

Oil/gas boiler

Hoval Max-3 E (3000-5000)

Boiler

- Three-pass steel boiler with plain pipes, fully mounted on steel frame (according to EN 14394)
- For oil/gas firing with internal flue gas recirculation
- Boiler door, swivelling to the right
- With sight glass on the boiler door
- Thermal insulation on the boiler body with 100 mm mineral wool mat
- Boiler fully cased, aluminium casing
- Flue gas outlet to the rear
- Heating flow and heating return at top
- Bracket for control on right side of the boiler as standard

Design on request

- Installation of the boiler insulation on site
- Boiler door swivelling to the left (please specify on ordering)
- Bracket for control on left side of the boiler (please specify on ordering)

On site

- Electrical connection to the burner
- Boiler thermometer and pressure gauge

Delivery

- Boiler fully assembled and cased
- Accessories delivered in separate packaging

Boiler control with thermostats T0.2

- For external switching command
- For plants without TopTronic® E controller
- For special connections
- System switch "I/O"
- Safety temperature limiter 120 °C
- 3 boiler temperature controllers 50-105 °C
 - Temperature controller for heating basic load
 - Temperature controller for heating full load
 - Temperature controller for water heating
- Without burner plug-in connection

Design on request

- 2 burner operating hours counters built in
- 2 burner operating hours and pulse counters built in
- Flue gas thermometer, 4 m capillary tube

Delivery

- Control panel delivered separately

On site

- Installation of the control panel on the left or right side of the boiler



Range Max-3 E type

Heat output kW

(3000)	750-3000
(4000)	950-4000
(5000)	1150-5000

Boiler approval

CE 0036 in accordance with
Pressure Equipment Directive 2014/68/EU

Note that in the EU member states the Directive (EU) 2015/2193 on the limitation of emissions of certain pollutants into the air from medium combustion plants must be complied with.

Oil/gas boiler



Hoval Max-3 E (3000-5000)

Three-pass steel boiler for oil/gas firing. Mounted on steel frame, completely insulated and cased (according to EN 14394).

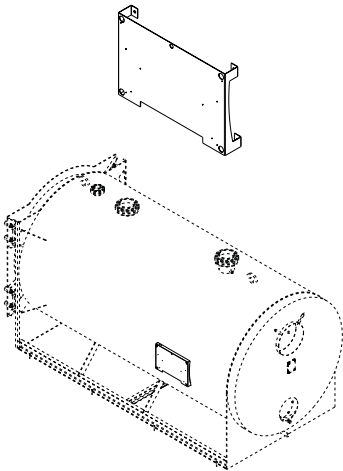
The control can be fitted on the right or left side.

Max-3 E Type	Heat output kW	Operating pressure bar
(3000)	750-3000	6
(3000)	750-3000	10
(4000)	950-4000	6
(4000)	950-4000	10
(5000)	1150-5000	10

Delivery time on request

Part No.

- 7015 498
- 7015 502
- 7015 499
- 7015 503
- 7015 504

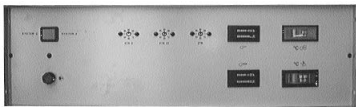


Console for boiler controller

Console for attaching the boiler controller TopTronic® E/E13.4 TopTronic® E/E13.5, T2.2 and T0.2 on the right or left of the boiler

6043 924

Boiler controllers with thermostats



Boiler controller T 0.2

- For operating temperature up to 105 °C
- For external switching command
- For plants without TopTronic® E controller
- For special connections without burner plug-in connection
 - without burner operating hours and pulse counter
 - incl. 2 burner operating hours counters built in
 - incl. 2 burner operating hours and pulse counters built in
- For installation on the right (standard installation) or left side (configuration on request) of the heat generator. Specify installation variant in purchase order.

