Operating and service instructions

for contractors

Vitoplex 100-LS
Type SXD, 0.26 to 0.7 t/h
Oil/gas low pressure steam boiler
Permissible operating pressure 1 bar (0.1 MPa)

VITOPLEX 100-LS

5692729 GB 3/2019

Please keep safe.

Safety instructions

Please follow these safety instructions closely to prevent accidents and material losses.

Safety instructions explained

Danger
This symbol warns against the risk of injury.

Please note
This symbol warns against the risk of material losses and environmental pollution.

Note
Details identified by the word "Note" contain additional information.

Target group

These instructions are exclusively intended for qualified contractors.

- Work on gas installations may only be carried out by a registered gas fitter.
- Work on electrical equipment may only be carried out by a qualified electrician.

Regulations to be observed

- Pressure Equipment Directive
- Health and Safety at Work Act (BetrSichV) [Germany] and extended technical rules for operational safety (TRBS)
- Country-specific safety regulations for the installation site
- National installation regulations
- Statutory regulations for the prevention of accidents
- Statutory regulations for environmental protection
- Codes of practice of the relevant trade associations

Safety instructions for working on the system

Commissioning

Note
Unpleasant odours may develop during commissioning. Ensure the installation room is well ventilated.

Before working on the system

- Close the fuel shut-off valve and secure against unintentional reopening.
- Isolate the system from the power supply, e.g. by removing the separate fuse or by means of a mains isolator, and check that it is no longer 'live'.
- Safeguard the system against reconnection.

Hot surfaces

Danger
Hot surfaces can lead to burns. Never touch hot surfaces, e.g.
- Steam pipes
- Hot water pipes
- Cleaning apertures and closures on the boiler system
- Boiler doors, as well as components behind the doors

Observe occupational safety. Wear protective clothing where necessary.

Electrostatic discharge

Please note
Electronic assemblies can be damaged by electrostatic discharge.
Prior to commencing work, touch earthed objects such as heating or water pipes to discharge static loads.

Repair work

Please note
Repairing components that fulfil a safety function can compromise the safe operation of the system.
Replace faulty components only with genuine Viessmann spare parts.

Safety instructions (cont.)

Auxiliary components, spare and wearing parts

Please note
Spare and wearing parts that have not been tested together with the system can compromise its function. Installing non-authorised components and making non-approved modifications or conversions can compromise safety and may invalidate our warranty.
For replacements, use only original spare parts supplied or approved by Viessmann.

Dismantling and disposal

When dismantling and disposing of thermal insulation materials and gaskets on the gas side, observe the applicable safety regulations.
The product and its components must be disposed of according to local environmental regulations.
This applies in particular to the disposal of thermal insulation materials and gaskets/seals on the gas side.

Safety instructions for operating the system

General

The materials included in the product pose no threat to health during operation.

If you notice oil leaks or the smell of gas

Danger
Escaping fuel can lead to explosions which may result in very serious injuries.
- Do not smoke. Prevent naked flames and sparks. Never switch lights or electrical appliances on or off.
- Close the quick-acting fuel valve and shut-off valve.
- Ventilate the boiler house.
- Evacuate any people from the danger zone.
- Notify your gas or electricity supply utility from outside the building.
- Have the power supply to the building shut off from a safe place (outside the building).

If you smell flue gas

Danger
Flue gas can lead to life threatening poisoning.
- Shut down the system.
- Ventilate the installation site.

Draining hot water

Please note
The blow-down and TDS water from boiler systems can reach temperatures of over 100 °C. Before draining water into the sewage system, allow it to cool to a temperature of < 35 °C. If necessary, consult the local water board.

Draining condensate from the flue gas side

Please note
When starting up the boiler system, or under certain operating conditions, condensate may build up in the flue passes, the flue gas collector and the downstream flues, including the chimney.
The condensate must be drained away safely by means of suitable installation measures put in place by the system installer.

Subject to the regulations in the country concerned, this condensate may need to be neutralised. In such cases, consult the local water board or the body responsible for issuing permits.

General information

Shut down the boiler immediately if there is any safety-related damage.
Observe safety-related instructions.
After an accident, the condition of the system must not be changed before the investigation takes place, unless necessary in order to rescue people or prevent further damage.
Only authorised personnel are permitted to enter the boiler house.
Keep the boiler house clean at all times.
Do not store anything in the boiler house.
Keep exits clear.
Never use the boiler house or system components as a drying area.

