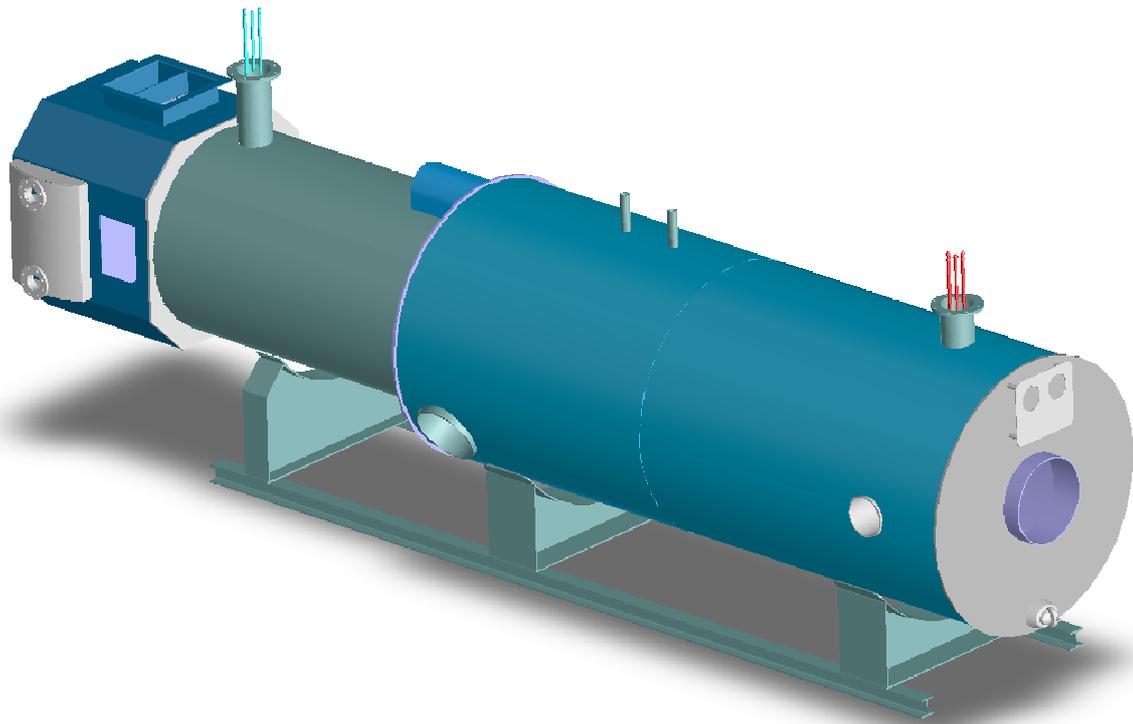


## ----BBK BOILER----

### ----MAINTENANCE AND OPERATING MANUAL----

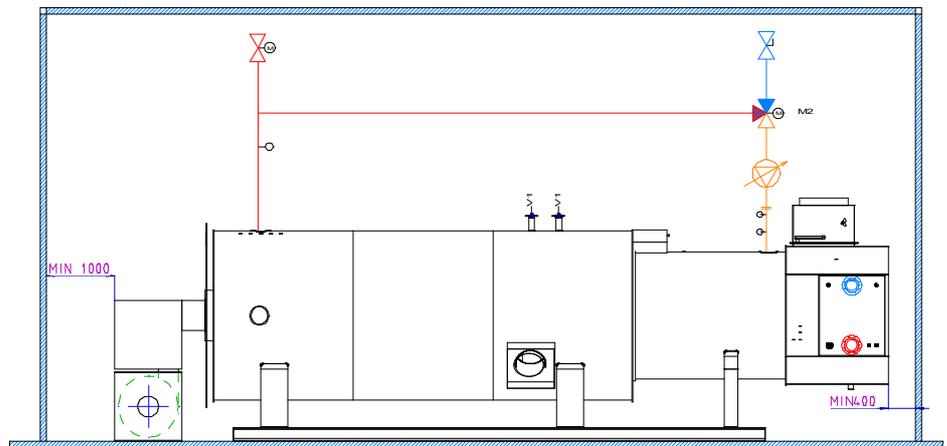


BOILER TYPE	Nominal capacity in kW	Nominal load O.W. in kW	Nominal load B.W. in kW
BBK 2.00	2326	2406	2674
BBK 2.50	2908	3007	3343
BBK 3.00	3490	3610	4012
BBK 3.50	4070	4210	4678
BBK 4.00	4652	4813	5347
BBK 5.00	5815	6016	6684
BBK 6.00	6978	7219	8020
BBK 6.50	7500	7759	8620
BBK 7.00	8140	8421	9356
BBK 8.00	9304	9625	10694
BBK 9.00	10467	10828	12031
BBK 10.00	11630	12031	13367
BBK 11.00	12793	13234	14705
BBK 12.00	13956	14437	16041

## 1. THE BOILER HOUSE

- 1.1 The boiler must be placed in a boiler house, unless it is installed in an operational area (a workshop or such like). The latter may not be used in a manner that creates a fire hazard or can cause damage to the boiler.
- 1.2 The space between the boiler(s) and the walls must be sufficient to accommodate assembling and dismantling the burner, pumps, flame tubes, etc.
- 1.3 Safe and straightforward access to the boiler house must be guaranteed at all times.
- 1.4 There must be enough electric lighting fitted in the boiler house, using permanent fittings, to facilitate executing work on the unit, even in the absence of natural light.
- 1.5 An electrical switch must be fitted in the vicinity of the firing unit, and at a location that is accessible under all circumstances, which is used to shutdown the burner(s). The lighting may not be connected to the same electrical group as the firing unit.
- 1.6 The boiler house floor must be capable of bearing the load of the weight of the boiler when filled plus all corresponding products, while taking pressure points of the boiler cradles or slider beams into account.  
The floor must also be level and smooth so that the boiler cradles/slider beams can distribute weight across their entire surface and the boiler is positioned horizontally.

Provisions for sufficient ventilation must be fitted in the area where the boiler is set up for combustion air and ventilation. The operation of the ventilation (aeration and venting) must be in line with the local and national regulations.



