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THW-I NTE

Hoval hot water boiler

The Hoval high output hot water boilers are made of quality steel and are distinguished by their solid, robust and elastic construction. They particularly convince by their easy way of operation, their easy maintenance and optimal efficiency. The client receives an economical, environment friendly compact unit, ready for installation. The boilers are constructed for oil or gas firing.

Boiler type THW-I NTE

The type THW-I NTE classical 3 pass flame tube flue gas tube boiler with an inner fully water cooled flue gas turning chamber guarantees high efficiency. The boiler consists of a cylindric shell, the two head plates, the centric flame tube including the back flue gas turning chamber with water cooled finned tube wall and the two flue gas passes. The boiler door is thermally insulated and flue gas proof for burner mounting. The boiler is completely electrically welded and provided with all required inspection openings.

The spacious designed flame tube with low thermal charges results in an excellent combustion and reduces emissions. The large water content secures an even boiler running time and thus reduces the number of boiler starts.

Admissible max. safety valve pressure/temperature

Standard pressures: 6 and 10 bar.

Higher pressure on request.

Max. operating temperature: 110/120 °C (depending on local regulations).

Thermal insulation

The boiler is fully insulated including flue gas collector with rock wool insulation. The casing is made of structured aluminium plate. Sockets and cuttings are nicely framed.

Connection fittings and sockets

The connection fittings and sockets on the boiler and on the fitting pipe are meant for the attachment of:

flow intermediate piece, thermometer for return, return shut-off, safety valve, drain, vent.

Large equipment

2 boiler supports

1 flue gas collector with integrated flue gas exit backward.

1 back cleaning cover with bleeder valves

1 boiler door for burner mounting, thermally insulated and designed flue gas proof, placed on left and right swivelable hinges for the flue gas sided cleaning of boiler

1 boiler plate

High efficiency

Due to the above technical facts an efficiency of up to 95 % (standard efficiency 75/ 60 °C flow/ return) can be achieved. Thus continuous working costs are kept low. The sources of energy are used more efficiently and Hoval spares the environment.



Construction guiding, quality approval

The boiler is designed with all necessary inspection doors.

The construction and manufacturing of the boilers is done according to the European Pressure Equipment Directive (PED) 2014/68/EU, with CE-Certification; boilers up to 10 MW and 10 bar according to EN 14394. The ISO 9001:2000 certification and the quality approval at our factory with our Hoval quality performance department guarantees the highest product quality. For installation and operation of the boiler the local laws and norms are to be respected.

Control panel

The control panel for the Hoval boiler can be equipped with the required control units and indicators for control and supervision of boiler and burner. The operation and alarm reports may be shown as fault indication. The control panel will be made upon customer requirements and depending on the burner to be used.

Boiler water quality

For operation the Hoval and the country specific boiler water regulations have to be respected and local waste water regulations have to be paid attention to. Detailed information for the boiler water quality can be found in the appendix.

Delivery

The pressure body is provided with a primer. Due to transport reasons the insulation can be fixed at the factory. Burner armatures and control panel are either pre-mounted (as far as transport technically possible) or packed loosely in a separate box. The mounting and wiring can be done at the factory or at site. Connection openings are covered.

On request

Volt-free contacts for BMS connection (Building Management System)

Sectional view



Return injection: The return water from the heating system is led into the warm area of the boiler. Because of the special return injection the entering water into the boiler will be turned by 90° and accelerated by a baffle plate. By injector effect hot water will be sucked in and will be mixed intensively with the cold water. Thereby the temperature of the return water increases.

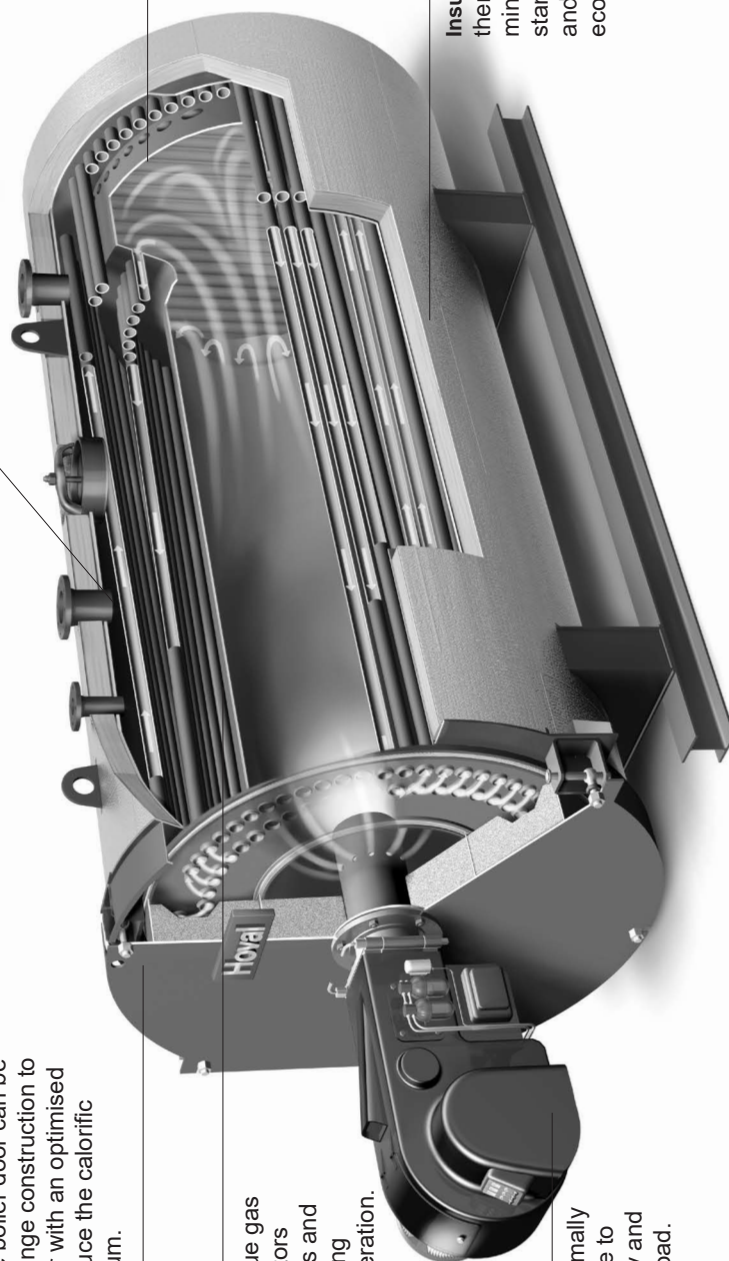
Boiler door: Large boiler door provides easy access for cleaning of the combustion chamber to the second and third pass. The boiler door can be easily opened by the special hinge construction to the left or right. The boiler door with an optimised thermal insulation helps to reduce the calorific losses of the boiler to a minimum.

Heating surface: The smooth flue gas flame tube without any turbulators reduces the exhaust gas losses and makes an easy and fast cleaning possible for an economical operation.

Burner: The boiler can be optimally fitted with LowNOx burners due to combustion chamber geometry and the low combustion chamber load.

Finned tube wall (reverse chamber): Due to the finned tube wall a completely water cooled turning chamber of the first to the second pass secure a maximum utilisation of the heat.

Insulation: A highly effective thermal insulation with aluminium boarding reduces the standby losses to a minimum and contributes to highest economy.



THW-I NTE (23/15 - 50/40)

Technical data

| Type | | (23/15) | (28/20) | (35/25) | (40/30) | (45/35) | (50/40) |
|---|------------|-----------|-----------|-----------|-----------|-----------|-----------|
| • Nominal output (oil and gas) | kW | 2300/1500 | 2800/2000 | 3300/2500 | 4000/3000 | 4500/3500 | 5000/4000 |
| • Operating temperature max. (SBT) ¹⁾ | °C | 120 | 120 | 120 | 120 | 120 | 120 |
| • Temperature level flow/return | °C | 80/60 | 80/60 | 80/60 | 80/60 | 80/60 | 80/60 |
| • Safety valve pressure | bar | 6 | 6 | 6 | 6 | 6 | 6 |
| | bar | 10 | 10 | 10 | 10 | 10 | 10 |
| • Boiler efficiency at 80/60 °C (natural gas) | % | 90.1/92.2 | 90.4/92.1 | 90.7/92.3 | 90.9/92.3 | 91.1/92.3 | 91.7/92.7 |
| • Flue gas resistance | mbar | 9.0/6.0 | 9.0/6.0 | 10.0/7.0 | 11.0/7.5 | 11.0/8.0 | 11.0/8.0 |
| • Water content | l | 2800 | 3500 | 4500 | 5000 | 5500 | 6500 |
| • Water flow resistance * | mbar | 150 | 200 | 150 | 200 | 250 | 150 |
| | z-value ** | 0.0145 | 0.01305 | 0.00626 | 0.00639 | 0.00631 | 0.00307 |
| • Flue gas temperature after boiler (natural gas) | °C | 226/180 | 222/184 | 217/180 | 213/182 | 209/182 | 197/174 |
| • Flue gas temperature after boiler (diesel oil) | °C | 216/172 | 213/177 | 208/173 | 204/174 | 200/175 | 189/167 |

¹⁾ Country and equipment specific

* for boiler max. load and $\Delta T = 20 \text{ K}$

** for other flow rates use "z-value" for water side pressure loss calculation: $\Delta p \text{ (mbar)} = \text{asked flow rate (m}^3/\text{h)}^2 \cdot z$

Dimensions and weights

| Type | | | (23/15) | (28/20) | (35/25) | (40/30) | (45/35) | (50/40) |
|--|--------|----|---------|---------|---------|---------|---------|---------|
| • Flame tube diameter | 6 bar | mm | 750 | 800 | 850 | 900 | 950 | 1000 |
| | 10 bar | mm | 750 | 800 | 850 | 900 | 950 | 1000 |
| • Flame tube length without turning chamber | | mm | 2420 | 2920 | 3270 | 3570 | 3720 | 4120 |
| • Boiler length | | | | | | | | |
| • with insulation, without burner | | mm | 3430 | 3930 | 4280 | 4580 | 4730 | 5330 |
| • Boiler width | | mm | 1770 | 1870 | 1970 | 2020 | 2070 | 2170 |
| • with insulation, without armatures | | | | | | | | |
| • Boiler height | | mm | 2600 | 2800 | 2900 | 2950 | 3000 | 3250 |
| • with insulation, with armatures | | | | | | | | |
| • Diameter flue gas outlet | | mm | 450 | 500 | 500 | 550 | 600 | 600 |
| • Transport weight without burner incl. equipment | 6 bar | kg | 4000 | 5300 | 6000 | 6600 | 7300 | 8400 |
| | 10 bar | kg | 4500 | 6000 | 6900 | 7600 | 8200 | 10000 |

Fitting pipe

| Type | (23/15) | (28/20) | (35/25) | (40/30) | (45/35) | (50/40) |
|---|---------|---------|---------|---------|---------|---------|
| • 1 fitting pipe without insulation (flow intermediate piece) (dimension for $\Delta T = 20\text{ K}$) | DN 150 | DN 150 | DN 150 | DN 200 | DN 200 | DN 200 |

Boiler basic equipment

| Type | | (23/15) | (28/20) | (35/25) | (40/30) | (45/35) | (50/40) |
|--------------------------------------|------|----------------|---------|---------|---------|---------|---------|
| • 1 drain ball valve | [DN] | 40 | 40 | 40 | 40 | 40 | 40 |
| • 1 ventilation valve (fitting pipe) | [DN] | 1/2" | 1/2" | 1/2" | 1/2" | 1/2" | 1/2" |
| • 1 thermometer flow | [DN] | 1/2" | 1/2" | 1/2" | 1/2" | 1/2" | 1/2" |
| • 1 thermometer return flow | [DN] | 1/2" | 1/2" | 1/2" | 1/2" | 1/2" | 1/2" |
| • 1 safety thermostat | [DN] | 1/2" | 1/2" | 1/2" | 1/2" | 1/2" | 1/2" |
| • 1 cleaning set | | Brush with rod | | | | | |

Boiler ancillary equipment

| Type | | (23/15) | (28/20) | (35/25) | (40/30) | (45/35) | (50/40) |
|-------------------------------------|--|----------|-----------|-----------|-----------|-----------|-----------|
| • 1 safety valve 6 bar | | DN 50/80 | DN 65/100 | DN 65/100 | DN 65/100 | DN 65/100 | DN 80/125 |
| • 1 safety valve 10 bar | | DN 40/65 | DN 50/80 | DN 50/80 | DN 50/80 | DN 65/100 | DN 65/100 |
| • 1 temperature switch | | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" |
| • 1 temperature limiter STB | | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" |
| • 1 pressure gauge | | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" |
| • 1 pressure limiter SDB | | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" |
| • 1 low water level indicator (Syr) | | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" |

Boiler return flow heat up

| Type | | (23/15) | (28/20) | (35/25) | (40/30) | (45/35) | (50/40) |
|----------------------|--------|---------|---------|---------|---------|---------|---------|
| • 1 pump 120 °C | [m³/h] | 35 | 40 | 45 | 60 | 65 | 75 |
| • 1 thermostat | [DN] | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" |
| • 1 non return valve | [DN] | 65 | 80 | 80 | 80 | 80 | 100 |
| • 2 non return flaps | [DN] | 65 | 80 | 80 | 80 | 80 | 100 |

1 connection pipe

| Type | | (23/15) | (28/20) | (35/25) | (40/30) | (45/35) | (50/40) |
|---------------------|------|---------|---------|---------|---------|---------|---------|
| • 1 connection pipe | [DN] | 65 | 80 | 80 | 80 | 80 | 100 |

Subject to project-related alterations

THW-I NTE (55/45-100/90)