The operating personnel must log the following:
- Settings
- Readings
- Faults
- Replacement of spare parts
- Repairs

Any defects must be dealt with immediately by trained personnel, e.g.:
- Abnormalities on weld seams
- Leaks
- Heavy corrosion
- Faulty instrument displays
- Noise in the boiler

Safety instructions (cont.)

Faults and defects that cannot be remedied locally must be reported to the manufacturer. Protect all boiler parts and control equipment from rain, water leaks and expelled steam.

Index

Symbols

Symbol	Meaning
	Reference to other document containing further information
	Step in a diagram: The numbers correspond to the order in which the steps are carried out.
	Warning of material losses and environmental pollution
	Live electrical area
	Pay particular attention.
	▪ Component must audibly click into place. or ▪ Acoustic signal
	▪ Fit new component. or ▪ In conjunction with a tool: Clean the surface.
	Dispose of component correctly.
	Dispose of component at a suitable collection point. Do **not** dispose of component in domestic waste.

The steps in connection with commissioning, inspection and maintenance are found in the "Commissioning, inspection and maintenance" section and identified as follows:

Symbol	Meaning
	Steps required during commissioning
	Not required during commissioning
	Steps required during inspection
	Not required during inspection
	Steps required during maintenance
	Not required during maintenance

Note

All diagrams in this document are schematic, illustrative examples.

Intended use

Note
Applies to the product including all components

1. Operate under defined Viessmann general and operating conditions (standard conditions) for Vitoplex steam boilers and accessories, e.g. temperature range, min./max. humidity, air pressure, etc.
2. Use the specified equipment and auxiliary materials (lubricants, spare and wearing parts, etc.)
3. Use defined fuels.
4. Read, observe and comply with associated product documentation, e.g. technical guides, installation/service/operating instructions.
5. Only install and operate in heating systems as per EN 12953 and 14394.
6. Only use for steam generation or water heating.

Intended use (cont.)

7. Only use for heating water according to EN 12953, TRD 611 and 612, and VdTÜV/AGFW datasheet (TCh 1466/FW510).
8. Equip for local operation according to regulations specific to the country and site.
9. Fixed installation
10. Use only components approved for the specific system.

Note
Any use not complying with the above points will be deemed to be ***inappropriate****.*

Manufacturer approval
Any usage not as intended must first be approved by the manufacturer.

Exclusion of liability

- Inappropriate use without manufacturer approval
- Incorrect use of the steam boiler or its components
- Incorrect operation
- Modification of system components not complying with their intended function

Product information

Vitoplex 100-LS, type SXD
- Fuels: Fuel oil and natural gas
- Steam output 0.26 to 0.7 t/h
- Permissible operating pressure up to 1 bar (0.1 MPa)

Spare parts lists

Information about spare parts can be found on the Viessmann spare parts app.

Download on the App Store

GET IT ON Google Play

Shutting down the system

Brief interruptions of operation

If you temporarily do not wish to use your boiler system, maintain the boiler water temperature at 95 °C to prevent corrosion through ingress of oxygen into the boiler water.

Longer interruptions of operation

Shut down your heating system completely if it will not be needed for longer periods (several months).

- Before taking the boiler system out of use for a longer period, we recommend you take certain steps, e.g. protecting the system against frost or preserving the heating surfaces.
- To preserve the heating surfaces, first thoroughly clean the surfaces on the flue gas side. Then preserve these surfaces with a preserving oil/graphite mixture.
- To protect the water side, we recommend flooding the boiler with degassed, oxygen-free and treated water with low salt content and added oxygen binders (e.g. sodium sulphite). Then close the steam shut-off valve.
  Check the concentration of the oxygen binder at least every month and replenish if required. When doing this, ensure that the binder is well mixed with water inside the boiler.
- Another option is that of dry preservation, which is recommended for shutdown periods of longer than 4 weeks.
- When there is a risk of frost, drain the boiler and the heating system via the drain valve. Open the shut-off control valve as well as the air vent valves.

Maintenance instructions

We recommend having the boiler system serviced regularly to ensure fault-free, efficient and environmentally responsible operation.
The boiler should be cleaned regularly to prevent the flue gas temperature rising with increasing contamination, which leads to higher energy consumption.
We recommend the installation of a flue gas thermometer. Monitoring the flue gas temperature highlights incorrect burner adjustment and the level of boiler contamination.