6015 016

6015 475

6015 476

Accessories for boiler controllers with thermostats

Flue gas thermometer
4 m, capillary tube

241 149

Accessories



Flow temperature monitor
for underfloor heating systems (1 controller per heating circuit) 15-95°C, SD 6K, capillary max. 700 mm
Setting (visible externally) under the casing cover,

Contact thermostat RAK-TW1000.S
Thermostat with retaining strap, without cable and plug

242 902

Immersion thermostat RAK-TW1000.S SB 150
Thermostat with immersion sleeve 1/2" - immersion depth 150 mm, nickel-plated brass

6010 082



Vibration elements for the plinth rail
for Max-3 E (3000-5000) and Max-3 condens E (3000-5000)
for support under the plinth rail of the boiler. Prevent transmission of sound and vibrations.
Set of 10 vibration elements
Material: rubber
Cross section: 80/50 mm
Size: L800
Length: 800 mm

6007 968



Flue gas thermometer with drag indicator
Ø 5 / 80x150 mm (mounting on site)
Range of indication 100-500°C

241 237

Max-3 E (3000-5000)

Type		(3000)	(4000)	(5000)
• Nominal heat output 80/60 °C	kW	3000	4000	5000
• Heat output range (natural gas H: variant 2)	kW	750-3000	950-4000	1150-5000
• Heat output range (heating oil EL, natural gas H: variant 1, heating oil L)	kW	1700-3000	2250-4000	2800-5000
• Combustion performance	kW	782-3218	990-4289	1197-5361
• Max. boiler operating temperature ²⁾	°C	105	105	105
• Min. boiler operating temperature	°C	see table of operating conditions (below)		
• Min. boiler return temperature (directly in the boiler after the flue gas °C heat exchanger)	°C	see table of operating conditions (below)		
• Safety temperature limiter setting (water side) ³⁾	°C	120	120	120
• Operating/test pressure	bar	6/9.6	6/9.6	10/16
• Operating/test pressure (optional)	bar	10/16	10/16	-
• Boiler efficiency at full load at 80/60 °C	%	93.2/84.0	93.3/84.0	93.3/84.0
• (related to heating value H _i / calorific value H _s , natural gas H)	%	94.9/85.5	94.9/85.5	94.9/85.5
• Boiler efficiency at partial load at 30 °C (EN 303)	%	94.9/85.5	94.9/85.5	94.9/85.5
• (related to heating value H _i / calorific value H _s , natural gas H)	%	94.7/85.3	94.7/85.3	94.7/85.4
• Standard efficiency at 75/60 °C (DIN 4702-8)	%	94.7/85.3	94.7/85.3	94.7/85.4
• (related to heating value H _i / calorific value H _s , natural gas H)	Watts	2000	2200	2400
• Standby losses q _B at 70 °C	Watts	2000	2200	2400
• Combustion gas resistance at nominal output (natural gas H, 10.5 % CO ₂), 500m above sea level (tolerance ±20 %)	mbar	11.5	12	12
• Flue gas mass flow at nominal output (natural gas H, 10.5 % CO ₂)	kg/h	4731	6301	7876
• Flow resistance boiler ¹⁾	z value	0.001	0.001	0.0004
• Hydraulic resistance at 10 K	mbar	66	118	73
• Hydraulic resistance at 20 K	mbar	17	29	18
• Water flow rate at 10 K	m³/h	257	343	429
• Water flow rate at 20 K	m³/h	129	171	214
• Boiler water capacity	Litres	6400	7100	7800
• Insulation thickness boiler body	mm	100	100	100
• Weight (incl. casing)				
- At operating / test pressure 6/9.6 bar	kg	6845	8049	-
- At operating / test pressure 10/16 bar	kg	7987	9392	11321
• Combustion chamber internal dimensions	mm	900	990	1070
• Combustion chamber length (with extension into the reversing chamber, half the length of the reversing chamber)	mm	3436	3756	4006
• Combustion chamber volume	m³	2.186	2.891	3.602
• Dimensions				
• Max. draught/underpressure at flue gas outlet	Pa	-50	-50	-50