- 1.7 Air which is contaminated with mists or components of crop protection products or other chemicals (propellants from aerosols) etc, must be prevented from being sucked into the burner ventilator at all times.  
This can result in major and irreversible corrosion in the boiler and must therefore be prevented **at all times**.

### 1.8 **Low water level safety device**

A low water level safety device must be fitted to the boiler on the boiler section and a low water level safety device on the economiser section, which makes it impossible to operate the boiler if the boiler is not completely filled with water.

The low water level safety device must be CE approved and must comply with the legislation of the local and national bodies.

### 1.9 **Mechanical overpressure safety device**

The boiler must be fitted with one or **more** (subject to the Capacity) mechanical overpressure safety device(s). The dimensions of the fittings on the heating unit are in conformance with **NEN 3028**.

The following must be stated on a safety valve:

- the identification symbol or type designation of the manufacturer;
- the pressure setting in bar overpressure;
- the maximum discharge capacity, in kW, at the corresponding pressure setting for the safety valve as supplied by the manufacturer.

The following points must also be taken into consideration:

- Minimum diameter of safety valve(s) clearance 50 mm;
- Clearance calculation and number of mechanical safety valves must be in conformance with CE legislation, local and national legislation at the very least.

## 2 **Maximum thermostat boiler**

A **(fail safe)** maximum thermostat must be fitted to the boiler, with a maximum adjustable temperature setting of 108 °C.

The maximum thermostat must deactivate and lock the boiler when the set temperature is achieved.

**If the thermostat is set above 98°C, then the unit must be fitted with a minimum water pressure (pressure switch) safety device.**

The safety device must be set to a minimum of 0.5 bar and must be fitted directly on top of the boiler.