Excessive flue gas temperatures through contamination or altered burner adjustment reduce efficiency. Where necessary, clean the boiler or adjust the burner settings.

Steps - commissioning, inspection and maintenance

Commissioning steps
Inspection steps
Maintenance steps

Adjusting the pressure regulator and safety pressure limiter

1. Set the safety pressure limiter response pressure a little higher than the setting of the pressure regulator.
2. Secure the protective cap again on the safety pressure limiter to prevent any unauthorised adjustment at a later time.
3. During commissioning, adjust the pressure regulator to the required operating pressure.
   Never adjust the pressure regulator again after this.

   Note
   Pressure regulators have one setting screw for the switching point (e.g. 0.45 bar/45 kPa) and one for the switching differential (e.g. 0.02 bar/2 kPa). This means that the pressure regulator starts the burner at 0.43 bar/43 kPa and shuts it down at 0.45 bar/ 45 kPa.

Commissioning the system

According to the German Operational Safety Ordinance, steam boilers with a safety pressure **in excess of 0.5 bar/50 kPa** must be supervised. In accordance with conformity assessment diagram no. 5 of the Pressure Equipment Directive, these boilers must be classed as category III. Prior to commissioning, the system must be tested by an approved inspection body (e.g. TÜV [Germany]).

Details provided by the burner manufacturer and regarding accessories

1. Open the boiler door.
2. Check that the turbulators are fully inserted into the hot gas flues (see page 14).
3. Check that the ventilation air aperture in the installation room is open.
4. Check the function of the water treatment system.
5. Fill the steam boiler with treated water higher than the low water indicator level.

   See manufacturer's documentation for the burner.

   Note
   Only operate steam boilers with suitable water.

   For water quality requirements, see from page 21.
6. Check all fitted components, such as pipework, valves, controllers, pumps, etc. for function and leaks.
7. Check the oil level or the gas supply pressure.
8. Open the flue gas damper (if installed).
9. Check that the cleaning aperture on the flue outlet is closed.
10. Open the shut-off valves in the oil lines (at the tank and filter) or the gas shut-off valve.
11. Switch ON the mains isolator, the switch for the feedwater pump and the burner ON/OFF switch, in that order.

    Burner manufacturer's operating instructions
12. Start the boiler with a low heating output (burner stage 1 or partial load). Slowly ramp the burner up to the required operating pressure.
13. Slowly open the steam valve after the required operating pressure has been reached.
14. Only then should the full burner load be enabled.
15. While the system heats up, check the correct function of all control and safety equipment.
16. Observe the pressure and temperature measuring devices.
17. Check the covers for leaks and retighten if necessary.
18. Check the boiler door and cleaning cover for leaks after approx. 50 hours run. Tighten the screws.

Commissioning the system (cont.)

Note
We recommend that you operate the boiler constantly at the required operating pressure. The ongoing operation of the boiler at pressure is harmless, even if no heat demand occurs for a longer period of time. In systems comprising several boilers, one of which is constantly only used as a standby boiler, operating mode changeover should take place at longer intervals. For example, during the annual inspection of the entire system.

Notice of completion

Within 4 weeks of the combustion equipment being commissioned, the operator must notify the local flue gas inspector accordingly [check local regulations].

Shutting down the system

⚠ **Danger**
Opening the boiler connections and apertures whilst the boiler is under pressure can lead to a high risk of severe personal injury.
Only open the connections on the water side and steam side, as well as the inspection ports, after the boiler has been completely depressurised.

! **Please note**
Negative pressure in the DHW cylinder can cause material damage.
The air vent valve must always be open when draining the DHW cylinder with a suction pump.

1. Close the shut-off valves in the oil lines (at the oil tank and filter) or the gas shut-off valve.
2. Switch OFF the burner and the feedwater pump. Pull the plug-in connector from the burner.
3. Isolate the system from the power supply.
4. Close all valves.

Closing the draught stabiliser (if installed)

1. Start the burner.
2. Shut the system down while pre-purge is active. The control disc is then closed.

Opening the boiler door and cleaning cover

⚠ **Danger**
When working with high temperature insulating materials that contain zirconium or aluminium silicate ceramic fibres, fibre dust may develop. This fibre dust can be harmful to health.
Only trained personnel may adjust or replace the insulation. Wear suitable protective clothing, especially breathing equipment and safety goggles.

Note
On gas burners, remove the gas supply pipe.

Opening the boiler door and cleaning cover (cont.)