Technical data

| Type | | (55/45) | (60/50) | (70/60) | (80/70) | (90/80) | (100/90) |
|---|------------|-----------|-----------|-----------|-----------|-----------|------------|
| • Nominal output (oil and gas) | kW | 5500/4500 | 6000/5000 | 7000/6000 | 8000/7000 | 9000/8000 | 10000/9000 |
| • Operating temperature max. (SBT) ¹⁾ | °C | 120 | 120 | 120 | 120 | 120 | 120 |
| • Temperature level flow/return | °C | 80/60 | 80/60 | 80/60 | 80/60 | 80/60 | 80/60 |
| • Safety valve pressure | bar | 6 | 6 | 6 | 6 | 6 | 6 |
| | bar | 10 | 10 | 10 | 10 | 10 | 10 |
| • Boiler efficiency at 80/60 °C (natural gas) | % | 91.4/92.4 | 91.4/92.3 | 91.5/92.3 | 91.5/92.1 | 91.5/92.1 | 91.6/92.1 |
| • Flue gas resistance | mbar | 12.0/9.0 | 13.0/9.5 | 13.0/10.0 | 14.0/10.5 | 14.0/11.0 | 15.0/12.0 |
| • Water content | l | 7000 | 8000 | 9000 | 10000 | 11500 | 13000 |
| • Water flow resistance * | mbar | 150 | 150 | 200 | 150 | 200 | 200 |
| | z-value ** | 0.00254 | 0.00213 | 0.00209 | 0.00120 | 0.00126 | 0.00102 |
| • Flue gas temperature after boiler (natural gas) | °C | 202/181 | 203/184 | 201/184 | 202/188 | 201/188 | 200/189 |
| • Flue gas temperature after boiler (diesel oil) | °C | 194/174 | 195/177 | 193/177 | 195/181 | 193/181 | 193/182 |

¹⁾ Country and equipment specific

* for boiler max. load and $\Delta T = 20\text{ K}$

** for other flow rates use "z-value" for water side pressure loss calculation: $\Delta p\text{ (mbar)} = \text{asked flow rate (m}^3/\text{h)}^2 \cdot z$

Dimensions and weights

| Type | | (55/45) | (60/50) | (70/60) | (80/70) | (90/80) | (100/90) |
|--|-----------|---------|---------|---------|---------|---------|----------|
| • Flame tube diameter | 6 bar mm | 1025 | 1050 | 1100 | 1150 | 1200 | 1250 |
| | 10 bar mm | 1025 | 1050 | 1100 | 1150 | 1200 | 1250 |
| • Flame tube length without turning chamber | mm | 4370 | 4420 | 4620 | 4820 | 5120 | 5420 |
| • Boiler length with insulation, without burner | mm | 5380 | 5430 | 5630 | 5830 | 6230 | 6530 |
| • Boiler width with insulation, without armatures | mm | 2220 | 2270 | 2370 | 2470 | 2570 | 2670 |
| • Boiler height with insulation, with armatures | mm | 3300 | 3400 | 3600 | 3700 | 3800 | 3900 |
| • Diameter flue gas outlet | mm | 650 | 650 | 700 | 750 | 750 | 800 |
| • Transport weight without burner incl. equipment | 6 bar kg | 9200 | 10000 | 11200 | 12500 | 14000 | 16000 |
| | 10 bar kg | 10800 | 12200 | 13500 | 15000 | 17000 | 18500 |

Fitting pipe

| Type | (55/45) | (60/50) | (70/60) | (80/70) | (90/80) | (100/90) |
|--|---------|---------|---------|---------|---------|----------|
| • 1 fitting pipe without insulation (flow intermediate piece) (dimension for $\Delta T = 20\text{ K}$) | DN 200 | DN 250 | DN 250 | DN 250 | DN 250 | DN 300 |

Boiler basic equipment

| Type | | (55/45) | (60/50) | (70/60) | (80/70) | (90/80) | (100/90) |
|--------------------------------------|------|----------------|---------|---------|---------|---------|----------|
| • 1 drain ball valve | [DN] | 40 | 40 | 40 | 40 | 40 | 40 |
| • 1 ventilation valve (fitting pipe) | [DN] | ½" | ½" | ½" | ½" | ½" | ½" |
| • 1 thermometer flow | [DN] | ½" | ½" | ½" | ½" | ½" | ½" |
| • 1 thermometer return flow | [DN] | ½" | ½" | ½" | ½" | ½" | ½" |
| • 1 safety thermostat | [DN] | ½" | ½" | ½" | ½" | ½" | ½" |
| • 1 cleaning set | | Brush with rod | | | | | |

Boiler basic equipment

| Type | | (55/45) | (60/50) | (70/60) | (80/70) | (90/80) | (100/90) |
|-------------------------------------|--|-----------|-----------|------------|------------|------------|------------|
| • 1 safety valve 6 bar | | DN 80/125 | DN 80/125 | DN 100/150 | DN 100/150 | DN 100/150 | DN 100/150 |
| • 1 safety valve 10 bar | | DN 65/100 | DN 65/100 | DN 80/125 | DN 80/125 | DN 80/125 | DN 80/125 |
| • 1 temperature switch | | R ½" | R ½" | R ½" | R ½" | R ½" | R ½" |
| • 1 temperature limiter STB | | R ½" | R ½" | R ½" | R ½" | R ½" | R ½" |
| • 1 pressure gauge | | R ½" | R ½" | R ½" | R ½" | R ½" | R ½" |
| • 1 pressure limiter SDB | | R ½" | R ½" | R ½" | R ½" | R ½" | R ½" |
| • 1 low water level indicator (Syr) | | R ½" | R ½" | R ½" | R ½" | R ½" | R ½" |

Boiler return flow heat up

| Type | | (55/45) | (60/50) | (70/60) | (80/70) | (90/80) | (100/90) |
|----------------------|--------|---------|---------|---------|---------|---------|----------|
| • 1 pump 120 °C | [m³/h] | 80 | 85 | 100 | 115 | 130 | 145 |
| • 1 thermostat | [DN] | R ½" | R ½" | R ½" | R ½" | R ½" | R ½" |
| • 1 non return valve | [DN] | 100 | 100 | 125 | 125 | 125 | 125 |
| • 2 non return flaps | [DN] | 100 | 100 | 125 | 125 | 125 | 125 |

1 connection pipe

| Type | | (55/45) | (60/50) | (70/60) | (80/70) | (90/80) | (100/90) |
|---------------------|------|---------|---------|---------|---------|---------|----------|
| • 1 connection pipe | [DN] | 100 | 100 | 125 | 125 | 125 | 125 |

Subject to project-related alterations

THW-I NTE (120/100)

Technical data

| Type | (120/100) ²⁾ | |
|---|-------------------------|-------------|
| • Nominal output (oil and gas) | kW | 12000/10000 |
| • Operating temperature max. (SBT) ¹⁾ | °C | 120 |
| • Temperature level flow/ return | °C | 80/60 |
| • Safety valve pressure | bar | 6 |
| | bar | 10 |
| • Boiler efficiency at 80/60 °C (natural gas) | % | 91.6/92.24 |
| • Flue gas resistance | mbar | 15/12 |
| • Water content | l | 14000 |
| • Water flow resistance * | mbar | 250 |
| | z-value ** | 0.00089 |
| • Flue gas temperature after boiler (natural gas) | °C | 200/187 |
| • Flue gas temperature after boiler (diesel oil) | °C | 193/180 |

¹⁾ Country and equipment specific

²⁾ According to EN 14394 max. allowed load = 10 MW

* for boiler max. load and $\Delta T = 20\text{ K}$

** for other flow rates use "z-value" for water side pressure loss calculation: $\Delta p\text{ (mbar)} = \text{asked flow rate (m}^3/\text{h)}^2 \cdot z$

Dimensions and weights

| Type | (120/100) | | |
|--|-----------|----|-------|
| • Flame tube diameter | 6 bar | mm | 1300 |
| | 10 bar | mm | 1300 |
| • Flame tube length without turning chamber | mm | | 5520 |
| • Boiler length | mm | | 6630 |
| with insulation, without burner | | | |
| • Boiler width | mm | | 2770 |
| with insulation, without armatures | | | |
| • Boiler height | mm | | 4200 |
| with insulation, with armatures | | | |
| • Diameter flue gas outlet | mm | | 850 |
| • Transport weight without burner incl. equipment | | | |
| | 6 bar | kg | 18000 |
| | 10 bar | kg | 21000 |

Fitting pipe

| Type | (120/100) |
|--|-----------|
| <ul style="list-style-type: none"> 1 fitting pipe without insulation (flow intermediate piece) dimension for $\Delta T = 20\text{ K}$, * dimension for $\Delta T = 30\text{ K}$ | DN 300 |

Boiler basic equipment

| Type | (120/100) |
|--|----------------|
| <ul style="list-style-type: none"> 1 drain ball valve | [DN] 40 |
| <ul style="list-style-type: none"> 1 ventilation valve (fitting pipe) | [DN] ½" |
| <ul style="list-style-type: none"> 1 thermometer flow | [DN] ½" |
| <ul style="list-style-type: none"> 1 thermometer return flow | [DN] ½" |
| <ul style="list-style-type: none"> 1 safety thermostat | [DN] ½" |
| <ul style="list-style-type: none"> 1 cleaning set | Brush with rod |

Boiler ancillary equipment

| Type | (120/100) |
|---|------------|
| <ul style="list-style-type: none"> 1 safety valve 6 bar | DN 125/200 |
| <ul style="list-style-type: none"> 1 safety valve 10 bar | DN 100/150 |
| <ul style="list-style-type: none"> 1 temperature switch | R ½" |
| <ul style="list-style-type: none"> 1 temperature limiter STB | R ½" |
| <ul style="list-style-type: none"> 1 pressure gauge | R ½" |
| <ul style="list-style-type: none"> 1 pressure limiter SDB | R ½" |
| <ul style="list-style-type: none"> 1 low water level indicator (Syr) | R ½" |

Boiler return flow heat up

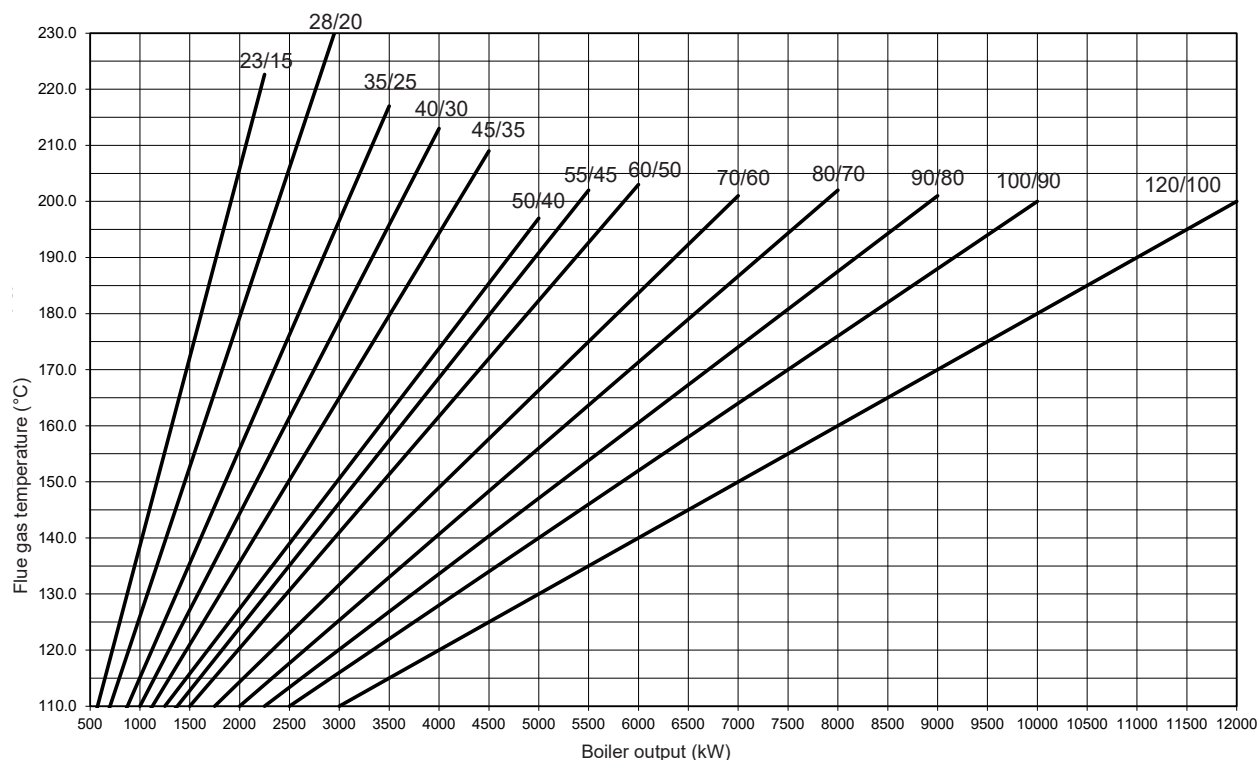
| Type | (120/100) |
|--|------------|
| <ul style="list-style-type: none"> 1 pump 120 °C | [m³/h] 175 |
| <ul style="list-style-type: none"> 1 thermostat | [DN] R ½" |
| <ul style="list-style-type: none"> 1 non return valve | [DN] 150 |
| <ul style="list-style-type: none"> 2 non return flaps | [DN] 150 |

1 connection pipe

| Type | (120/100) |
|---|-----------|
| <ul style="list-style-type: none"> 1 connection pipe | [DN] 150 |

Subject to project-related alterations

Flue gas diagram



These data represent an average value from measurements with different burner manufacturers.

