 - ⇒ The 1st make up tank pump should start up automatically.
 - d The *Second Low Water* alarm does not automatically reset so it needs to be manually tried until the level is high enough for the reset to work.

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- e The *First Low Water* warning light will go out and the Normal water light will come on automatically when the water level is sufficient for the boiler to be fired up. At this point turn the *Feed Pump* switch to 0 (Off)
 - ◇ **Warning:** Do not let the water level go to high.

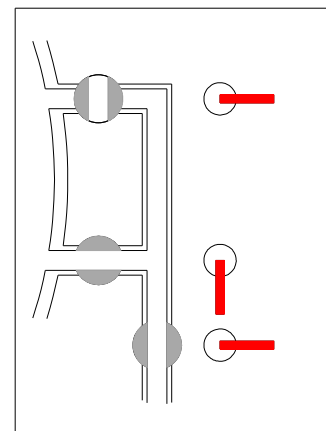
4.5.2. Level too high

- 1 Be aware that the water level is too high if the *High Water* light is on and cannot be reset.
- 2 Reduce the volume of water in the boiler using the following procedure:
 - a Ensure the level in the blow down tank is low enough to accept the water to be expelled.
 - b Open the blow down valve to release water from the boiler
 - ◇ It will flow under gravity or steam pressure into the blow down tank.
 - ◇ If there is too much water in the blow down tank it must be reduced using the technique in Section 2
 - ⇒ **Reminder:** There is no overflow on the blow down tank. It can be drained as the boiler is being emptied if the boiler is cold but it mustn't be allowed to drain too far.(see Section 4.5)
 - ◇ When the *High Water* warning light goes out, close the blow down valve.
 - ⇒ The warning light resets itself, but it is necessary to keep an eye on it to determine when the blow down valve can be shut.

4.6. Blow down the sight glasses

- 1 The procedure set out in this section is used to remove any accumulated debris from the sight glasses, using the pressure in the boiler to expel water and debris into the blow down tank.
- 2 Each glass (there are 2) has 3 valves:
 - ◇ Top (steam) – Open when the handle is vertically down
 - ◇ Middle (water) – Open when the handle is vertically down
 - ◇ Bottom (drain) – Open when the handle is horizontal pointing out from the boiler
 - ◇ The blow down tank contains cold water which starts to cool the expelled water / steam so it can be drained safely to waste when cold.
 - ⇒ **Reminder:** The blow down tank must not be drained when it is hot
- 3 Blow down each site glass using the following procedure:

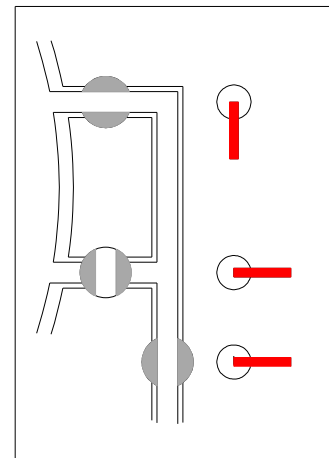
- 4 Ensure the middle (water) valve is open (vertical down)
- 5 Shut the top (steam) valve (horizontal)
- 6 Open the bottom (drain) valve (horizontal) for 3 seconds



- 7 Close the bottom (drain) valve (vertically down)

- 8 Shut the middle (water) valve (horizontal)
- 9 Open the top (steam) valve (vertical down)
- 10 Open the drain (bottom) valve (horizontal)

- 11 Ensure the valves are left in these positions to avoid creating a vacuum in the boiler as it cools.



4.7. Break tank and pump by-pass

The system was originally installed with a break tank and pump (see figure Figure 2 Water Circuit). This was later bypassed by installing a pipe between the inlet and the pump outlet and some valves. It is expected that the bypass will normally be used and therefore the pump and break tank will not. The relevant checks that must be made are:

- 1 If the bypass is used check:
 - a The quarter turn valve in the bypass tube is open.
 - b The quarter turn valve to the break tank is closed.
 - c The quarter turn valve between the pump and the bypass tube is closed.
 - d The power to the pump is off.
- 2 If the bypass is not to be used check:
 - a The quarter turn valve in the bypass tube is closed.
 - b The quarter turn valve to the break tank is open.
 - c The quarter turn valve between the bypass tube and the pump is open.
 - d The power to the pump is on.