¹⁾ Flow resistance boiler in mbar = flow rate (m³/h)² x z

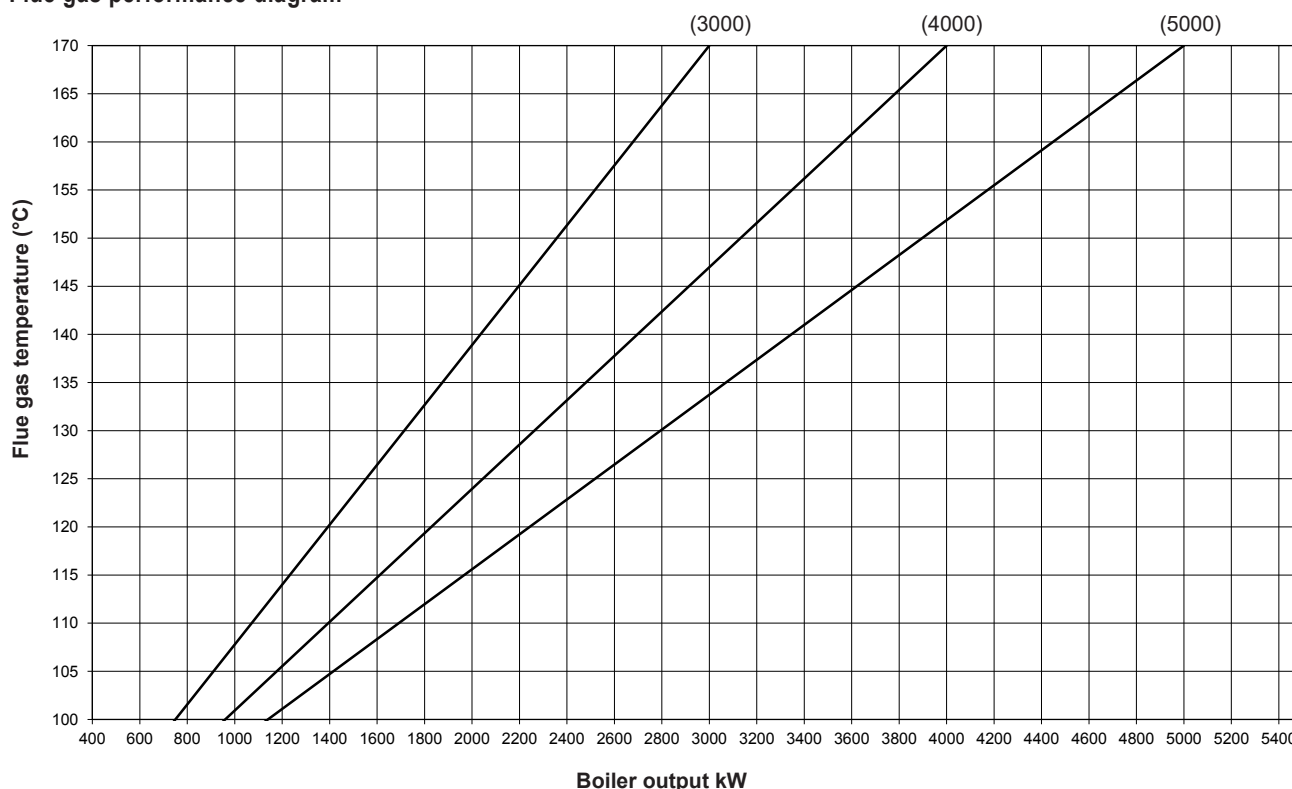
²⁾ Limited by the boiler controller T0.2 to 105 °C.

³⁾ Max. safety temperature for boiler controller T0.2: 120 °C.