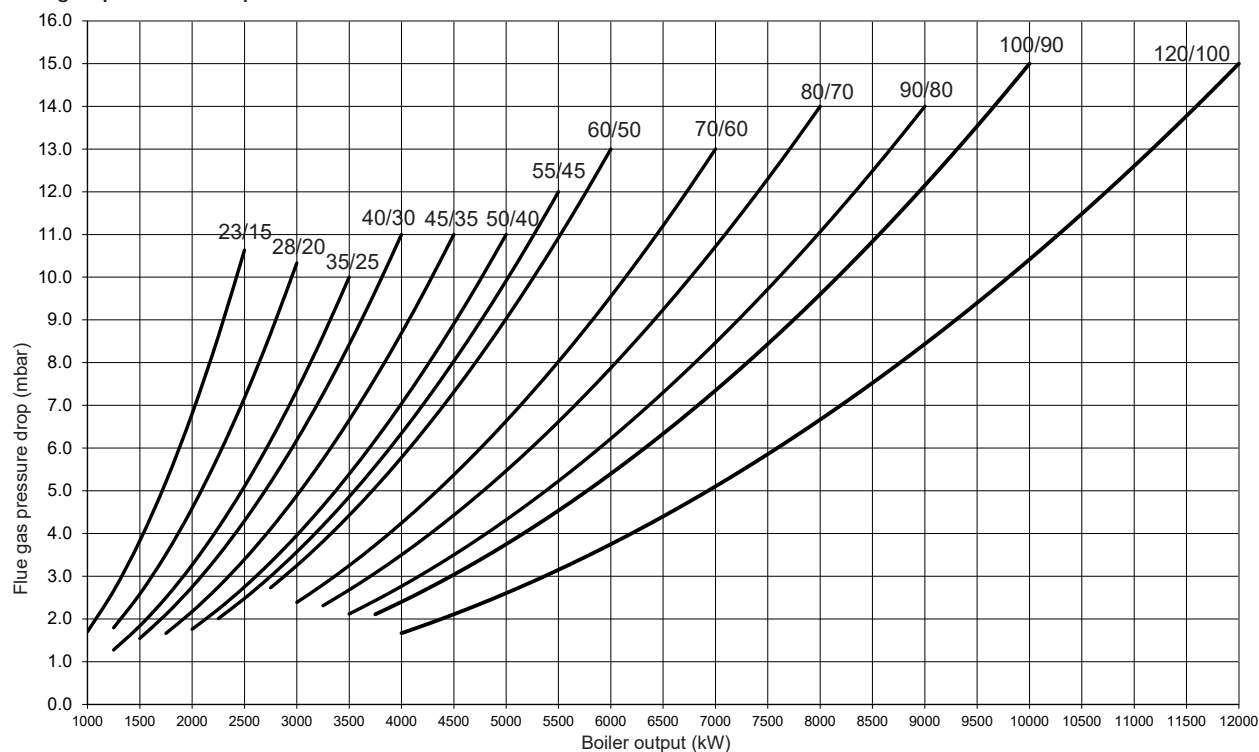
kW = Boiler output

°C = Flue gas temperature with cleaned heating surface, boiler flow temperature 80 °C, boiler return flow temperature 60 °C

- Operated with natural gas,
 $\lambda = 1.15$ with max. burner output

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

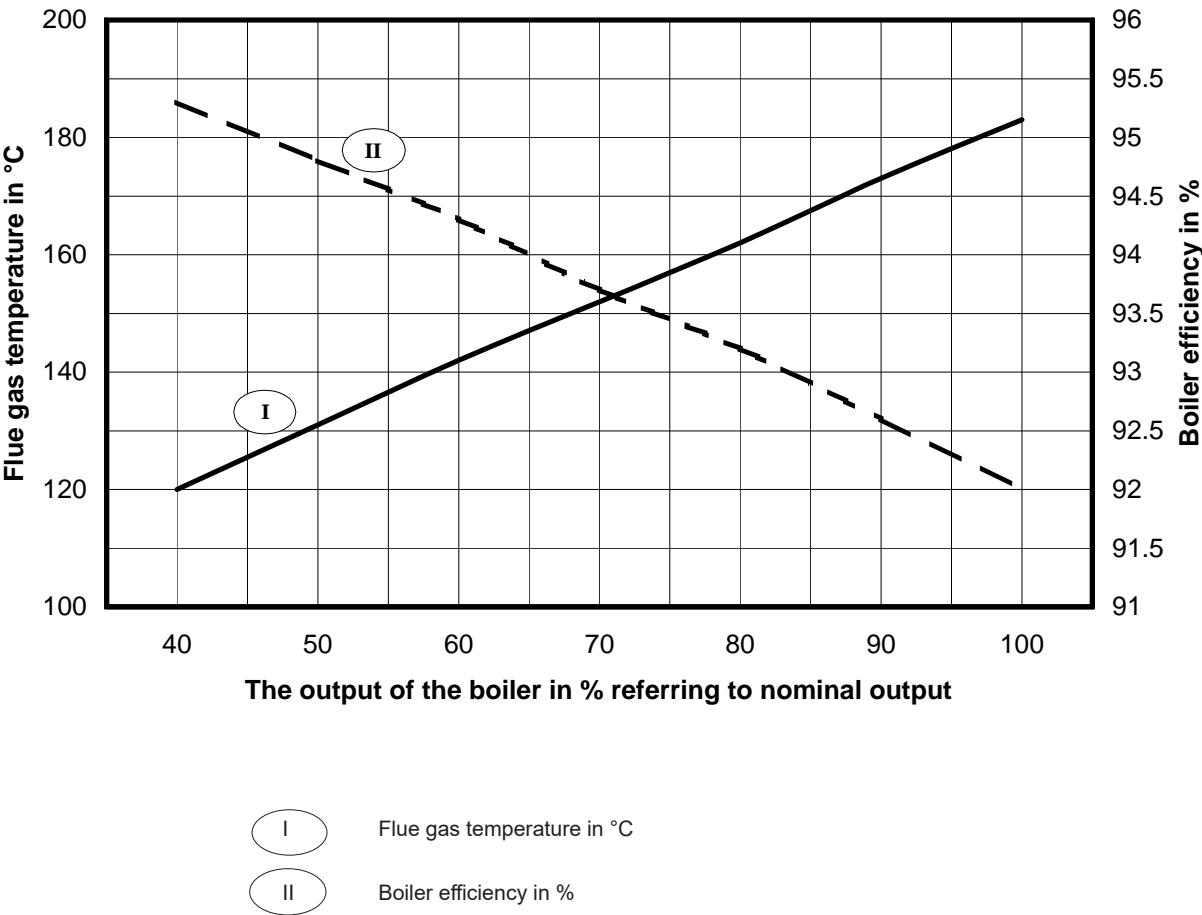
Flue gas pressure drop



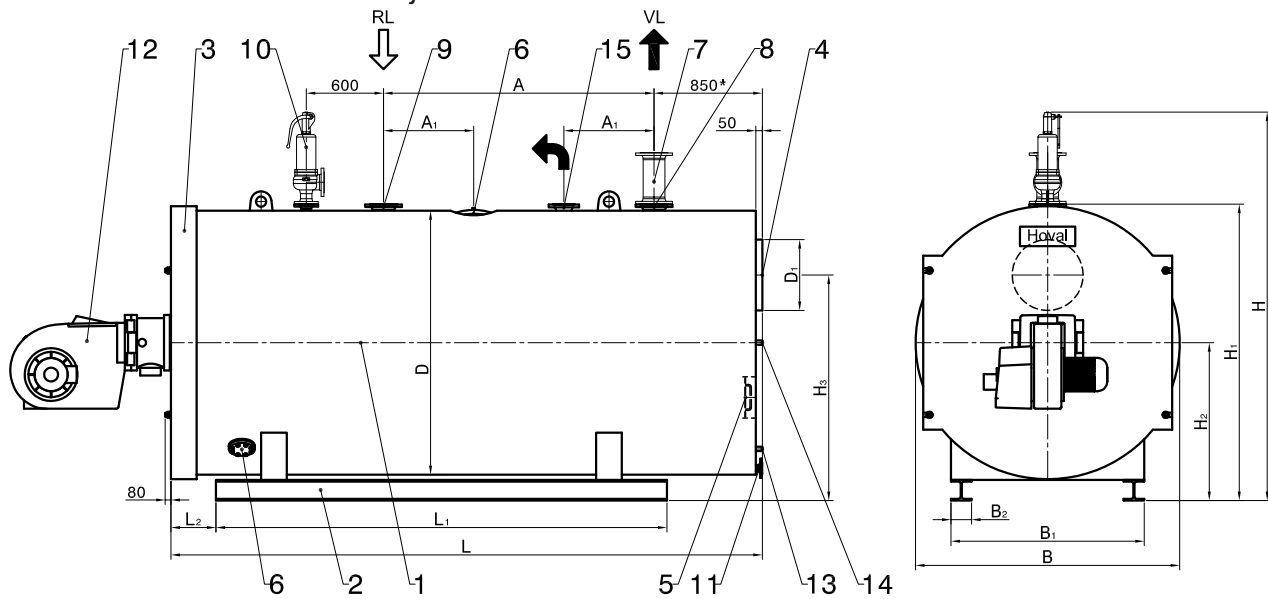
Flue gas temperature and boiler efficiency

Flue gas temperature and boiler efficiency

In dependence on the boiler efficiency with a boiler water temperature of 80/60 °C.



THW-I NTE without economiser - subject to construction-caused alterations



- 1 Boiler (with flue gas collector)
- 2 Boiler base
(to THW-I NTE (45/35) with U-girder,
from THW-I NTE (50/40) with I-girder)
- 3 Hinged door, incl. reversal chamber
2nd/3rd smoke gas pass

- 4 Flue gas outlet with 1 x 1/2" fitting
- 5 Explosion flap and cleaning opening
- 6 Inspection opening
- 7 Fitting pipe PN 16
- 8 Boiler outlet nozzle

- 9 Return flow nozzle
- 10 Safety valve nozzle PN 16
- 11 Drain nozzle DN 40/PN 16
- 12 Burner
- 13 Condensate drain nozzle 1"
- 14 Flame peephole
- 15 Admixing nozzle (BS)

Pressure stage 6 or 10 bar (overpressure).
 Dimensions for boiler design pressure 10 bar
 Safety valve dimensions for boiler design pressure 6 bar
 For transport lugs 100 mm to H₁, are to add.

* from boiler size 90/80
 upward = 950 mm
 Further pressure stages on request!
 Dimensions incl. 100 mm insulation.

| Boiler type | Main dimensions | | | | | Boiler foundation | | | | | Transport dim | | OL/IL nozzle | | | Flue gas con. | | SV | BS |
|-------------|-----------------|-------------|------|----------------|----------------|-------------------|----------------|----------------|----------------|----------------|------------------|--------------------------------|--------------|----------------|---------------------|----------------|----------------|------------------|------------------|
| | B Width | L Length | H | H ₁ | H ₂ | D | L ₁ | L ₂ | B ₁ | B ₂ | B _{min} | H _{min} ⁴⁾ | A | A ₁ | DN ^{1),3)} | H ₃ | D ₁ | DN ¹⁾ | DN ¹⁾ |
| (23/15) | 1770 | 3430 | 2600 | 1960 | 1000 | 1700 | 2650 | 230 | 1250 | 60 | 2000 | 2160 | 1600 | 600 | 150 | 1400 | 450 | 50 | 65 |
| (28/20) | 1870 | 3930 | 2800 | 2060 | 1050 | 1800 | 3000 | 230 | 1350 | 60 | 2100 | 2260 | 1800 | 600 | 150 | 1500 | 500 | 65 | 80 |
| (35/25) | 1970 | 4280 | 2900 | 2160 | 1100 | 1900 | 3500 | 230 | 1400 | 60 | 2200 | 2360 | 2100 | 700 | 150 | 1550 | 500 | 65 | 80 |
| (40/30) | 2020 | 4580 | 2950 | 2210 | 1125 | 1950 | 3500 | 230 | 1450 | 60 | 2250 | 2410 | 2100 | 700 | 200 | 1600 | 550 | 65 | 80 |
| (45/35) | 2070 | 4730 | 3000 | 2260 | 1150 | 2000 | 3500 | 230 | 1500 | 60 | 2300 | 2460 | 2100 | 700 | 200 | 1650 | 600 | 65 | 80 |
| (50/40) | 2170 | 5330 | 3250 | 2410 | 1250 | 2100 | 4000 | 350 | 1550 | 160 | 2400 | 2610 | 2500 | 800 | 200 | 1750 | 600 | 80 | 100 |
| (55/45) | 2220 | 5380 | 3300 | 2460 | 1325 | 2150 | 4000 | 350 | 1600 | 160 | 2450 | 2660 | 2500 | 800 | 200 | 1800 | 650 | 80 | 100 |
| (60/50) | 2270 | 5430 | 3400 | 2560 | 1350 | 2200 | 4500 | 350 | 1650 | 160 | 2500 | 2760 | 2500 | 800 | 250 | 1850 | 650 | 80 | 100 |
| (70/60) | 2370 | 5630 | 3600 | 2660 | 1400 | 2300 | 4500 | 350 | 1700 | 160 | 2600 | 2860 | 2500 | 800 | 250 | 1900 | 700 | 100 | 125 |
| (80/70) | 2470 | 5930 | 3700 | 2760 | 1450 | 2400 | 5000 | 350 | 1800 | 160 | 2700 | 2960 | 3000 | 900 | 250 | 2050 | 750 | 100 | 125 |
| (90/80) | 2570 | 6230 | 3800 | 2860 | 1500 | 2500 | 5000 | 350 | 1850 | 160 | 2800 | 3060 | 3000 | 900 | 250 | 2100 | 750 | 100 | 150 |
| (100/90) | 2670 | 6530 | 3900 | 2960 | 1550 | 2600 | 5500 | 350 | 1950 | 160 | 2900 | 3160 | 3000 | 900 | 300 | 2200 | 800 | 100 | 150 |
| (120/100) | 2770 | 6630 | 4200 | 3060 | 1600 | 2700 | 5500 | 350 | 2000 | 160 | 3000 | 3260 | 3000 | 900 | 300 | 2300 | 850 | 125 | 150 |

¹⁾ DN/...PN 16

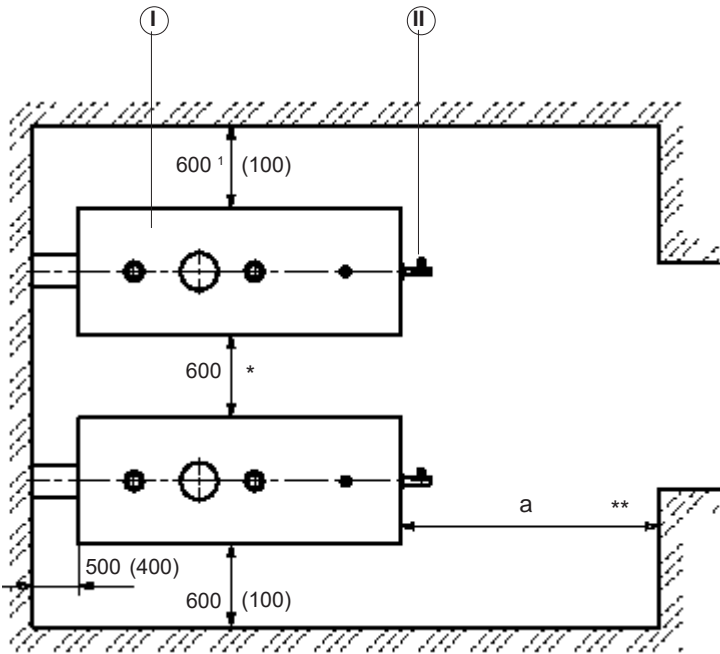
³⁾ Diameter for standard $\Delta T = 20$ K (from THW-I 140/120 NTE upwards $\Delta T = 30$ K), other dimensions on request

⁴⁾ without fitting pipe

Space requirements

Installation

(Dimensions in mm)



- I

Boiler
- II

Burner
- * Consider control panel
- ** Flame tube length (cleaning)
- ¹ 600-900, depending on local standards

To facilitate installation and maintenance the given measures should be kept; in case of limited space the minimal spaces (measures in brackets) are sufficient.