5. Boiler Emergency Shut Down

5.1. From within the Boiler House

- 3 On the left hand panel (Burner control) turn off the power (Main Switch → 0)

5.2. External to the Boiler House

- 1 Press the Emergency stop switch on the outside of the back wall of the boiler house.
 - ◇ **Warning:** Because there will be pressure in the system this will NOT stop the Beam Engine, the line shafting or the small engines. If it is necessary to isolate the steam operated plant from the boiler follow the procedure in Section 5.4.

5.3. Testing the External Emergency Shut Down Switch

- 1 Ensure the oil burner is flaming correctly
- 2 Press the emergency shut down button
 - a Confirm that the flame has been extinguished



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- 3 Pull out the emergency button
 - a Confirm that the burner goes through its normal start up routine and that the burner flame is reinstated in due course
- 4 Record the successful outcome of the test in the boiler log book
- 5 **Warning:** be aware that:
 - a If pressing the external stop button fails to extinguish the burner flame the boiler must be shut down using the procedure set out in Section 5.1.
 - ◇ If the boiler fails any aspect of this test then, once the flame is extinguished, no further attempt must be made to restart the boiler.
 - b **Report any failure to a competent person as quickly as possible.**

5.4. Isolation of the Steam Operated Plant

- 1 If accessible close the main steam valve (blue) on the top of the boiler
 - ◇ This action isolates all steam operated plant
- 2 Close the Blue valve by the Beam Engine
 - ◇ This action isolates the Beam Engine and line shafting
- 3 Close the quarter turn valve by the Weir pump
 - ◇ This action isolates the small engines.