Possible operating conditions:

Fuel		Heating oil EL		Natural gas H		Heating oil L
		Variant 1	Variant 2	Variant 1	Variant 2	
Min. flue gas temperature	°C	130	110	130	100	130
Min. boiler temperature	°C	60	65	65	75	65
Min. return temperature	°C	50	55	55	65	55
Return temperature control		Yes	Yes	Yes	Yes	Yes

Flue gas performance diagram



The data shown here represent an average value based on measurements taken with burners from various manufacturers.

kW = boiler output

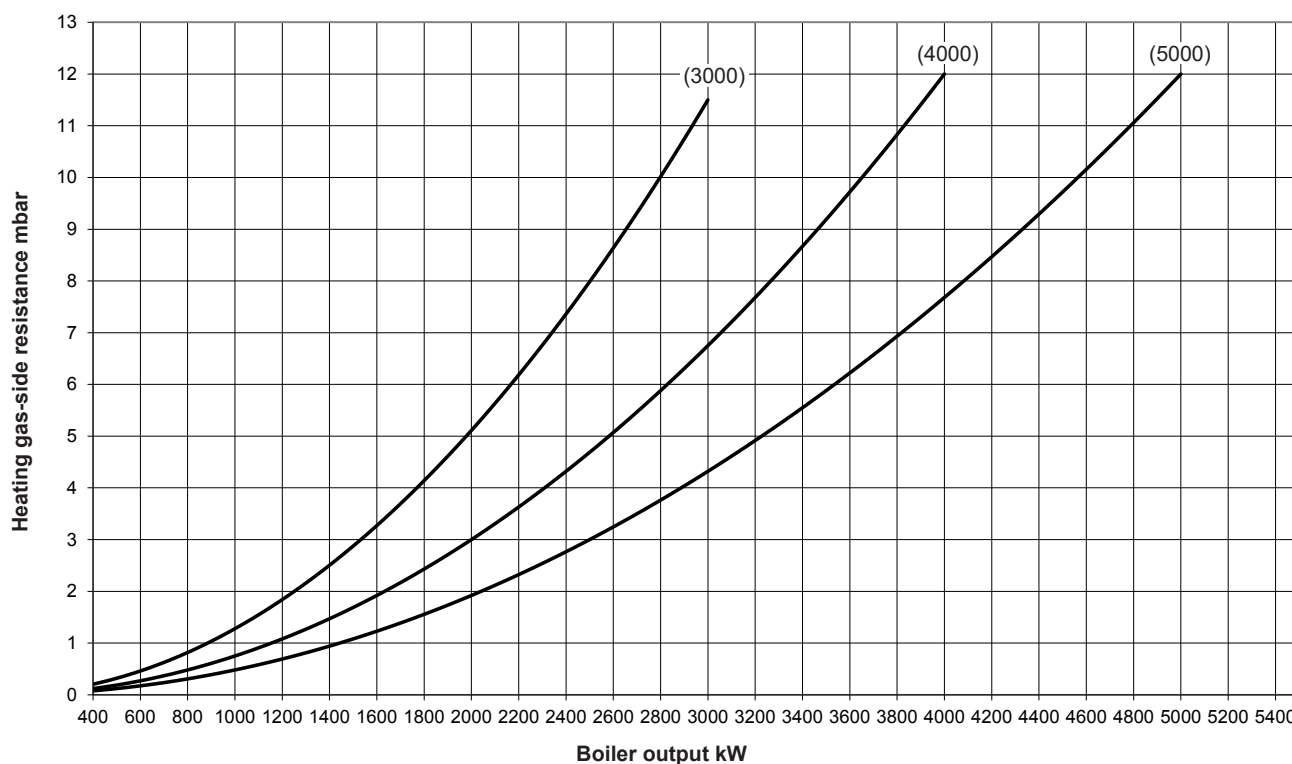
°C = Flue gas temperature with reduced heating surface, boiler flow temperature 80 °C, return temperature 60 °C (field measurement according to DIN 4702).