Positioning

- No air pollution through halogenated hydrocarbon (contained e.g. in sprays, paints, solvents and cleaners)

- No large amounts of dust

- No high atmospheric humidity

- Frost-resistant and well ventilated
- Otherwise errors and damages to the installation may occur.

The boiler may only be installed in rooms where air pollution through halogenated hydrocarbon can occur if sufficient measures are taken ensuring the supply of unpolluted combustion air.

| | | | | | | | | |
|------------------|---------|---------|---------|---------|---------|---------|---------|---------|
| Type | (23/15) | (28/20) | (35/25) | (40/30) | (45/35) | (50/40) | (55/45) | (60/50) |
| THW-I NTE a (mm) | 2900 | 3400 | 3750 | 4050 | 4200 | 4600 | 4850 | 4900 |

| | | | | | |
|------------------|---------|---------|---------|----------|-----------|
| Type | (70/60) | (80/70) | (90/80) | (100/90) | (120/100) |
| THW-I NTE a (mm) | 5100 | 5300 | 5600 | 5900 | 6100 |

Rules and regulations

The following rules and regulations have to be respected:

- Hoval technical information and installation guide.
- hydraulic and control technical regulations, to guarantee the min. admissible boiler temperature and the conditions for a safe operation according to national regulations.
- fire protection regulations
- national regulations concerning permission, installation and operation of boiler appliances. Boiler appliances have to be installed according to national laws and regulations and accessories requirements.
- Besides the national and local regulations the project specific circumstances of the boiler supplier have to be considered for every application.

Water treatment/water quality

- The quality of the boiler water has to be guaranteed according to Hoval technical information and national regulations.
- Hoval boilers must only be operated with treated water. For the treatment of water apply for the values to be kept refer to the Hoval guide lines.
- Requested water quality: see supplement.
- Do not use chemical additives such as anti-freeze, inhibitors, etc. without written confirmation from Hoval.
- Old and new installations must be well flushed before filling.
- The water quality should be monitored and recorded.

Planning, operation and maintenance

- National and local rules and regulations have to be considered for the fuel supply.
- Safety and exhaust valve connections must be able to discharge the system pressure without any risk.
- Filters and strainers have to be cleaned periodically, especially if installed in front of control devices.
- The components containing heat and the pipes are to be insulated in order to reduce radiation losses.

Combustion air

- The supply of combustion air must be guaranteed for a safe and economic operation. There must be no possibility to close the air supply opening.
- Aeration and ventilation of the boiler house has to be secured.
- In the installation room no negative pressure larger than 3 N/m^2 is allowed. To adhere to this demand, plan a cross free section for the air supply opening of at least 200 cm^2 , resp. 2 cm^2 per kW output. The aspect ratio for rectangular openings should not be more than 1.5 : 1. If the opening is trellised an adequate surcharge is needed. National laws have to be respected.
- Boilers are not to be installed in rooms where halogen compounds occur which can enter the combustion air. (e.g. laundries, drying, etc.).

Noise level reduction

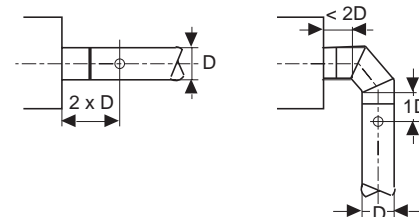
The following measures for noise level reduction are possible:

- Solid construction of heating room walls, ceiling and floor, installation of silencer in fresh air supply, noise insulation for support and bracket of pipes.
- Installation of sound attenuation cowl for burner.
- A substantial part of the sound caused in the combustion chamber and in the top heating surfaces is radiated from the flu gas system as sound transmitted by air. In addition to this, resonance features, depending on chimney dimensioning and inlet, may occur which are triggered by the oscillation of the combustion noises (snooping). These sounds can be reduced by burner-lateral measures, e.g. changes of flame geometry, atomisation characteristics or fuel throughput.
- Flue gas sound absorbers cause a substantial sound level reduction as well. These sound absorbers should usually be tuned at low frequencies of 60 - 250 Hz. Flue gas sound absorbers function according to the principle of sound absorption. The kinetic energy of the exhaust gases is consumed by friction requiring an increase in chimney draft in the flue gas system. This has to be considered for burner dimensioning. The connection piece from the boiler to the flue gas sound absorber has to be gas-tight because the draft- and pressure-zero point is behind the flue gas sound absorber.
- The necessary space requirement of approx. 2 m for the later installation of a flue gas sound absorber should already be included when planning.

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 $30\text{--}45^\circ$ 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 $>200^\circ \text{C}$.
- 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.

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!

Boiler water specifications

Guiding lines for boiler water and system water specifications for pump circulation boilers (large water room boiler)

| | | |
|--|--|------------|
| Operating pressure | bar | > 0.5 ≤ 25 |
| General requirements | colourless, clear, free from suspended matter and foam | |
| pH value at 25 °C | | 9.0-11.5 |
| Sum of earth alkalies (Ca + Mg) ¹⁾ | mmol/l | < 0.02 |
| | °dH | < 0.112 |
| Conductivity at 25 °C ⁴⁾ | µS/cm | < 1500 |
| Acid capacity KS 8.2 ²⁾ (p-value) | mmol/l | 1-5 |
| Silicic acid (SiO ₂) | mg/l | < 100 |
| Phosphate (P ₂ O ₄) ³⁾ | mg/l | 10-30 |
| Sodium sulphite (Na ₂ SO ₃) ³⁾ | mg/l | 5-10 |
| Iron (Fe) | mg/l | < 0.2 |
| Copper (Cu) | mg/l | < 0.1 |
| Oil/fat | mg/l | < 1.0 |
| Oxygen (O ₂) | mg/l | < 0.02 |

¹⁾ Noted in the past as °dH, changing factor: 1 mmol/l = 5.6 °dH (German hardness)

²⁾ Noted in the past as p-value, changing factor: KS 8.2 = 1 according p-value = 1

³⁾ Measuring only necessary if dosing chemicals are used which contains these values.

⁴⁾ For level electrodes minimum conductivity > 5 µS/cm

It is not necessary to make continuous control of following parameters: silicic acid (SiO₂)

Important notice:

Hoval recommends that a water treatment specialist is employed to carry out routine monitoring of the supply water in order to ensure it remains within specification.

aqua3 E

Hoval hot water boiler

The Hoval high output hot water boilers are made of quality steel and are distinguished by their solid, robust and elastic construction. They particularly convince by their easy way of operation, their easy maintenance and optimal efficiency. The client receives an economical, environment friendly compact unit, ready for installation. The boilers are constructed for oil or gas firing.

Boiler type aqua3 E

The type aqua3 E as classical 3 pass flame tube flue gas tube boiler with an inner fully water cooled flue gas turning chamber guarantees high efficiency. The boiler consists of a cylindric shell, the two head plates, the centric flame tube including the back flue gas turning chamber with water cooled finned tube wall and the two flue gas passes. The boiler door is thermally insulated and flue gas proof for burner mounting. The boiler is completely electrically welded and provided with all required inspection openings.

The spacious designed flame tube with low thermal charges results in an excellent combustion and reduces emissions. The large water content secures an even boiler running time and thus reduces the number of boiler starts.

Admissible max. safety valve pressure/temperature

Standard pressures: 10, 13 and 16 bar.

Higher pressure on request.

Max. temperature up to 210 °C.

Thermal insulation

The boiler is fully insulated including flue gas collector with rock wool insulation. The casing is made of structured aluminium plate. Sockets and cuttings are nicely framed.

Connection fittings and sockets

The connection fittings and sockets on the boiler and on the fitting pipe are meant for the attachment of:

Flow intermediate piece, Thermometer for return, return shut-off, safety valve, drain.

Large equipment

2 boiler supports

1 flue gas collector with integrated flue gas exit backward

1 back cleaning cover with bleeder valves

1 boiler door for burner mounting, thermally insulated and designed flue gas proof, placed on left and right swivelable hinges for the flue gas sided cleaning of boiler

1 boiler plate

High efficiency

Due to the above technical facts an efficiency of up to > 91 % (120 °C middle temperature, flow/return) can be achieved. Thus continuous working costs are kept low. The sources of energy are used more efficiently and Hoval protects the environment.



Construction guiding, quality approval

The boiler is designed with all necessary inspection doors.

The construction and manufacturing of the boilers is done according to the European Pressure Equipment Directive (PED) 2014/68/EU - EN 12953 with CE-certificate. The ISO 9001:2000 certification and the quality approval at our factory with our Hoval quality performance department guarantees the highest product quality. For installation and operation of the boiler the local laws and norms are to be respected.

Control panel

The control panel for the Hoval boiler can be equipped with the required control units and indicators for control and supervision of boiler and burner. The operation and alarm reports may be shown as fault indication. The control panel will be made upon customer requirements and depending on the burner to be used.

Boiler water quality

For operation the Hoval and the country specific boiler water regulations have to be respected and local waste water regulations have to be paid attention to. Detailed information for the boiler water quality can be found in the appendix.

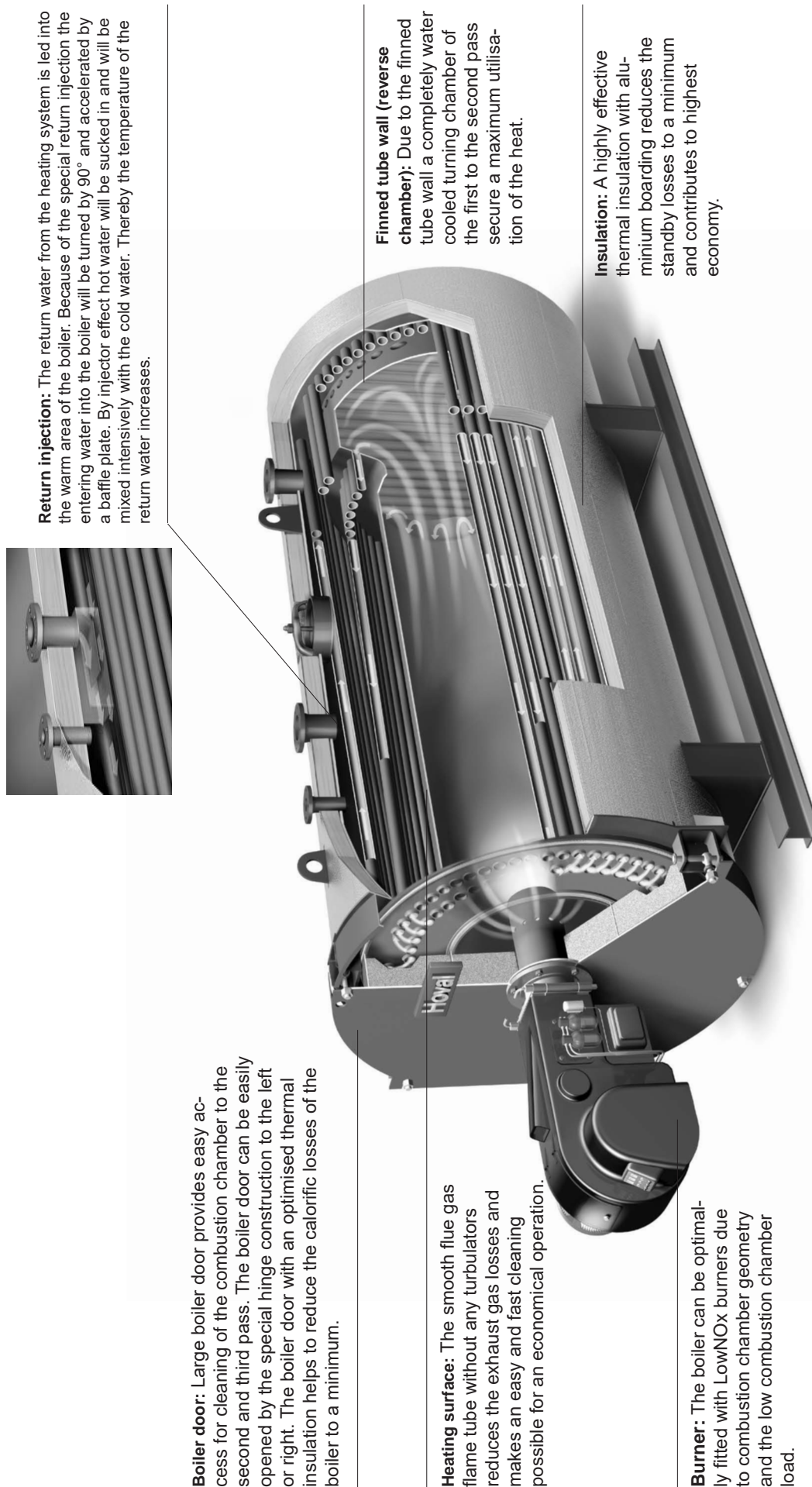
Delivery

The pressure body is provided with a primer. Due to transport reasons the insulation can be fixed at the factory. Burner armatures and control panel are either pre-mounted (as far as transport technically possible) or packed loosely in a separate box. The mounting and wiring can be done at the factory or at site. Connection openings are covered.