Oil Fired Boiler Operation

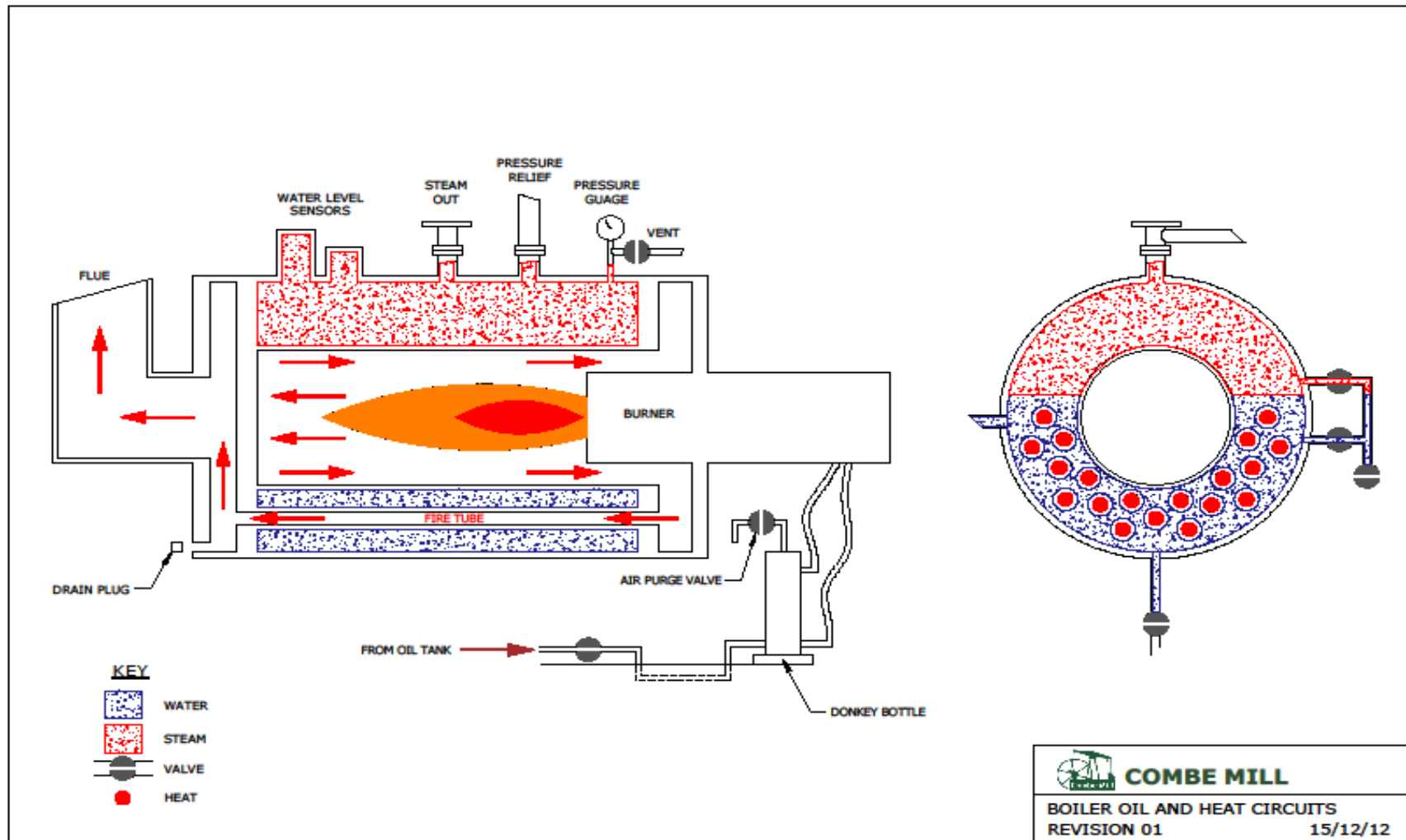


Figure 1 Oil and Heat Circuits

Oil Fired Boiler Operation