The safety device must deactivate and lock the burner if the water pressure drops below the set pressure.

## 3 **THE STACK**

We shall submit the stack diameter.

The length of the stack is subject to the conditions on site and must comply with local/national legislation.

If a stack is used that is not directly fitted to the boiler, then the flue gas flow must be introduced at the entry of the stack as a flow.

In this case, the stack can be positioned either inside or outside the boiler house.

The connector outside the boiler house must be insulated.

A drainage opening (diameter ½") must also be fitted on the lower side of the stack to discharge rainwater and any condensation formed during firing up.

In order to combat condensation of the flue gasses, the stack can be constructed with a double-wall or insulated using alternative methods.

#### 4 THE FEED WATER

The water used as feed water for the central heating unit must be treated if the water contains components which may cause formation of scale deposits in the boiler, or have a potential corrosive effect.

Scale deposits are formed by hard water.

Certain variants of scale deposits can cause such a highly restrictive effect on the heat transportation that they cause damage to one or more flame tube(s) and the furnace.

The corrosiveness of the water is primarily caused by the presence of oxygen and/or free and bound carbon dioxide.

The feed water treatment used must restrict the hardness, oxygen and bound carbon dioxide levels in the water.

On account of the aforementioned reasons, it is clear that the feed water must have a very low or no hardness, more so as scale deposits can be difficult to remove once they have formed depending on their composition.

The hardness of the feed water used for the central heating system is subject to the hardness of the make up water.

In turn, the hardness of the make up water is subject to the method used to treat the hard water.

It is therefore important that the procedures of any water treatment units used are strictly observed.

We have set the following requirements for the feed water:

➤ hardness	:	max 0.1° D
➤ -Ph at 25° C	:	min between 9 and 10
➤ -oxygen	:	max 0.1 mg/kg
➤ -oil	:	max 1.0 mg/kg
➤ -Cu	:	max 0.1 mg/kg
➤ -Fe	:	max 0.3 mg/kg
➤ -KMnO4	:	max 10 mg/kg
➤ Colour	:	clear

#### 5 COMMENTS

There are well-established companies in the field of water treatment and purification that provide service contract based services which include checking the condition of the water and making recommendations accordingly.

The boiler must be connected with an expansion vessel/system.

This must have enough capacity to hold the expanded water.

We would prefer a closed system, which ensures that the introduction of oxygen and other hazardous gasses is limited an absolute minimum.

**Oil expansion systems where the oil comes into contact with high temperatures are strongly discouraged in relation to the mixture of oil in the boiler and heating circuit.**

**This can cause substantial damage to the boiler and the heating unit.**

## 6 FILLING THE BOILER

Before filling the boiler with water, use the feed water analysis results to confirm that the water meets the conditions we set.

See point 4.

Take care that there is sufficient de-aeration when filling the boiler.

Ensure that the water connectors are in the open position when filling the unit.

This ensures that the entire unit is filled.

After filling you can close the water connectors that must be closed.

## 7 FIRING UP THE BOILER

Check whether the mud holes, manholes and inspection hatches on the boiler are closed.

Establish whether the free discharge of the flue gasses through the stack is guaranteed.

Check that the expansion vessel/system is open and operational.

**All boiler and any condenser safety devices must be set correctly and tested before starting.**

Ensure that the boiler/buffer pump is switched on (minimum 15 Hz).

Firing up must be a gradual process.

Fire up the boiler to 65°C using the small flame and then on automatic; this will fire it up to the set temperature, for example: 95°C.

The boiler will condense when firing up from cold, especially when fired with natural gas, large volumes of moisture from the flue gasses on the cold boiler surfaces.

This condensate can be drained off via the condensation drain on the smoke box on the rear of the boiler.

The drain must be connected to a steam trap at the boiler.

The maximum temperature of the unit must be set in conformance with point 2.

The maximum working pressure is 2 bar, unless stated otherwise on the name plate.