On request

Volt-free contacts for BMS connection (Building Management System).

Sectional view



aqua3 E (1000-6000)

Technical data

| Type | | (1000) | (2000) | (3000) | (4000) | (5000) | (6000) |
|---|-------------|---------------------------|---------|---------|---------|---------|---------|
| • Nominal output (oil firing) | kW | 1000 | 2000 | 3000 | 4000 | 5000 | 6000 |
| • Nominal output (gas firing) | kW | 1000 | 2000 | 3000 | 4000 | 5000 | 6000 |
| • Operating temperature max. (SBT) ¹⁾ | | depending on net pressure | | | | | |
| • Temperature level flow/return | | depending on net pressure | | | | | |
| • Safety valve pressure | bar | 10 | 10 | 10 | 10 | 10 | 10 |
| | bar | 13 | 13 | 13 | 13 | 13 | 13 |
| | bar | 16 | 16 | 16 | 16 | 16 | 16 |
| • Boiler efficiency at 120 °C (natural gas) * | % | 89.2 | 89.6 | 89.7 | 89.6 | 89.4 | 89.5 |
| • Boiler efficiency at 120 °C (diesel oil) * | % | 89.9 | 90.3 | 90.3 | 90.2 | 90.1 | 90.2 |
| • Flue gas resistance | mbar | 8.0 | 9.0 | 10.0 | 11.0 | 11.0 | 11.0 |
| at max. boiler load of | kW | 1000 | 2000 | 3000 | 4000 | 5000 | 6000 |
| • Water content | l | 2150 | 4000 | 5810 | 6890 | 8310 | 10020 |
| • Water flow resistance ** | mbar | 95 | 65 | 72 | 52 | 80 | 110 |
| | z-value *** | 0.05264 | 0.00901 | 0.00406 | 0.00181 | 0.00178 | 0.00170 |
| • Flue gas temperature after boiler (natural gas) | °C | 246 | 240 | 241 | 244 | 248 | 247 |
| • Flue gas temperature after boiler (diesel oil) | °C | 235 | 230 | 231 | 234 | 238 | 237 |

¹⁾ Country and equipment specific

* efficiency for boiler middle temperature

** for boiler max. load and $\Delta T = 20 \text{ K}$

*** for other flow rates use "z-value" for water side pressure loss calculation: $\Delta p \text{ (mbar)} = \text{asked flow rate (m}^3/\text{h)}^2 \cdot z$

Dimensions and weights

| Type | | (1000) | (2000) | (3000) | (4000) | (5000) | (6000) |
|--|-----------|--------|--------|--------|--------|----------|-----------|
| • Flame tube diameter | 10 bar mm | 600 | 740 | 860 | 920 | 980 | 1050 |
| | 13 bar mm | 600 | 740 | 860 | 920 | 980 | 1050 |
| | 16 bar mm | 600 | 740 | 860 | 920 | 980/1080 | 1050/1200 |
| • Flame tube length without turning chamber | mm | 1764 | 2606 | 3206 | 3610 | 4056 | 4306 |
| • Boiler length | | | | | | | |
| with insulation, without burner | mm | 2830 | 3680 | 4280 | 4680 | 5130 | 5480 |
| • Boiler width | | | | | | | |
| with insulation, without armatures | mm | 1660 | 1910 | 2110 | 2210 | 2310 | 2460 |
| • Boiler height | | | | | | | |
| with insulation, without assembly tube | mm | 1800 | 2050 | 2250 | 2450 | 2550 | 2700 |
| • Diameter flue gas outlet | mm | 300 | 450 | 500 | 600 | 650 | 750 |
| • Transport weight without burner incl. equipment | | | | | | | |
| | 10 bar kg | 3500 | 5000 | 7500 | 9200 | 11100 | 13300 |
| | 13 bar kg | 3800 | 5500 | 8300 | 10000 | 11400 | 14300 |
| | 16 bar kg | 4100 | 6000 | 8800 | 10800 | 12500 | 15200 |

Assembly tube

| Type | | (1000) | (2000) | (3000) | (4000) | (5000) | (6000) |
|---|------|--------|--------|--------|--------|--------|--------|
| • 1 assembly tube without insulation (flow intermediate piece) (dimensions for $\Delta T = 20\text{ K}$) | [DN] | 80 | 125 | 150 | 200 | 200 | 200 |

Boiler basic equipment

| Type | | (1000) | (2000) | (3000) | (4000) | (5000) | (6000) |
|---------------------------------------|------|----------------|--------|--------|--------|--------|--------|
| • 1 drain ball valve | [DN] | 40 | 40 | 40 | 40 | 40 | 40 |
| • 1 ventilation valve (assembly tube) | [DN] | 1/2" | 1/2" | 1/2" | 1/2" | 1/2" | 1/2" |
| • 1 thermometer flow | [DN] | 1/2" | 1/2" | 1/2" | 1/2" | 1/2" | 1/2" |
| • 1 thermometer return flow | [DN] | 1/2" | 1/2" | 1/2" | 1/2" | 1/2" | 1/2" |
| • 1 safety thermostat | [DN] | 1/2" | 1/2" | 1/2" | 1/2" | 1/2" | 1/2" |
| • 1 cleaning set | | Brush with rod | | | | | |

Boiler basic equipment

| Type | | (1000) | (2000) | (3000) | (4000) | (5000) | (6000) |
|-------------------------|--|--------|--------|--------|--------|--------|--------|
| • 1 safety valve 10 bar | | 25/40 | 40/65 | 50/80 | 50/80 | 65/100 | 65/100 |
| • 1 safety valve 13 bar | | 25/40 | 32/50 | 40/65 | 50/80 | 65/100 | 65/100 |
| • 1 safety valve 16 bar | | 25/40 | 32/50 | 40/65 | 50/80 | 50/80 | 65/100 |

Flow/return flow shut off armature

| Type | | (1000) | (2000) | (3000) | (4000) | (5000) | (6000) |
|-----------------|--|--------|--------|--------|--------|--------|--------|
| • Shut-off flap | | 80 | 125 | 150 | 200 | 200 | 200 |

Boiler equipment according to TRD 604 - EN 12953-6

| Type | | (1000) | (2000) | (3000) | (4000) | (5000) | (6000) |
|-------------------------------------|--|--------|--------|--------|--------|--------|--------|
| • 2 safety temperature controls | | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" |
| • 1 return flow temperature control | | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" |
| • 1 pressure gauge | | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" |
| • 2 safety pressure controls | | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" |
| • 1 pressure min. control | | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" |
| • 1 water level limiter | | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" |
| • 1 min. flow control switch | | DN 50 | DN 50 | DN 50 | DN 50 | DN 50 | DN 50 |

Boiler return flow heat up

| Type | | (1000) | (2000) | (3000) | (4000) | (5000) | (6000) |
|----------------------|--------|--------|--------|--------|--------|--------|--------|
| • 1 pump 140 °C | [m³/h] | 14 | 35 | 50 | 65 | 80 | 90 |
| • 1 thermostat | [DN] | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" |
| • 1 non return valve | [DN] | 40 | 80 | 80 | 80 | 80 | 100 |
| • 2 shut-off flaps | [DN] | 40 | 80 | 80 | 80 | 80 | 100 |
| • 1 pump 180 °C | [m³/h] | 14 | 35 | 50 | 65 | 80 | 90 |
| • 1 thermostat | [DN] | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" |
| • 1 non return valve | [DN] | 65 | 80 | 80 | 80 | 80 | 100 |
| • 2 shut-off flaps | [DN] | 65 | 80 | 80 | 80 | 80 | 100 |

Subject to project-related alterations

aqua3 E (8000-16500)

Technical data

| Type | | (8000) | 10000) | (12000) | (15000) | (16500) |
|---|-------------|---------------------------|---------|---------|---------|---------|
| • Nominal output (oil firing) | kW | 7930 | 9400 | 12000 | 12730 | 12810 |
| • Nominal output (gas firing) | kW | 8000 | 10000 | 12000 | 15000 | 16380 |
| • Operating temperature max. (SBT) ¹⁾ | | depending on net pressure | | | | |
| • Temperature level flow/return | | depending on net pressure | | | | |
| • Safety valve pressure | bar | 10 | 10 | 10 | 10 | 10 |
| | bar | 13 | 13 | 13 | 13 | 13 |
| | bar | 16 | 16 | 16 | 16 | 16 |
| • Boiler efficiency at 120 °C (natural gas) * | % | 89.4 | 89.5 | 89.1 | 89.6 | 89.9 |
| • Boiler efficiency at 120 °C (diesel oil) * | % | 90.1 | 90.4 | 89.8 | 90.8 | 91.4 |
| • Flue gas resistance | mbar | 12.0 | 11.0 | 14.0 | 15.0 | 14.0 |
| at max. boiler load of | kW | 8000 | 10000 | 12000 | 15000 | 16380 |
| • Water content | l | 12970 | 15870 | 20780 | 26920 | 32350 |
| • Water flow resistance ** | mbar | 80 | 120 | 85 | 135 | 120 |
| | z-value *** | 0.00070 | 0.00067 | 0.00033 | 0.00033 | 0.00022 |
| • Flue gas temperature after boiler (natural gas) | °C | 250 | 249 | 259 | 248 | 240 |
| • Flue gas temperature after boiler (diesel oil) | °C | 240 | 234 | 248 | 223 | 210 |

¹⁾ Country and equipment specific

* efficiency for boiler middle temperature

** at boiler max. load and $\Delta T = 20 \text{ K}$

***for other flow rates use "z-value" for water side pressure loss calculation: $\Delta p \text{ (mbar)} = \text{asked flow rate (m}^3/\text{h)}^2 * z$

Dimensions and weights

| Type | | (8000) | (10000) | (12000) | (15000) | (16500) |
|--|-----------|-----------|-----------|-----------|-----------|-----------|
| • Flame tube diameter | 10 bar mm | 1170 | 1280 | 1400/1550 | 1550/1700 | 1620/1770 |
| | 13 bar mm | 1170/1320 | 1280/1430 | 1400/1550 | 1550/1700 | 1620/1770 |
| | 16 bar mm | 1170/1320 | 1280/1430 | 1400/1550 | 1550/1700 | 1620/1770 |
| • Flame tube length without turning chamber | mm | 4680 | 5130 | 5830 | 6130 | 6430 |
| • Boiler length | | | | | | |
| with insulation, without burner | mm | 5830 | 6330 | 7030 | 7365 | 7665 |
| • Boiler width | | | | | | |
| with insulation, without armatures | mm | 2660 | 2860 | 3060 | 3360 | 3560 |
| • Boiler height | | | | | | |
| with insulation, without assembly tube | mm | 2900 | 3150 | 3350 | 3650 | 3900 |
| • Diameter flue gas outlet | mm | 850 | 950 | 1050 | 1150 | 1200 |
| • Transport weight without burner incl. equipment | | | | | | |
| | 10 bar kg | 17800 | 20500 | 23000 | 26500 | 31000 |
| | 13 bar kg | 19000 | 22000 | 24500 | 28000 | 33000 |
| | 16 bar kg | 20500 | 23500 | 26700 | 32000 | 35000 |

Assembly tube

| Type | | (8000) | (10000) | (12000) | (15000) | (16500) |
|---|------|--------|---------|---------|---------|---------|
| • 1 assembly tube without insulation (flow intermediate piece) (dimensions for $\Delta T = 20 \text{ K}$) | [DN] | 250 | 250 | 300 | 300 | 350 |

Boiler basic equipment

| Type | | (8000) | (10000) | (12000) | (15000) | (16500) |
|---------------------------------------|------|----------------|---------|---------|---------|---------|
| • 1 drain ball valve | [DN] | 40 | 40 | 40 | 40 | 40 |
| • 1 ventilation valve (assembly tube) | [DN] | 1/2" | 1/2" | 1/2" | 1/2" | 1/2" |
| • 1 thermometer flow | [DN] | 1/2" | 1/2" | 1/2" | 1/2" | 1/2" |
| • 1 thermometer return flow | [DN] | 1/2" | 1/2" | 1/2" | 1/2" | 1/2" |
| • 1 safety thermostat | [DN] | 1/2" | 1/2" | 1/2" | 1/2" | 1/2" |
| • 1 cleaning set | | Brush with rod | | | | |

Safety valve

| Type | | (8000) | (10000) | (12000) | (15000) | (16500) |
|-------------------------|--|--------|---------|---------|---------|---------|
| • 1 safety valve 10 bar | | 80/125 | 80/125 | 100/150 | 100/150 | 125/200 |
| • 1 safety valve 13 bar | | 65/100 | 80/125 | 80/125 | 100/150 | 100/150 |
| • 1 safety valve 16 bar | | 65/100 | 65/100 | 80/125 | 80/125 | 100/150 |

Flow/return flow shut-off armature

| Type | | (8000) | (10000) | (12000) | (15000) | (16500) |
|-----------------|--|--------|---------|---------|---------|---------|
| • Shut-off flap | | 250 | 250 | 300 | 300 | 350 |

Boiler equipment according to TRD 604 - EN 12953-6

| Type | | (8000) | (10000) | (12000) | (15000) | (16500) |
|-------------------------------------|--|--------|---------|---------|---------|---------|
| • 2 safety temperature controls STB | | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" |
| • 1 return flow temperature control | | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" |
| • 1 pressure gauge | | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" |
| • 2 safety pressure controls | | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" |
| • 1 pressure min. control | | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" |
| • 1 water level limiter | | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" |
| • 1 min. flow control switch | | DN 50 | DN 50 | DN 50 | DN 50 | DN 50 |