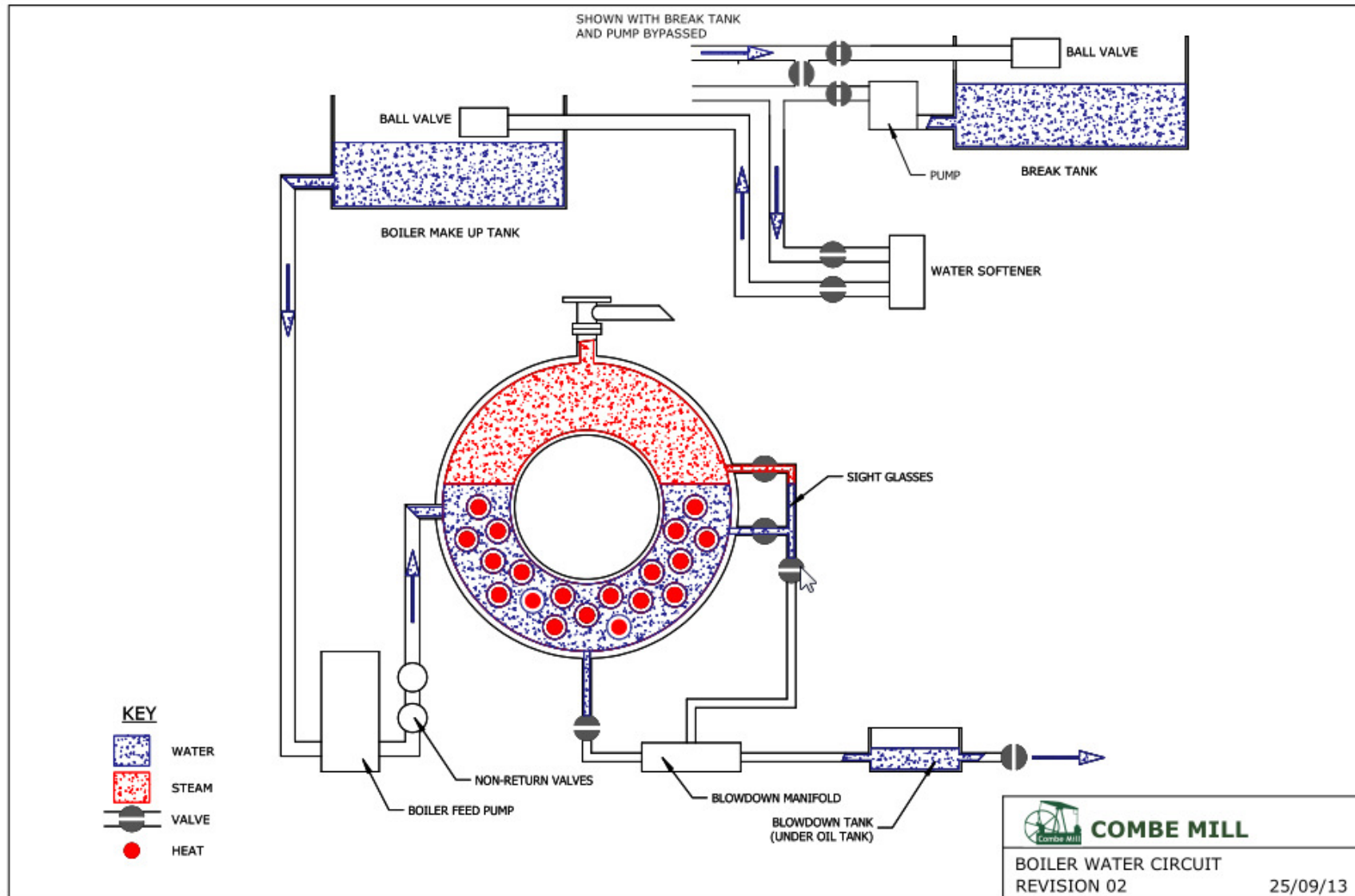


Figure 2 Water Circuit

Oil Fired Boiler Operation

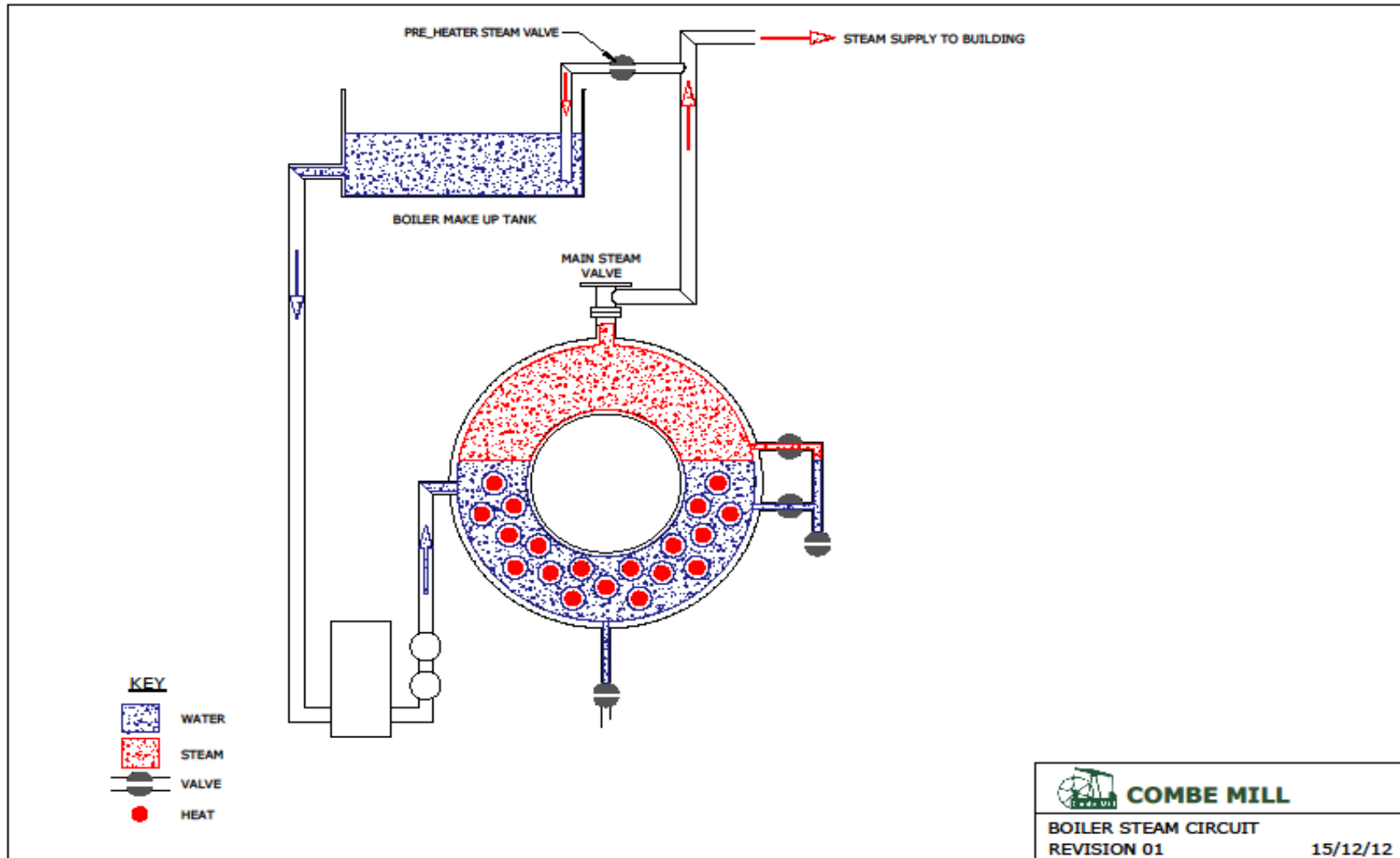


Figure 3 Steam Circuit