- Operation with natural gas H₂, $\lambda = 1.14$ at full burner load (CO₂ natural gas H = 10.5 %)

- A reduction of the boiler water temperature of -10 K effectuates a reduction of the flue gas temperature of approx. 6-8 K.

- A change in the air index I of +/-0.09 % effectuates a change in the flue gas temperature of approx. +/-8 K.

Heating gas-side resistance



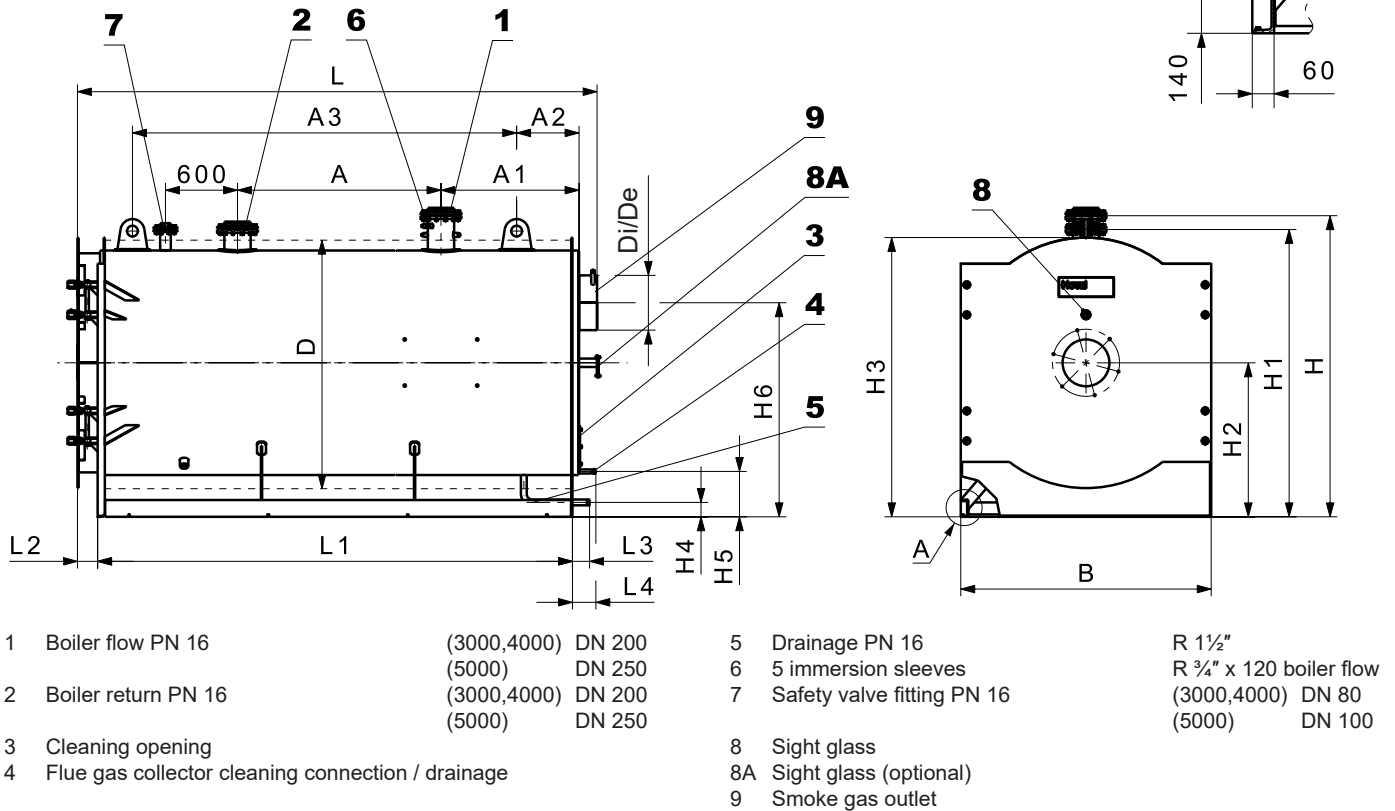
kW = boiler output mbar = heating side resistance at $\lambda = 1.14$ (natural gas H₂, CO₂ = 10.5 %), 500m above sea level (tolerance +/- 20 %)