Boiler return flow heat up

| Type | | (8000) | (10000) | (12000) | (15000) | (16500) |
|----------------------|--------|--------|---------|---------|---------|---------|
| • 1 pump 140 °C | [m³/h] | 120 | 150 | 175 | 230 | 260 |
| • 1 thermostat | [DN] | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" |
| • 1 non return valve | [DN] | 125 | 150 | 150 | 200 | 200 |
| • 2 shut-off flaps | [DN] | 125 | 150 | 150 | 200 | 200 |
| • 1 pump 180 °C | [m³/h] | 120 | 150 | 175 | 230 | 260 |
| • 1 thermostat | [DN] | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" |
| • 1 non return valve | [DN] | 125 | 150 | 150 | 200 | 200 |
| • 2 shut-off flaps | [DN] | 125 | 150 | 150 | 200 | 200 |

Subject to project-related alterations

aqua3 E (18000-20000)

Technical data

| Type | | (18000) | (20000) |
|---|-------------|---------------------------|---------|
| • Nominal output (oil firing) | kW | 17980 | 19580 |
| • Nominal output (gas firing) | kW | 18000 | 20000 |
| • Operating temperature max. (SBT) ¹⁾ | | depending on net pressure | |
| • Temperature level flow/return | | depending on net pressure | |
| • Safety valve pressure | bar | 10 | 10 |
| | bar | 13 | 13 |
| | bar | 16 | 16 |
| • Boiler efficiency at 120 °C (natural gas) * | % | 90.2 | 90.9 |
| • Boiler efficiency at 120 °C (diesel oil) * | % | 91.0 | 91.5 |
| • Flue gas resistance | mbar | 15.0 | 15.0 |
| at max. boiler load of | kW | 18000 | 19580 |
| • Water content | l | 35140 | 38250 |
| • Water flow resistance ** | mbar | 80 | 100 |
| | z-value *** | 0.00014 | 0.00014 |
| • Flue gas temperature after boiler (natural gas) | °C | 235 | 220 |
| • Flue gas temperature after boiler (diesel oil) | °C | 226 | 211 |

¹⁾ Country and equipment specific

* efficiency for boiler middle temperature

** at boiler max. load and $\Delta T = 20 \text{ K}$

*** for other flow rates use "z-value" for water side pressure loss calculation: $\Delta p \text{ (mbar)}$
 $= \text{asked flow rate (m}^3/\text{h)}^2 \cdot z$

Dimensions and weights

| Type | | | (18000) | (20000) |
|--|--------|----|-----------|-----------|
| • Flame tube diameter | 10 bar | mm | 1700/1850 | 1770/1920 |
| | 13 bar | mm | 1700/1850 | 1770/1920 |
| | 16 bar | mm | 1700/1850 | 1770/1920 |
| • Flame tube length without turning chamber | | mm | 6680 | 7080 |
| • Boiler length | | | | |
| with insulation, without burner | | mm | 7915 | 8315 |
| • Boiler width | | | | |
| with insulation, without armatures | | mm | 3660 | 3760 |
| • Boiler height | | | | |
| with insulation, without assembly tube | | mm | 4050 | 4200 |
| • Diameter flue gas outlet | | mm | 1250 | 1300 |
| • Transport weight without burner incl. equipment | | | | |
| | 10 bar | kg | 35000 | 40000 |
| | 13 bar | kg | 38500 | 43000 |
| | 16 bar | kg | 42000 | 46000 |

Assembly tube

| Type | | (18000) | (20000) |
|---|------|---------|---------|
| • 1 assembly tube without insulation (flow intermediate piece) (dimensions for $\Delta T = 20\text{ K}$) | [DN] | 400 | 400 |

Boiler basic equipment

| Type | | (18000) | (20000) |
|---------------------------------------|------|----------------|---------|
| • 1 drain ball valve | [DN] | 40 | 40 |
| • 1 ventilation valve (assembly tube) | [DN] | 1/2" | 1/2" |
| • 1 thermometer flow | [DN] | 1/2" | 1/2" |
| • 1 thermometer return | [DN] | 1/2" | 1/2" |
| • 1 safety thermostat | [DN] | 1/2" | 1/2" |
| • 1 cleaning set | | Brush with rod | |

Safety valve

| Type | | (18000) | (20000) |
|-------------------------|--|---------|---------|
| • 1 safety valve 10 bar | | 125/200 | 125/200 |
| • 1 safety valve 13 bar | | 100/150 | 125/200 |
| • 1 safety valve 16 bar | | 100/150 | 100/150 |

Flow/return flow shut-off armature

| Type | | (18000) | (20000) |
|-----------------|--|---------|---------|
| • Shut-off flap | | 400 | 400 |

Boiler equipment according to TRD 604 - EN 12953-6

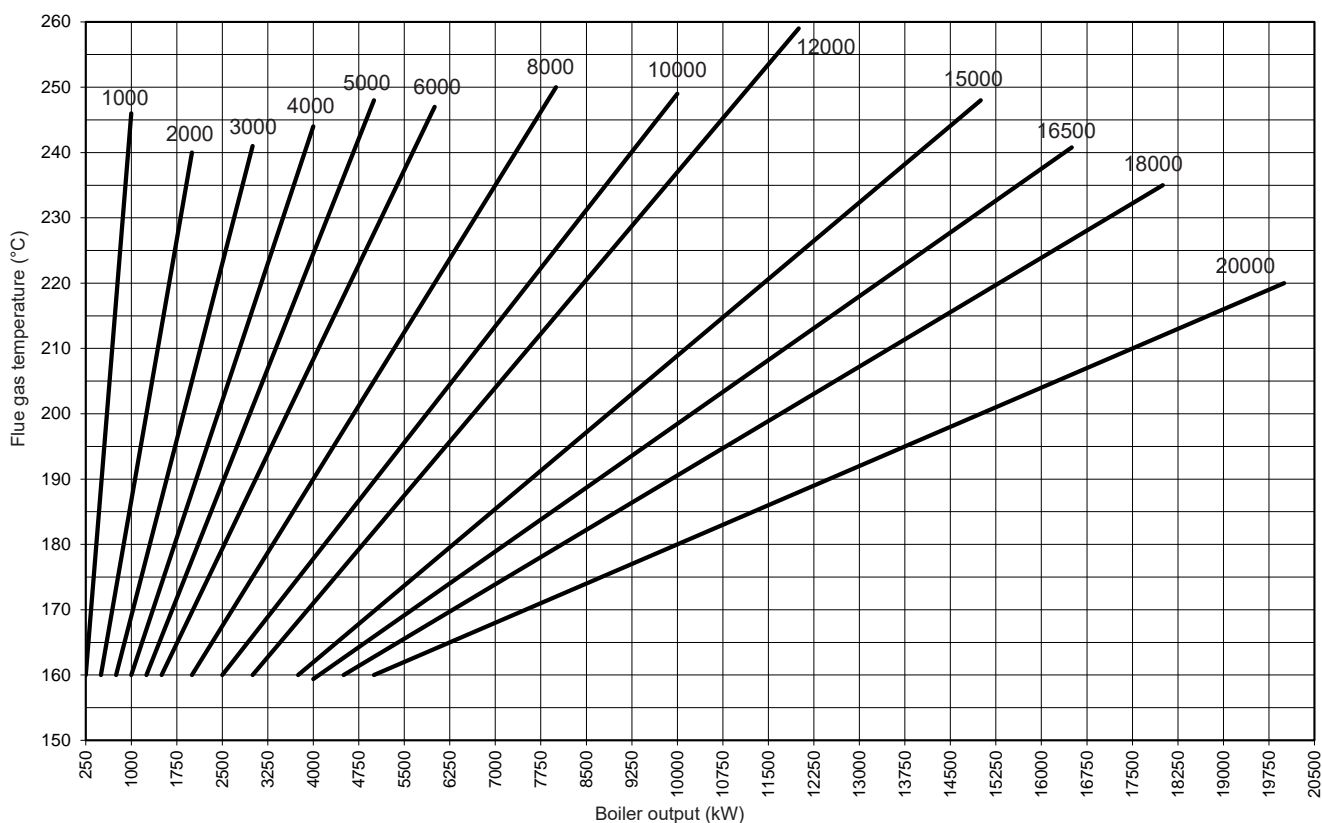
| Type | | (18000) | (20000) |
|-------------------------------------|--|---------|---------|
| • 2 safety temperature controls | | R 1/2" | R 1/2" |
| • 1 return flow temperature control | | R 1/2" | R 1/2" |
| • 1 pressure gauge | | R 1/2" | R 1/2" |
| • 2 safety pressure controls | | R 1/2" | R 1/2" |
| • 1 pressure min. control | | R 1/2" | R 1/2" |
| • 1 water level limiter | | R 1/2" | R 1/2" |
| • 1 min. flow control switch | | DN 50 | DN 50 |

Boiler return flow heat up

| Type | | (18000) | (20000) |
|----------------------|--------|---------|---------|
| • 1 pump 140 °C | [m³/h] | 290 | 320 |
| • 1 thermostat | [DN] | R 1/2" | R 1/2" |
| • 1 non return valve | [DN] | 200 | 200 |
| • 2 shut-off flaps | [DN] | 200 | 200 |
| • 1 pump 180 °C | [m³/h] | 290 | 320 |
| • 1 thermostat | [DN] | R 1/2" | R 1/2" |
| • 1 non return valve | [DN] | 200 | 200 |
| • 2 shut-off flaps | [DN] | 200 | 200 |

Subject to project-related alterations

Flue gas diagram



These data represent an average value from measurements with different burner manufacturers.

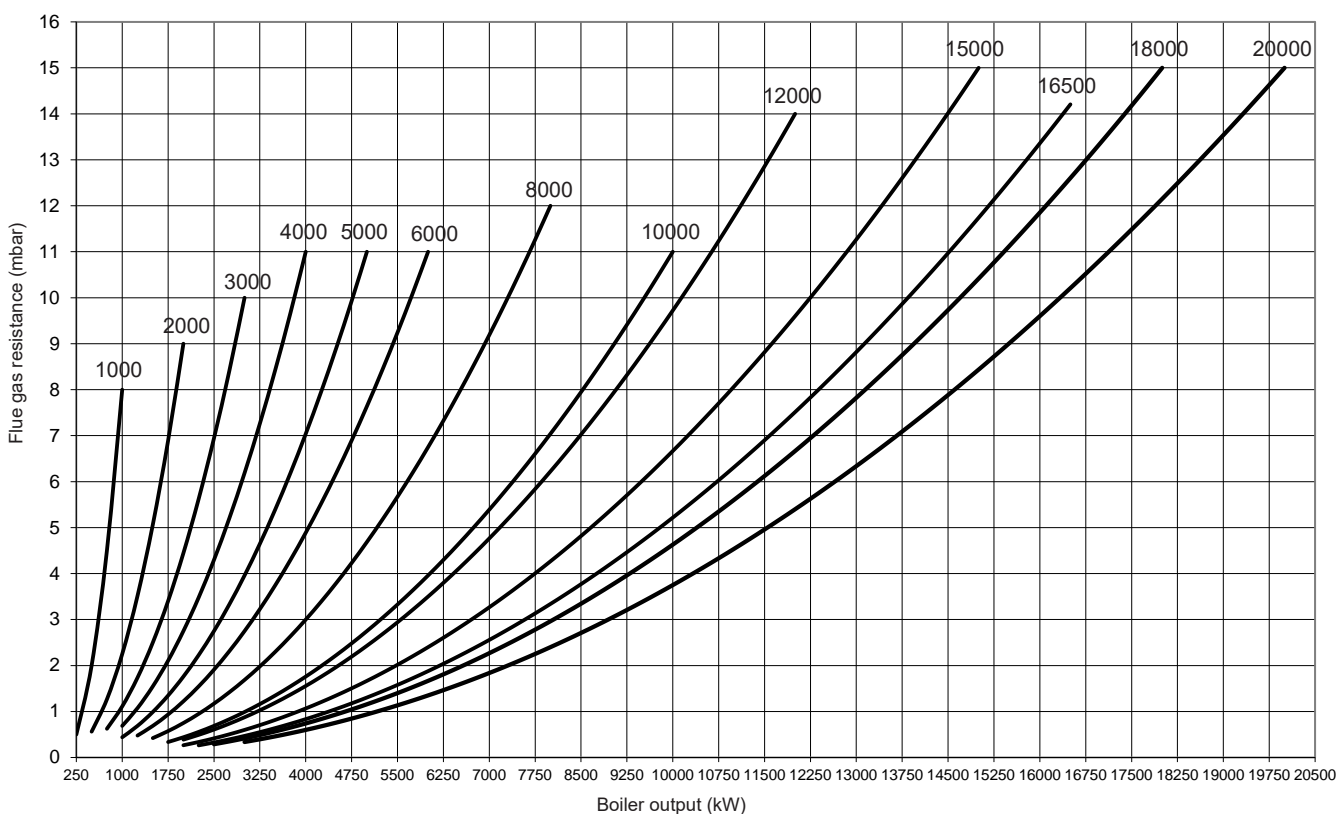
kW = Boiler output

°C = Flue gas temperature with cleaned heating surface, boiler middle temperature 120 °C