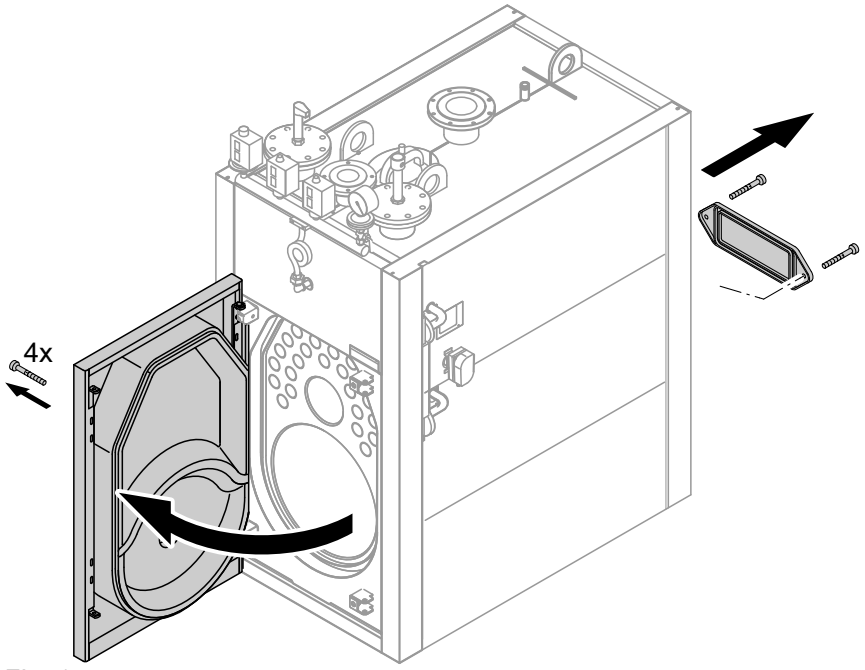

Fig. 1

Removing and cleaning the turbulators

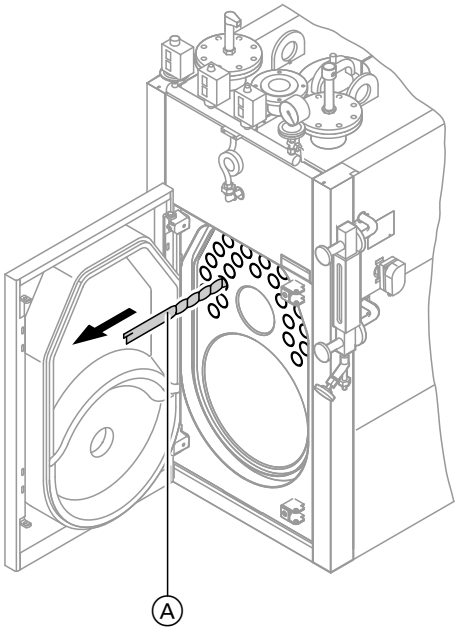

Fig. 2

Remove turbulators Ⓐ without force; for this, use the turbulator extractor, which is part of the cleaning equipment.