The safety devices must be examined in the event that these pressures are exceeded.

Therefore, the condition and operation of these must be checked regularly.

**Unauthorised changes to the load settings for these devices are strictly prohibited.**

**In particular, overloading or deactivating these devices is taken as a serious violation of the (1869) Steam Act.**

## **BOILER INSPECTION AND MAINTENANCE**

Regular checks must be made of the flue gas temperature.

The normal flue gas temperature is between 65 and 95°C, subject to the load status of the burner.

If this exceeds 125°C, the inspection hatch on the smoke box must be dismantled and checks must be made for any visible contamination (any traces of soot).

If this is the case, the burner supplier must be contacted as the burner is out of alignment and needs to be realigned.

Contact BKC if the boiler requires cleaning.

More frequent cleaning is required if oil is used for firing (emergency operation) than if gas is used for firing.

Check the flue gas thermometer by submersing the sensor in boiling water (100°C) occasionally.

## **CHECKS**

Regularly check the smoke box, manholes/ mud holes and inspection hatches for leaks.

Regularly check the flange packing seals for leaks.

Regularly check the temperature and pressure.

Check the thermostat 2 x per year.

Adjust the setting on the thermostat to a temperature that is lower than the actual temperature of the boiler at that time.

The burner should then deactivate and enter malfunction mode.

Then return the thermostat to the original temperature.

## **ANNUAL CHECKS**

- Inspect and clean the boiler on the flue gas side once a year.
- Replace packing seals in the event of leaks in manholes/mud holes and inspection hatches.
- Annual water quality checks/samples by a company that specialises in this field.
- **Annually purge boiler section and economiser.**  
It will be immediately evident whether the water is dirty as soon as the purge tap is opened.  
Purging must be continued until the water runs clear again.  
The BBK boiler has two purge fittings, namely one on the boiler section and one on the economiser section.  
**Purging is required to remove any sludge and drab and to prevent damage as a result of this.**  
We recommend that these activities are executed by the company that also checks the Water quality.
- Check the burner brickwork for any damage or cracks.
- We refer to the procedures of the supplier for maintenance of the burner.
- Fill and fire up the boiler as stated under points 6 and 7.
- Retighten the bolts on the corresponding inspection hatches after firing up the boiler.

## **CLEANING FLUE GAS SIDE OF THE BOILER**

Inspection hatches have been fitted to the side of the boiler for cleaning the flue gas side of the boiler.

All flame tubes can also be inspected and cleaned using flame tube brushes or high pressure cleaning via these hatches.

The soot from this process can be removed via the soot hatch in the flue gas unit i.e. condenser.

### **Malfunctions**

<b>Malfunction</b>	<b>Cause</b>	<b>Remedy</b>
Water running out of inspection hatch	Condenser discharge blocked	Clean condenser discharge
	Boiler temperature too low	Check burner setting thermostat setting min boiler temperature 65°C
	Leak on flue gas side	Check flame tube furnace contact supplier
Burner is extinguished through back pressure	Condenser or discharge blocked	Clean condenser discharge
	Boiler contaminated flue gas side	Clean flame tubes clean smoke box
Pressure drop	Leak in packing seals	Check packing seals and replace where necessary
	Leak on flue gas side	Check flame tubes furnace contact supplier
	Leak in purge/safety devices	Check whether the appendages are properly closed contact supplier
Sudden pressure differences	Expansion vessel over filled with water	Purge expansion vessel
	Expansion vessel valve closed	Open valve

## Annual maintenance checklist

- Check inspection hatch packing seals.
- Check manhole / mud hole packing seals.
- Burner check (burner supplier).
- Check brickwork /insulation trim around burner head container.
- Purging boiler section.
- Purging economiser section.
- Check water quality.
- Clean smoke box.
- Clean condenser.
- Clean siphon basin.
- Inspect flame tubes and clean where required.
- Check safety.
- Check sight-glass on the side of the boiler.
- Tidy up boiler house.

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