- Operating with natural gas,
 $\lambda = 1.15$ with max. burner output

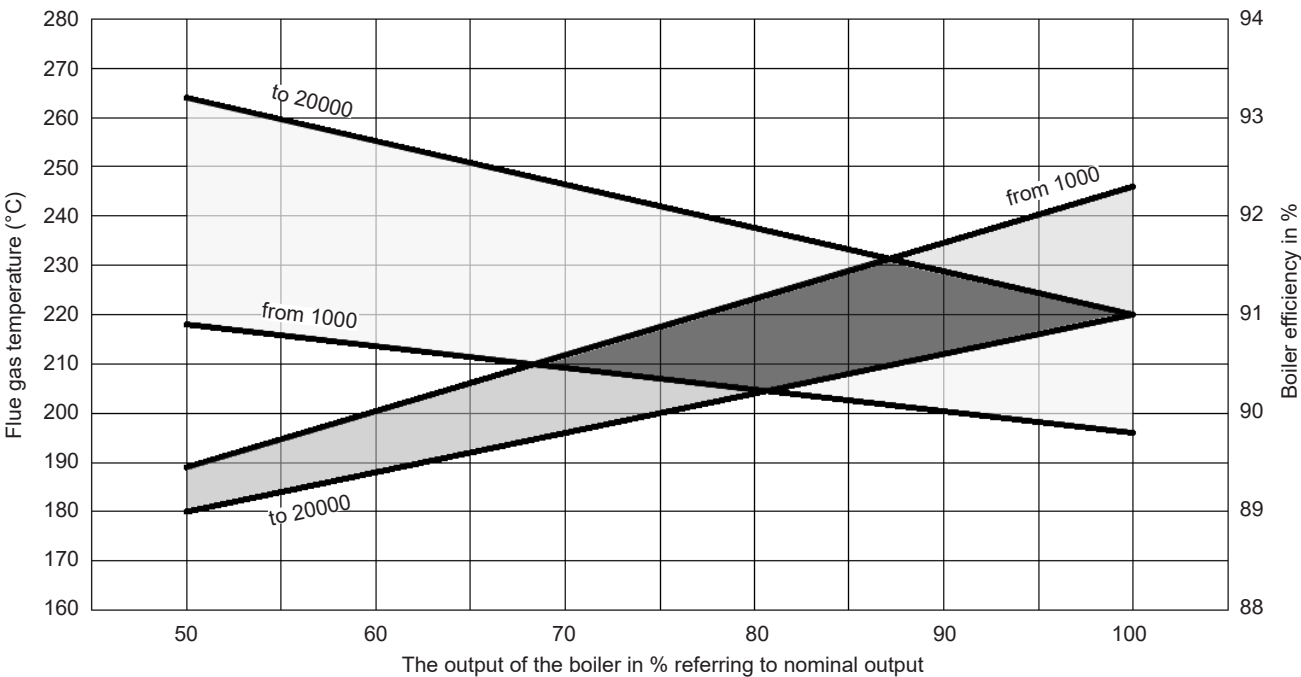
- A reduction of the boiler water temperature of 10 K causes a reduction of the flue gas temperature by approx. 6-8 K.

Flue gas resistance

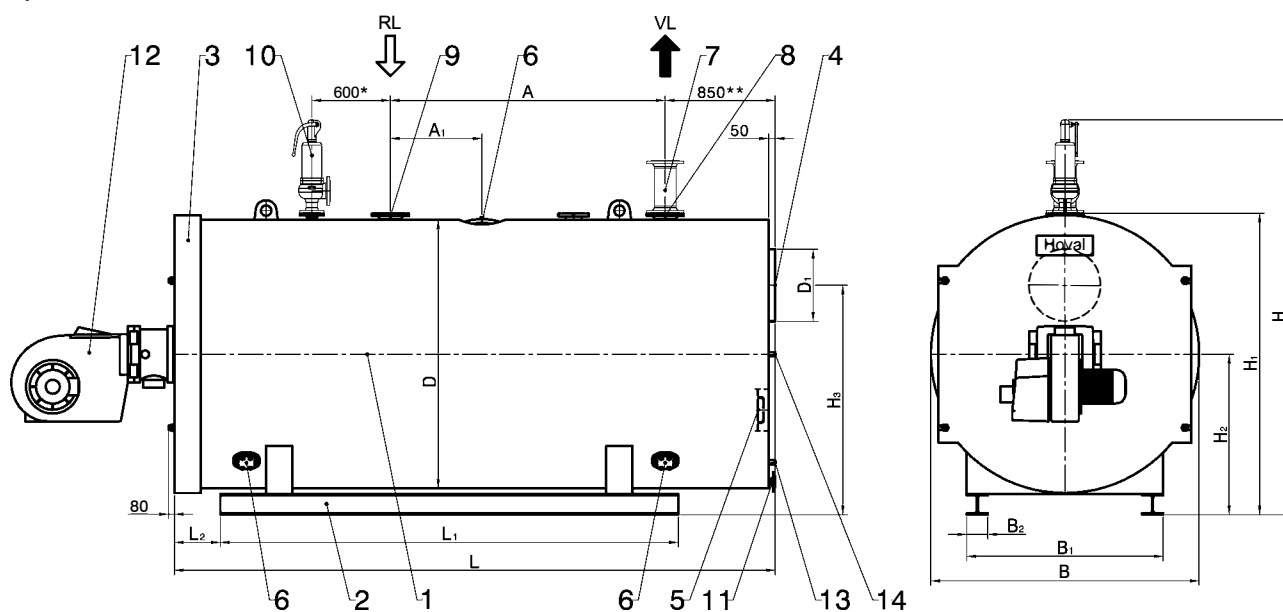


Flue gas temperature and boiler efficiency

In dependence on the boiler efficiency with a middle boiler water temperature of 120 °C.



aqua3 E (1000-20000)



- 1 Boiler (with flue gas collector)
- 2 Boiler base (up to type 3000 with U-girder, from type 4000 with I-girder)
- 3 Hinged door, incl. reversal chamber 2nd/3rd smoke gas pass
- 4 Flue gas outlet with 1 x 1/2" pipe fitting
- 5 Explosion flap and cleaning opening
- 6 Inspection opening
- 7 Boiler outlet armature tube PN 16/PN 25
- 8 Boiler flow nozzle (BF)
- 9 Return flow nozzle

- 10 Safety valve nozzle (SV)
- 11 Purge/drain valve DN 40/PN 40
- 12 Burner
- 13 Condensate drain nozzle R1"
- 14 Flame peephole

* type 1000 = 400, type 2000 = 500, type 16500 - 20000 = 700 mm
 ** From type 6000 upwards = 950 mm

Design pressure 10, 13 and 16 bar (gauge).
 Dimensions for boiler design pressure 10 bar
 Safety valve dimensions for boiler design pressure 10 bar
 Notice: Add 100 mm to H₁ for crane hooks.

Other pressure levels on request!
 Dimensions incl. 100 mm insulation

| Boiler type | Main dimensions | | | | | Boiler foundation | | | | | Transport dim. | | F/R nozzle | | | Flue gas con. | | SV |
|-------------|-----------------|------|------|----------------|----------------|-------------------|----------------|----------------|----------------|----------------|------------------|--|------------|----------------|-------------------|----------------|----------------|-----------------|
| | B | L | H | H ₁ | H ₂ | D | L ₁ | L ₂ | B ₁ | B ₂ | B _{min} | H ₄ ⁴ _{min} | A | A ₁ | DN ^{1,3} | H ₃ | D ₁ | DN ¹ |
| (1000) | 1660 | 2830 | 2185 | 1800 | 950 | 1600 | 2000 | 0 | 1150 | 60 | 1760 | 2285 | 800 | 300 | 80 | 1300 | 300 | 25 |
| (2000) | 1910 | 3680 | 2580 | 2050 | 1075 | 1850 | 2850 | 0 | 1375 | 60 | 2010 | 2680 | 1500 | 500 | 125 | 1500 | 450 | 40 |
| (3000) | 2110 | 4280 | 2835 | 2250 | 1175 | 2050 | 3450 | 0 | 1550 | 60 | 2210 | 2935 | 2000 | 700 | 150 | 1700 | 500 | 50 |
| (4000) | 2210 | 4680 | 3035 | 2450 | 1325 | 2150 | 3700 | 150 | 1600 | 160 | 2310 | 3135 | 2400 | 800 | 200 | 1800 | 600 | 50 |
| (5000) | 2310 | 5130 | 3265 | 2550 | 1375 | 2250 | 4150 | 150 | 1700 | 160 | 2410 | 3365 | 2850 | 950 | 200 | 1900 | 650 | 65 |
| (6000) | 2460 | 5480 | 3415 | 2700 | 1450 | 2400 | 4400 | 150 | 1800 | 160 | 2560 | 3515 | 3100 | 1000 | 200 | 2000 | 750 | 65 |
| (8000) | 2660 | 5830 | 3705 | 2900 | 1550 | 2600 | 4750 | 150 | 1950 | 160 | 2760 | 3805 | 3450 | 1150 | 250 | 2150 | 850 | 80 |
| (10000) | 2860 | 6330 | 3955 | 3150 | 1700 | 2800 | 5200 | 150 | 2050 | 200 | 2960 | 4055 | 3900 | 1300 | 250 | 2350 | 950 | 80 |
| (12000) | 3060 | 7030 | 4260 | 3350 | 1800 | 3000 | 5900 | 150 | 2200 | 200 | 3160 | 4360 | 4600 | 1530 | 300 | 2500 | 1050 | 100 |
| (15000) | 3360 | 7365 | 4560 | 3650 | 1950 | 3300 | 6200 | 150 | 2400 | 200 | 3460 | 4660 | 4900 | 1630 | 300 | 2725 | 1150 | 100 |
| (16500) | 3560 | 7665 | 4995 | 3900 | 2100 | 3500 | 6500 | 150 | 2600 | 200 | 3660 | 5095 | 5100 | 1700 | 350 | 2925 | 1200 | 125 |
| (18000) | 3660 | 7915 | 5145 | 4050 | 2200 | 3600 | 6750 | 150 | 2700 | 200 | 3760 | 5245 | 5350 | 1780 | 400 | 3050 | 1250 | 125 |
| (20000) | 3760 | 8315 | 5295 | 4200 | 2300 | 3700 | 7150 | 150 | 2900 | 200 | 3860 | 5395 | 5750 | 1910 | 400 | 3175 | 1300 | 125 |

¹ DN/...PN 16/PN 40

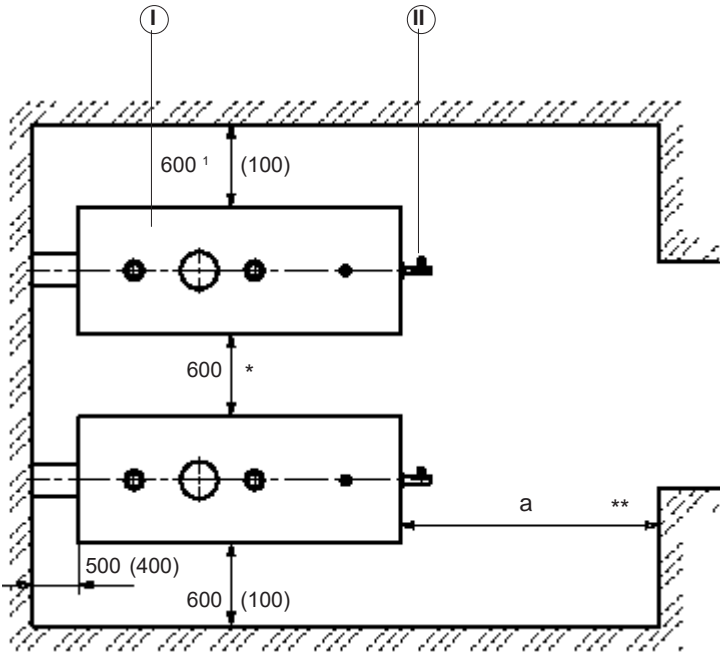
³ Diameter for standard ΔT = 20 K, other dimensions on request

⁴ without armature tube

Space requirements

Installation

(Dimensions in mm)



- I

Boiler
- II

Burner
- *

Consider control panel
- **

Flame tube length (cleaning)
- ¹

600-900, depending on local standards

To facilitate installation and maintenance the given measures should be kept; in case of limited space the minimal spaces (measures in brackets) are sufficient.

Positioning

- No air pollution through halogenated hydrocarbon (contained e.g. in sprays, paints, solvents and cleaners)
 - No large amounts of dust
 - No high atmospheric humidity
 - Frost-resistant and well ventilated
- Otherwise errors and damages to the installation may occur.
- The boiler may only be installed in rooms where air pollution through halogenated hydrocarbon can occur if sufficient measures are taken ensuring the supply of unpolluted combustion air.

aqua3 E

| Type | (1000) mm | (2000) mm | (3000) mm | (4000) mm | (5000) mm | (6000) mm | (8000) mm | (10000) mm | (12000) mm | (15000) mm | (16500) mm |
|------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|---------------|---------------|---------------|
| a | 2200 | 3000 | 3600 | 4000 | 4400 | 4700 | 5100 | 5500 | 6200 | 6500 | 6800 |

aqua3 E

| Type | (18000) mm | (20000) mm |
|------|---------------|---------------|
| a | 7100 | 7500 |

Rules and regulations

The following rules and regulations have to be respected:

- Hoval technical information and installation guide.
- hydraulic and control technical regulations, to guarantee the min. admissible boiler temperature and the conditions for a safe operation according to national regulations.
- fire protection regulations
- national regulations concerning permission, installation and operation of boiler appliances. Boiler appliances have to be installed according to national laws and regulations and accessories requirements.
- Besides the national and local regulations the project specific circumstances of the boiler supplier have to be considered for every application.

Water treatment/water quality

- The quality of the boiler water has to be guaranteed according to Hoval technical information and national regulations.
- Hoval boilers must only be operated with treated water. For the treatment of water apply for the values to be kept refer to the Hoval guide lines.
- Requested water quality: see supplement.
- Do not use chemical additives such as anti-freeze, inhibitors, etc. without written confirmation from Hoval.
- Old and new installations must be well flushed before filling.
- The water quality should be monitored and recorded.

Planning, operation and maintenance

- National and local rules and regulations have to be considered for the fuel supply.
- Safety and exhaust valve connections must be able to discharge the system pressure without any risk.
- Filters and strainers have to be cleaned periodically, especially if installed in front of control devices.
- The components containing heat and the pipes are to be insulated in order to reduce radiation losses.