Cleaning the heating surface, flue outlet and flue

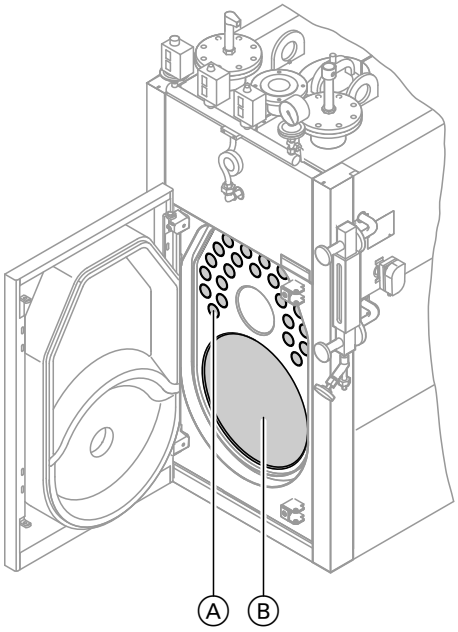

Fig. 3

1. Clean flues Ⓐ and combustion chamber Ⓑ with cleaning equipment and remove combustion residues.

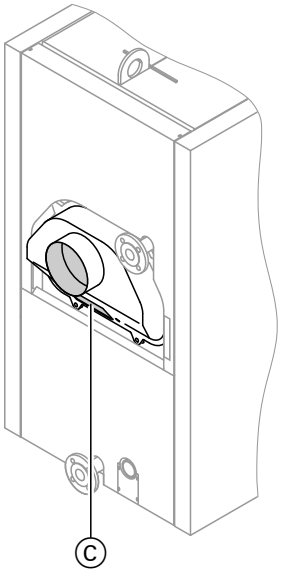

Fig. 4

2. Remove combustion residues from the flue and flue outlet Ⓒ.

Checking all gaskets and packing cords on the flue gas side

Checking the thermal insulation components on the boiler door

Inserting the turbulators

Please note
Burner adjustments and specific system conditions can cause the turbulators to move forward, which may result in them being burnt. This can also lead to damage to the thermal insulation on the boiler door.
Before insertion, the turbulators must be slightly bent (see steps).

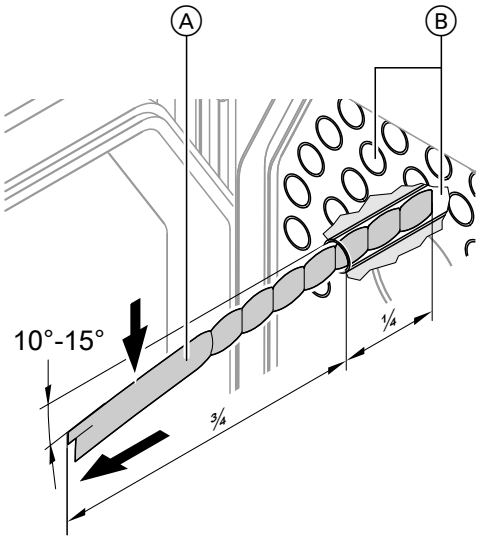

Fig. 5

1. Push turbulators Ⓐ approx. ¼ of their length into secondary hot gas flues Ⓑ.
2. Bend turbulators approx. 10 - 15°.
3. Insert the turbulators into the secondary hot gas flues as far as they will go. At the same time, check the pre-tension.

Note
Turbulators must not be able to be pulled from the secondary heating pipes easily.

Securing the boiler door and cleaning cover

Note
Mount the gas supply pipe on gas burners.

Danger
Escaping gas leads to a risk of explosion.
Check all gas connections for tightness.

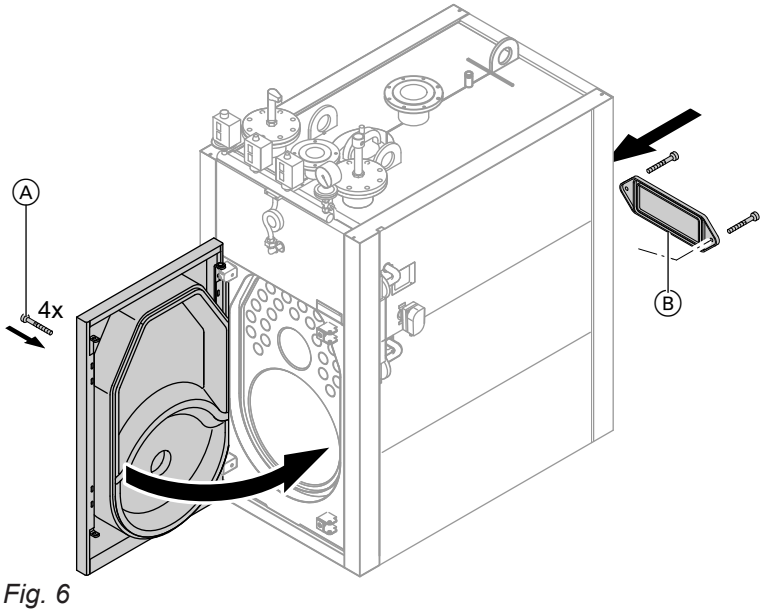

Fig. 6

Securing the boiler door and cleaning cover (cont.)