Max-3 E (3000-5000)

(Dimensions in mm)

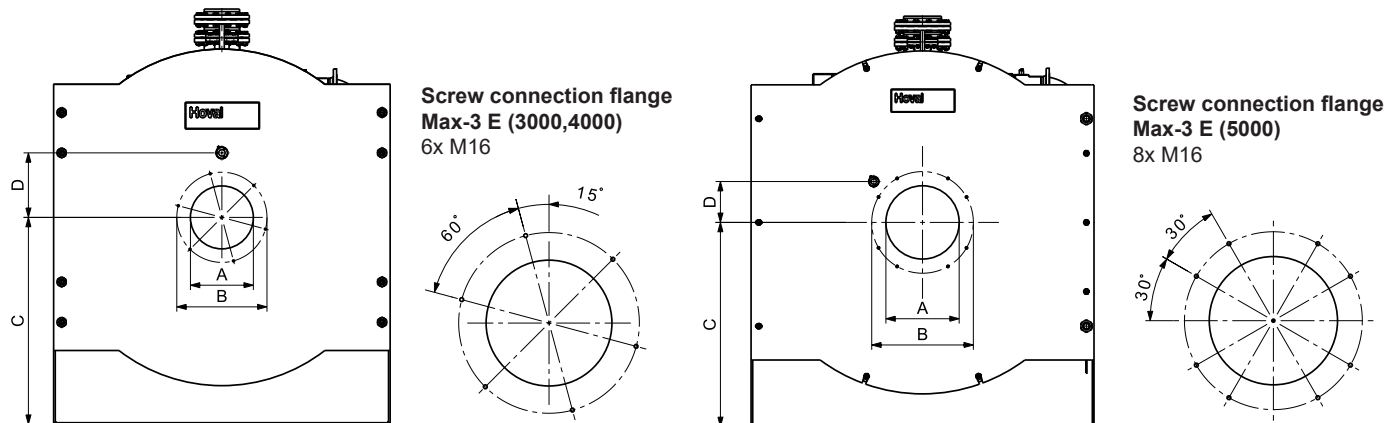
The control can be fitted on the right or left side.

View A

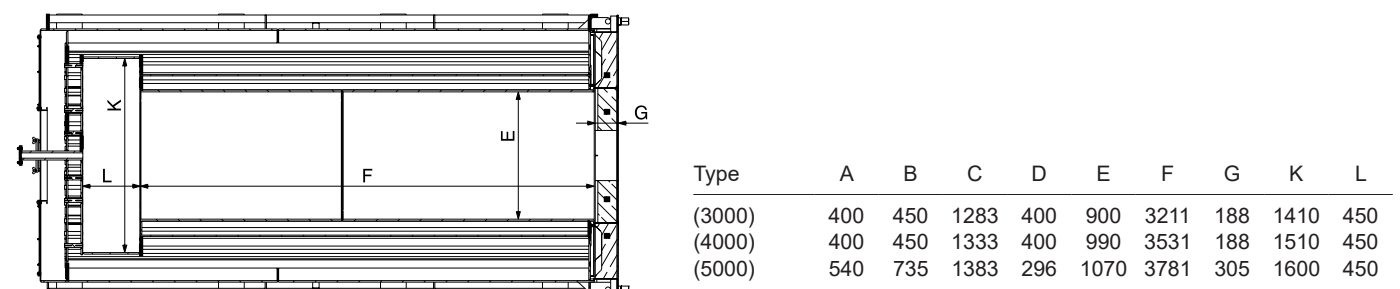


Type	B	L	H	H1	H2	D	Di/De	H3	H4	H5	H6	L1	L2	L3	L4	A	A1	A2	A3
(3000)	2086	4378	2508	2393	1283	2070	450/456	2326	120	378	1783	3943	168	155	207	1695	1150	520	3200
(4000)	2186	4698	2608	2493	1333	2170	500/506	2426	120	378	1833	4263	168	155	207	2015	1150	640	3400
(5000)	2286	5060	2708	2593	1383	2270	550/556	2526	120	378	1903	4511	282	155	207	2265	1155	550	3750