	Torque
Boiler door Ⓐ	25 Nm
Screws for cleaning cover Ⓑ	7 Nm

Checking the water chamber for deposits

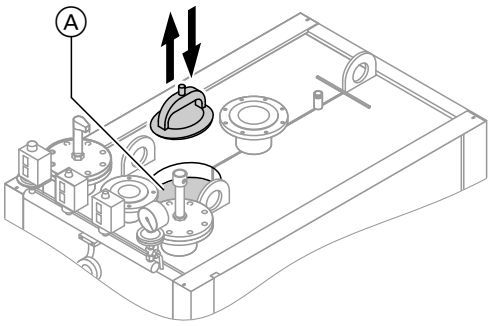

Fig. 7

1. Open hand hole cover Ⓐ.
2. Fully drain the boiler.
3. Clean the water chamber (hose it out) and remove deposits via the blow-down valve and drain outlet. If hard deposits have formed which cannot be removed by hosing down, carry out a chemical cleaning process with added descaling agent.
4. Clean the sealing faces of closures and fit new gaskets. Tighten new gaskets after commissioning and check again after 24 hours.

Torque settings for closure gaskets

System size	Gasket	Torque
SXD size 1 (170 kW)	HL gasket 100 x 150 1 x M16	80 Nm
SXD size 2 - 6 (285 - 1450 kW)	HL gasket 150 x 200 1 x M20	100 Nm

Cleaning the multiple level electrode

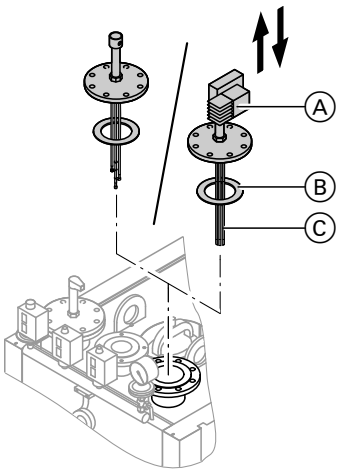

Fig. 8

1. Remove electrode Ⓐ.
2. Clean electrode tips Ⓒ.
3. Clean the sealing faces and use a new gasket Ⓑ (see standard EN 1591).
4. Install the electrodes and carry out a safety test in line with the manufacturer's instructions.
5. Retighten new gaskets after commissioning.

Cleaning the water level indicator

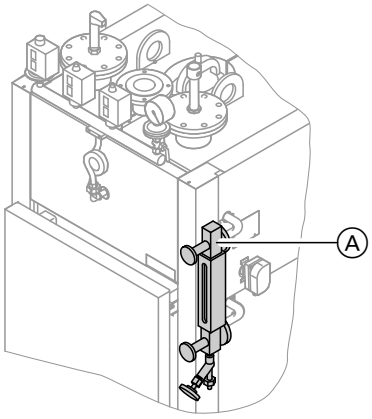

Fig. 9

1. Blow through the water level indicator.
2. Remove upper locking screw Ⓐ and clean the water level indicator with a brush.

   See documentation for the water level indicator.

Checking the hydraulic connections for leaks

Checking all connections on the water and steam side, as well as the sensor well and the inspection ports, for leaks after filling the boiler

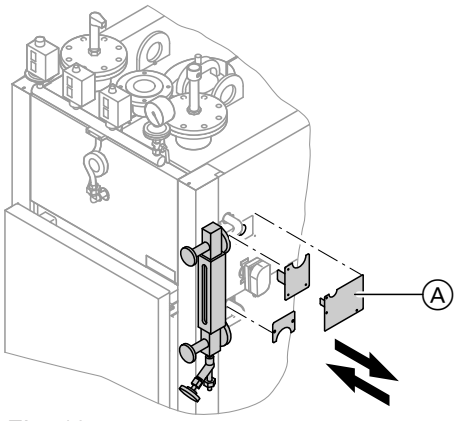

Fig. 10

1. Each time inspection ports have been opened: Clean the sealing face.
2. Replace the gasket.
3. Retighten all covers after commissioning.
4. For testing the sensor well, remove cover Ⓐ.

Cleaning the sight glass in the boiler door

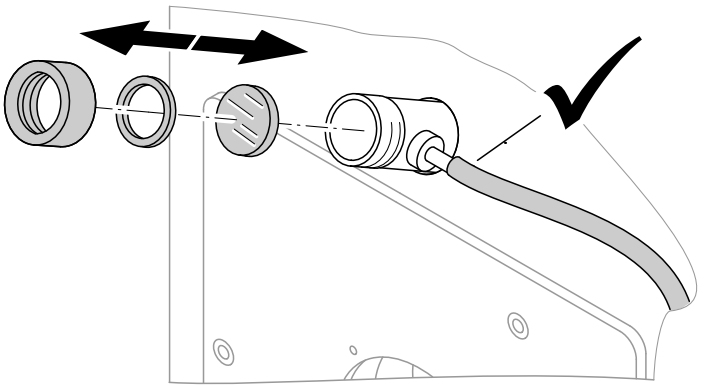

Fig. 11

Check the gaskets and hose connection for leaks.

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Checking the Vitoair draught stabiliser (if installed)

Release the latch on the control disc.

The control disc must swing freely during burner operation.

Adjusting the burner

Burner manufacturer's details

During adjustments, observe the minimum heating output. Set the minimum heating output for the base load stage according to the actual chimney conditions.

Checking the safety valve

Manufacturer's details

Raise the operating pressure to the response pressure or manually vent when 85 % of the response pressure has been reached.

Checking the pressure switch function

Installation instructions in the "pressure switch set"

Checking the safety and control equipment

Checking the pressure regulator, safety pressure limiter and temperature controller (standby)

Check the pressure regulator, safety pressure limiter and temperature controller (standby) for function and correct adjustment.

Set the temperature controller (standby) to at least 95 °C.

Checking the water quality

Observe the instructions in chapter "Water quality requirements".
Enter the amount of top-up water and the total hardness of the feed and boiler water into the table on page 23.
The total hardness of the feed and top-up water must not exceed the total of alkaline earths of 0.015 mmol/l.

The pH value should be higher than 9.

Checking the thermal insulation

Checking the installation room ventilation

Checking the flue for tightness

Operating and service documents

1. Complete and detach the customer registration card:
   - Hand the system user this part for safekeeping.
   - Retain the heating contractor's part.
2. File all parts lists, operating and service instructions in the folder and hand this over to the system user.
   The installation instructions are no longer required after the installation and, therefore, do not need to be retained.

Diagnostics

Fault	Cause	Action
Burner does not start.	No power	Switch ON the mains isolator.
	Safety chain activated.	Check safety equipment.
	Burner fault indicator illuminates	Press reset button on the burner control unit.
	Fuel supply interrupted	Open shut-off valves in the fuel supply line and filter.
	Remedy other faults in accordance with the burner manufacturer's instructions.	
Oxygen corrosion (water side)	Topping up with unsuitable water	Check water treatment system and injection system in accordance with VdTÜV guideline.
	Boiler is switched off every day.	Switch to standby (95 °C) instead of a complete shutdown.
Excessive flue gas temperature	Heat transfer is reduced by contamination on the flue gas and water sides	Clean boiler.
	The rated boiler heating output is exceeded.	Check burner heating output.
	Turbulators missing or incorrectly fitted.	Maintenance and installation: See page 12 and 14.
Discharge from safety valve.	Discharge pressure does not match system pressure.	Check the operating pressure with a suitable pressure gauge.
	Valve seat contaminated	Clean valve seat.
	Water trap pipe (upstream of pressure regulator) clogged up	Clean pipes.
Boiler produces wet steam	Excessive boiler water alkalinity	Regularly blow-down the boiler and install a TDS unit if required; treat water according to EN 12953. Drain the downstream steam line.
	Water level set too high	Check boiler water and feedwater daily. Check electrode length.
Steam knocking inside boiler	Feedwater not fed in at the feedwater connector	Connect feedwater line to the correct connector.
Steam knocking inside the condensate tank	The check valve in the feedwater line is missing or faulty.	Install or clean check valve (observe flow direction)
	Steam trap in the system is faulty.	Identify and repair faulty steam trap.
	U-bends buckle	Reduce steam pressure.
Boiler water level too high	Steam distributor above the boiler is not adequately drained.	Install a steam trap.

Diagnostics (cont.)

Fault	Cause	Action
Water level limiter switches off.	Shut-off valve in the feedwater line is closed	Open the shut-off valve.
	No feedwater in the condensate tank	Check mains water connection.
	Faulty feedwater pump or water level controller	Determine cause of water level controller fault using the controller installation instructions.
	Severe water level fluctuations through excessive alkalinity	Drain water from boiler and condensate tank. If a TDS valve is fitted, increase desalination rate. Refill with treated water. Blow-down more frequently. Check water treatment system.

Water quality according to EN 12953-10

For steam operation, return as much condensate as possible to the feedwater tank.