Burner connection dimensions



Firing system dimensions



Standards and guidelines

The following standards and guidelines must be respected:

- technical information and installation manual of the Hoval company.
- hydraulic and control technical control regulations of the Hoval company.
- local building law
- fire protection standards
- DVGW guidelines
- DIN EN 12828 Heating systems in building plans of hot water heating plants.
- DIN EN 12831 Heating plants in buildings - procedure for computing the normed heating capacity
- VDE 0100

Water quality

Heating water:

- The European Standard EN 14868 and the Directive VDI 2035 must be observed.
- Hoval boilers and calorifiers are designed for heating plants without significant oxygen intake (plant type I according to EN 14868).
- Plants with
 - **continuous** oxygen intake (e.g. under-floor heating systems without diffusion proof plastic piping) or
 - **intermittent** oxygen intake (e.g. where frequent refilling is necessary)
 must be equipped with **separate circuits**.
- Treated heating water must be tested at least once yearly. According to the inhibitor manufacturer's instructions, more frequent testing may be necessary.
- A refilling is not recommended if the quality of the heating water in existing installations (e.g. exchange of boiler) conforms to VDI 2035. The Directive VDI 2035 applies equally to the replacement water.
- New and if applicable existing installations must be adequately cleaned and flushed before being recharged! The boiler may only be filled after the heating system has been flushed.
- Parts of the boiler which have contact with water are made of ferrous materials.

- On account of the danger of stress cracking corrosion the chloride, nitrate and sulfate contents of the heating water must not exceed 200 mg/l in total.
- The pH value of the heating water should lie between 8.3 and 9.5 after 6 to 12 weeks of heating operation.

Filling and replacement water:

- For a plant using Hoval boilers untreated domestic water is generally best suited as filling and replacement water. However, the quality of the untreated domestic water must at least fulfil the standard set in VDI 2035 or be desalinated and/or be treated with inhibitors. The stipulations of EN 14868 must be observed.
- In order to maintain a high level of boiler efficiency and to avoid overheating of the heating surfaces the values given in the table should not be exceeded (dependent on boiler performance ratings - for multi-boiler plants rating of smallest boiler applies - and on the water content of the plant).
- The total amount of filling and replacement water which is used throughout the total service life of the boiler must not exceed three times the water capacity of the plant.

Combustion air

- The combustion air supply must be warranted. The air opening must not be lockable.
- Minimal free cross section for air opening 6.5 cm² per 1 kW boiler output.

Space requirements

- The cleaning opening on the flue gas collector must be easily accessible.

Burner mounting

- For mounting of the burner an adapter flange may be required depending on the size of the burner flange. The adaptor flange including screws must be delivered by the burner company.
- The pipes must be fitted in such a way that the boiler door can be opened completely.
- The connections must be flexible and lead in a sufficient large loop to the burner so that the boiler door can be swung out around 90° to the left or right.

The space between the burner pipe and the hinged flange is to be insulated. A line must be routed from the burner to the sight glass to carry cooling air, in order to cool the boiler sight glass and keep it clean. (Delivery by the burner company)

Electric connection of the burner

- Control voltage 1 x 230 V
- Burner motor 1 x 230 V / 3 x 400 V.
- The burner must be connected to the burner connection plug of the boiler.
- For safety reasons the electrical cable of the burner must be that short that the plug must be removed when swivelling boiler door.