Treat the condensate with top-up water, so that the following conditions are maintained:

Boiler feedwater requirements

General requirements		Colourless, clear and free of undissolved substances
pH value at 25 °C		> 9
Conductivity at 25 °C	µS/cm	Only standard values applicable to boiler water
Total alkaline earths (Ca^{2+} + Mg^{2+})	mmol/l	< 0.01
Oxygen (O_2)	mg/l	< 0.1
Bound carbon dioxide (CO_2)	mg/l	< 25
Free carbon dioxide (CO_2)	mg/l	n.n.
Oxidability (Mn VII ⇒ Mn II) as $KMnO_4$	mg/l	< 10
Oil, grease	mg/l	< 3

Boiler water requirements

General requirements		Colourless, clear and free of undissolved substances
pH value at 25 °C		8.5 to 10
Acid capacity up to pH 8.2 ($K_{S8.2}$)	mmol/l	1 to 12
Conductivity at 25 °C	µS/cm	< 5000
Phosphate (PO_4)	mg/l	10 to 20

The addition of phosphate is recommended, but is not always essential.
Conversion:
1 mol/m^3 = 5.6 °dH
1 °dH = 0.1792 mol/m^3
1 mval/kg = 2.8 °dH

Recommendations for operation, maintenance and testing in accordance with EN 12953-6

Checklist for boiler system: Steam boiler

Key
- **O** = Monitor/check for unusual noises, odours, other unusual phenomena
- **T** = Functional testing of equipment, including monitoring

Operation, maintenance and inspections/tests:	72 hrs	Months				Type of tests (examples)
		1	3	6	12	
Devices to protect against excess pressure (safety valves)	O			T		Ventilation. Additional functional testing and monitoring possible, based on national regulations.
Water level indicator	T					Blow through only with boilers at p < 32 bar
Blow-down and drainage system	T					By activation
Valves	O			T		According to manufacturer's specifications
Feedwater control	O			T		
Low water level protection (LWL)	O	T				Function check by reducing the water level down to the switching points
Steam pressure and temperature indicator (pressure gauge)	O					Comparison with limiters and controllers
Pressure limit	O	T				Function check by increasing the pressure up to the switching points
Temperature limit	O	T				Change in set value/test keys
Circulation limit	O	T				
Devices for protecting the water quality	O	T (1.)		T (2.)		1. Comparison of measured values to reliable samples 2. Checking by a qualified specialist
Protective systems	O			T		Electrical and mechanical tests by a qualified specialist
Pressurised parts (pipes, inspection ports, flanges, gaskets, connections, etc.)		O				Check for leaks
Pressure and temperature controllers	O			T		Comparison
Feedwater inlet	O		T			
Water quality	T					To specifications of EN 12953-10
Heat supply	O				T	Carried out by a suitably qualified specialist at least once per year, in line with the manufacturer's operating manual

Tab. 1

Scope and duration of testing

Note

The extent of inspections and time intervals are manufacturer's recommendations. As part of the commissioning, these should be matched to the individual system as part of the arrangements made with the system user, the supervisory authority and the manufacturer.

Recommendation
The 6-monthly tests should be conducted in accordance with the applicable regulations (e.g. EN 12953) by a qualified employee of the manufacturer.

Note
The checklists included in the appendix can be used as templates.

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Fill and top-up water table

Meter reading	Fill and top-up water	Total water volume	Total hardness		pH value	Date
			Feedwater	Boiler water		
m^3	m^3	m^3				

Maintenance/service report

	Commissioning	Maintenance/service	Maintenance/service
Date:			
By:			

	Commissioning	Maintenance/service	Maintenance/service
Date:			
By:			

	Commissioning	Maintenance/service	Maintenance/service
Date:			
By:			

	Commissioning	Maintenance/service	Maintenance/service
Date:			
By:			

Maintenance/service report (cont.)

	Commissioning	**Maintenance/service**	**Maintenance/service**
Date:			
By:			

Specification

Steam output[*1]	**t/h**	**0.26**	**0.44**	**0.7**
Flue gas parameters[*2]				
Temperature				
- at rated heating output	°C		200	
- at partial load (50 %)	°C		130	
CE designation			CE-0035	

[*1] *At a feedwater temperature of 80 °C.*

[*2] *Values for sizing the flue system to DIN 4750 relative to 13 % CO_2 for fuel oil EL and 10 % CO_2 for natural gas.*

Declaration of Conformity

We, Viessmann Werke GmbH & Co. KG, D-35107 Allendorf, declare as sole responsible body that the named product complies with the European directives and supplementary national requirements in terms of its design and operational characteristics.
Using the serial number, the full Declaration of Conformity can be found on the following website:

www.viessmann.co.uk/eu-conformity

Keyword index

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5692729 Subject to technical modifications.