Sound absorption

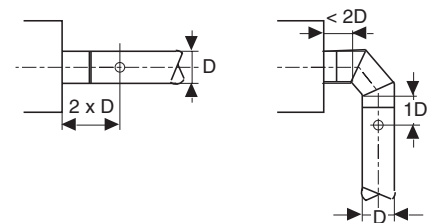
Sound absorption is possible through the following steps:

- Heating room walls, ceiling and floor should be very solidly built, a sound absorber should be mounted into the air inlet. Pipe holders and support should be protected by means of anti-vibration sleeves.
- Install sound absorber hood for burner.
- If living rooms are located above or under the boiler room, vibration absorbers have to be mounted to the boiler base. Pipes and flue gas tube must be connected flexible with compensators.
- Circulating pumps have to be connected with compensators to the pipes.
- For damping of flame noise it is possible to install a silencer into the flue gas tube (space should be foreseen for later installation).

Chimney/flue gas system

Flue gas line

- The flue gas connection pipe between the boiler and the vertical part of the flue gas line should be routed into the vertical part with a 30-45° incline.
- Thermal insulation is required with a length of more than 1 m
- The insertion of the connection tube into the chimney must be carried out in such a way that no condensate can flow into the boiler
- A closable flue gas test port with a circular internal diameter of between 10-21 mm must be installed in the connection tube. The port must protrude beyond the thermal insulation



Flue gas system

- The flue gas system must be humidity-insensitive and acid-proof and admitted for flue gas temperatures up to >200 °C.
- For existing flue gas systems the restoration must be carried out according to the instructions of the chimney constructor.
- Calculation of the chimney section based on EN 13384 and EN 1443.
- Planning a bypass air flap as a chimney limitation is recommended.

Table 1: Standard values for boiler and circuit water for circulation boiler (shell boiler)

General requirements		colourless, free of undissolved substances and foaming agents
pH value at 25 °C		8.2-11.5
Conductance at 25 °C	µS/cm	< 1500
Total alkaline earths (Ca + Mg) ¹	mmol/l	< 0.02
	° dH	< 0.112
	° fH	< 0.19
Silica acidic capacity 8.2 ² (p-value)	mmol/l	1-5
Silica (SiO ₂)	mg/l	< 100
Phosphate (P ₂ O ₄) ³	mg/l	5-10
Sodium sulphite (Na ₂ SO ₃) ³	mg/l	5-10
Iron	mg/l	< 0.2
Copper	mg/l	< 0.1

¹ Previously specified in °dH, conversion: 1 mmol/l = 5.6 °dH (German hardness)

² Previously specified as p-value, silica conversion 8.2 1 = p-value 1

³ Proof only required if respective dosing chemicals are used.

The following value does not have to be verified constantly during plant operation: silica (SiO₂)

Start-up condensate from the boiler

- When commissioning a cold boiler, condensate always occurs within the boiler. This collects in the lower area of the boiler (flue gas collector) and is then evaporated through the boiler's continued heating up.
- The boiler should therefore – due also to this reason – only be started up without “network acceptance”, so that the condensation temperature threshold (approx. 55 °C) is exceeded as quickly as possible
- If necessary, the condensate which occurs can be drained via the flue gas collector's cleaning fitting (remove cap on the drain connection before starting the burner, connect ball valve and temperature-resistant drain hose).

Remarks

- When draining the condensate, it must be ensured that no uncontrolled escape of flue gas occurs in the installation room (do not keep the ball valve open “constantly”, but only drain off the condensate “intermittently”).
 - The locally valid waste water regulations must be observed when disposing of the condensate!
-
- As soon as the boiler has reached its minimum temperature and this can be kept stable via the return boost, the burner should be shut off briefly and the closure cap mounted on the cleaning drain connection again.
 - The drain connection on the boiler's flue gas collector is not intended for the permanent connection of a drainage line – frequent condensation in the area of the boiler is impermissible!

For selection of the calorifier,
see “Calorifiers”.