Combustion air

- The supply of combustion air must be guaranteed for a safe and economic operation. There must be no possibility to close the air supply opening.
- Aeration and ventilation of the boiler house has to be secured.
- In the installation room no negative pressure larger than 3 N/m² is allowed. To adhere to this demand, plan a cross free section for the air supply opening of at least 200 cm², resp. 2 cm² per kW output. The aspect ratio for rectangular openings should not be more than 1.5 : 1. If the opening is trellised an adequate surcharge is needed. National laws have to be respected.
- Boiler houses have to be fitted with the relevant outer pressure relief surface.
- Boilers are not to be installed in rooms where halogen compounds occur which can enter the combustion air. (e.g. laundries, drying, etc.).

Noise level reduction

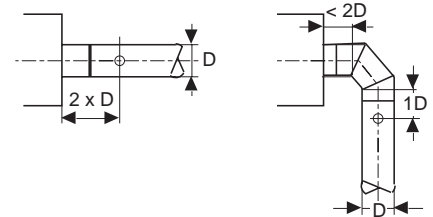
The following measures for noise level reduction are possible:

- Solid construction of heating room walls, ceiling and floor, installation of silencer in fresh air supply, noise insulation for support and bracket of pipes.
- Installation of sound attenuation cowl for burner.
- A substantial part of the sound caused in the combustion chamber and in the top heating surfaces is radiated from the flue gas system as sound transmitted by air. In addition to this, resonance features, depending on chimney dimensioning and inlet, may occur which are triggered by the oscillation of the combustion noises (snooping). These sounds can be reduced by burner-lateral measures, e.g. changes of flame geometry, atomisation characteristics or fuel throughput.
- Flue gas sound absorbers cause a substantial sound level reduction as well. These sound absorbers should usually be tuned at low frequencies of 60 - 250 Hz. Flue gas sound absorbers function according to the principle of sound absorption. The kinetic energy of the exhaust gases is consumed by friction requiring an increase in chimney draft in the flue gas system. This has to be considered for burner dimensioning. The connection piece from the boiler to the flue gas sound absorber has to be gas-tight because the draft- and pressure-zero point is behind the flue gas sound absorber.
- The necessary space requirement of approx. 2 m for the later installation of a flue gas sound absorber should already be included when planning.

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.

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!

Boiler water specifications

Boiler water - general

Boiler water must be free of hardness components. pH-value should be above neutral level. Please refer to following tables for water composition.

During a BOSB-operation feed- and boiler water have to be checked every 72 h, without BOSB- operation daily checks are necessary! The values must be recorded in the operating log book!

Make up water for hot water boilers (table 1)

| Parameter | Unit | Make-up water for hot water boilers |
|--|------------------|---|
| Operating pressure | bar (0.1 MPa) | total range |
| Appearance | - | clear, free from suspended solids and foam |
| Direct conductivity at 25 °C | µS/cm | not specified, only guide values for boiler water relevant |
| pH value at 25 °C ¹⁾ | - | > 7.0 |
| Total hardness ³⁾ (Ca + Mg) | mmol/l | < 0.02 |
| Iron (Fe) concentration | mg/l | < 0.2 |
| Copper (Cu) concentration | mg/l | < 0.1 |
| Silica (SiO ₂) concentration | mg/l | not specified, only guide values for boiler water relevant, see table 2 |
| Oxygen (O ₂) concentration | mg/l | - |
| Oil/grease concentration (see EN 12953-6) | mg/l | < 1 |
| Organic substances (as TOC) concentration | - | see footnote ²⁾ |

¹⁾ With copper alloys in the system the pH value shall be maintained in the range 8.7 to 9.2.

²⁾ Organic substances are generally a mixture of several different compounds. The composition of such mixtures and the behaviour of their individual components under the conditions of boiler operation are difficult to predict. Organic substances may be decomposed to form carbonic acid or other acidic decomposition products which increase the acid conductivity and cause corrosion or deposits. They also may lead to foaming and/or priming which shall be kept as low as possible.

³⁾ Noted in the past as °dH, conversion factor: 1 mmol/l = 5.6°dH (German hardness)

Source: EN12953-10:2003 (E) + Hoval handbook

Boiler water specifications

Boiler water for hot water boilers (table 2)

| Parameter | Unit | Boiler water for hot water boilers |
|--|------------------|---|
| Operating pressure | bar (0.1 MPa) | total range |
| Appearance | - | clear, free from suspended solids and foam |
| Direct conductivity at 25 °C | µS/cm | < 1 500 ⁶⁾ |
| pH value at 25 °C | - | 9.0 to 11.5 ¹⁾ |
| Total hardness (Ca + Mg) ⁶⁾ | mmol/l | < 0.02 |
| Composite alkalinity ⁴⁾ | mmol/l | < 5 |
| Silica (SiO ₂) concentration | mg/l | pressure dependent, according to figure 1 ⁷⁾ |
| Phosphate (PO ₄) ^{2), 5)} | mg/l | 10 to 30 |
| Sodium Sulphite (Na ₂ SO ₃) ⁵⁾ | mg/l | 5 to 10 |
| Iron (Fe) concentration | mg/l | < 0.2 |
| Copper (Cu) concentration | mg/l | < 0.1 |
| Oxygen (O ₂) concentration) ⁸⁾ | mg/l | < 0.02 |
| Oil/grease concentration (see EN 12953-6) | mg/l | < 1 |
| Organic substances | - | see footnote ³⁾ |

¹⁾ If non-ferrous materials are present in the system, e. g. aluminium, they may require lower pH value and direct conductivity, however, the protection of the boiler has priority.

²⁾ If coordinated phosphate treatment is used; considering all other values higher PO₄-concentrations are acceptable (see clause 4 of EN 12953-10 for details).

³⁾ See ²⁾ at table 1

⁴⁾ Noted in the past as p-value, conversion factor: KS 8.2 = 1 according p-value = 1

⁵⁾ Measuring only necessary if dosing chemicals are used which contains these composition

⁶⁾ For level electrodes minimum conductivity = > 5 µS/cm

⁷⁾ It's not necessary to make continuous control of following parameters: Silica (SiO₂) concentration

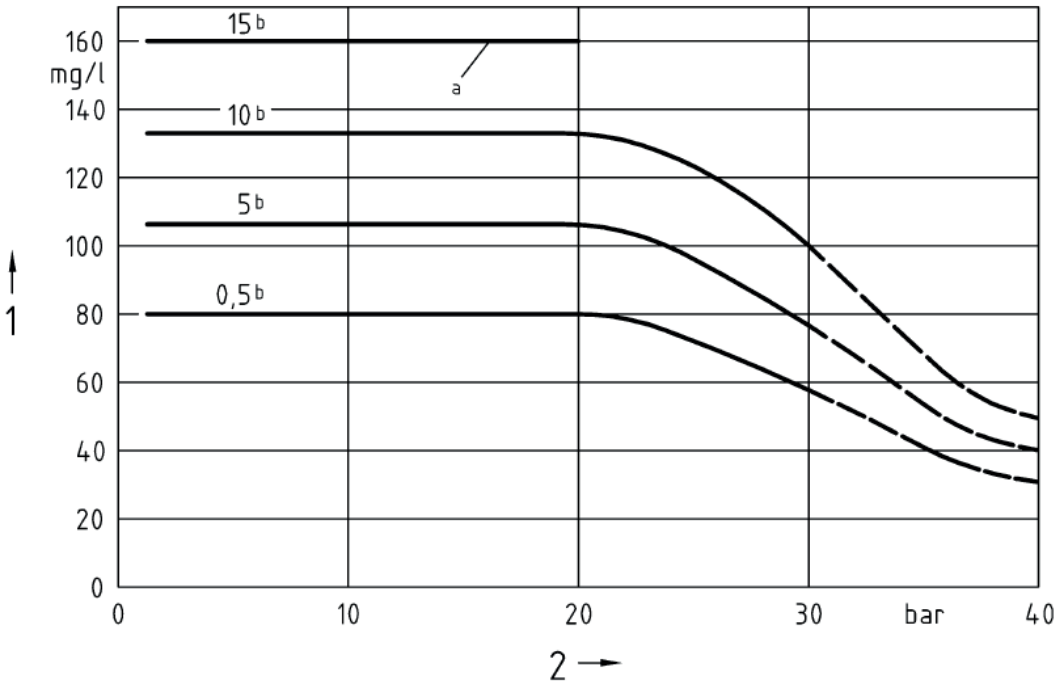
⁸⁾ Value for continuous operation and/or if a deaerator is used; if the operation is discontinuous or without deaerator film forming agents and/or excess of oxygen scavenger shall be used.

Source: EN12953-10:2003 (E) + Hoval handbook

Boiler water specifications

Fig. 1 Maximum acceptable silica content (SiO_2) of the boiler water dependent on the pressure

Source: EN12953-10:2003 (E)



- 1 Maximum silica content (SiO_2)
- 2 Operating pressure
- a This level of alkalinity is not permissible > 20 bar
- b Alkalinity in mmol/l

Important notice
Hoval recommends that a water treatment specialist is employed to carry out routine monitoring of the supply water in order to ensure it remains within specification.

THD-U

Hoval steam boiler

The Hoval high output steam boilers are made of high quality steel and are distinguished by their solid, robust and flexible design, particularly by their ease of operation, their easy maintenance and an optimal efficiency. The client receives an economical, environmentally friendly compact unit, ready for installation. The boilers are constructed for oil or gas firing.

Boiler type THD-U

The type THD-U classical 3 pass flame tube flue gas tube boiler with reverse flame tube and an inner completely water cooled flue gas reversal chamber guarantees high efficiency. The boiler consists of a cylindric shell, the two end plates, the reverse flame tube including the back flue gas reversal chamber with water cooled finned tube wall, the dimple flue gas tubes which increase the heat transfer (Hoval patent) and the fitting pipe, placed either on the right (standard) or on the left. The boiler door is insulated and flue gas proof for burner mounting. The boiler is completely electrically welded and provided with all required inspection openings.

The spacious flame tube with low thermal heat release results in an excellent combustion and reduced emissions. The large water content gives steady state boiler operation and thus reduces the number of boiler starts.

Admissible max. safety valve pressure

Standard pressures: 8.5, 11.5 and 13.6 bar

Safety valve pressures: 10, 13 and 16 bar

Higher operating pressure on request.

Thermal insulation

The boiler is fully insulated including the flue gas collector with mineral wool insulation. The casing is made of stucco aluminium plate. Sockets and cuttings are nicely framed.

Connection fittings and sockets

The connection fittings and sockets on the boiler and on the fitting pipe are meant for the attachment of:

water level regulation and water level control, water level indicator (reflection indicator), pressure switch for pressure regulation and pressure supervision, pressure gauge set, main steam valve, safety valve(s), boiler feed, sludge/drainage, desalting.

Large equipment

- 2 boiler base supports in heavy construction
- 1 flue gas collector with integrated horizontal flue gas connection with cleaning door and integrated bleeder valve
- 1 boiler door for burner mounting, thermally insulated and designed flue gas proof, placed on left and right swivelable hinges for the flue gas side cleaning of boiler
- 1 feed water distribution pipe
- 1 boiler plate
- 1 low water mark NW
- 1 water separator
- 1 flue gas tube cleaning kit

High efficiency

Due to the above technical facts an efficiency of up to 90 % resp. and up to 94 % with economiser, can be achieved. Thus continuous fuel costs are kept to a minimum. The sources of energy are used more efficiently and Hoval benefits the environment.



Construction guiding, quality approval

The boiler is designed with all necessary inspection doors.

Construction and production is made acc. to the European Pressure Directive Equipment (PED) 2014/68/EU - EN 12953, with CE-approval. The local official approval and inspection is carried out by TÜV or an independent test authority. The ISO 9001:2000 certification and the quality approval at our factory with our Hoval quality performance department guarantees the highest product quality. For installation and operation of the boiler the local laws and norms are to be respected.

Control panel

The control panel for the Hoval boiler is equipped with the required control units and indicators for control and supervision of boiler and burner. The operation and alarm reports are shown as fault indication. The control panel will be made upon customer requirements and depending on burner to be used.

Feed water quality

For operation the Hoval and the country specific feed and boiler water regulations have to be respected and local waste water regulations have to be paid attention to.

Detailed information for the feed water quality can be found in the appendix.

Delivery

The pressure body is provided with a primer paint finish. Due to transport reasons the insulation can be fixed at the factory. Burner and control panel are either pre-mounted (if transport is possible) or packed in a separate box. The mounting and wiring can be done at the factory or at site. Connection openings are capped.

On request

- Second safety valve
- Second water level meter
- Visible boiler lockout display
- Second feed water pump
- Modulating feed water control
- Quick action blow down valve
- Automatic boiler blow down
- Economiser
- PLC (programmable logic controller) S7-200/300
- Volt-free contacts for BMS (Building Management System)

THD-U (500-1600)

Technical data without economiser

| Type | | (500) | (650) | (800) | (1000) | (1200) | (1600) |
|---|-----------------|-------|-------|-------|--------|--------|--------|
| • Saturated steam output (oil- and gas-fired) | kg/h | 500 | 650 | 800 | 1000 | 1200 | 1600 |
| • Heat conduction | kW | 326 | 424 | 522 | 652 | 783 | 1044 |
| • Feed water temperature | °C | 103 | 103 | 103 | 103 | 103 | 103 |
| • Safety valve pressure | bar | 10 | 10 | 10 | 10 | 10 | 10 |
| | bar | 13 | 13 | 13 | 13 | 13 | 13 |
| | bar | 16 | 16 | 16 | 16 | 16 | 16 |
| • Boiler efficiency without economiser (10 bar) | % | 89.1 | 89.4 | 89.3 | 89.4 | 89.7 | 89.6 |
| • Flue gas resistance | mbar | 3.1 | 3.3 | 3.6 | 4.2 | 4.7 | 5.5 |
| • Water content | up to low water | l | 871 | 997 | 1211 | 1328 | 1647 |
| | full | l | 1054 | 1247 | 1601 | 1775 | 2165 |
| • Flue gas temperature after boiler without economiser | at 10 bar °C | 243 | 236 | 240 | 239 | 231 | 237 |

Data economiser (only with gas - or diesel oil possible)

| Type | | (500) | (650) | (800) | (1000) | (1200) | (1600) |
|--|-----------|-------|-------|-------|--------|--------|--------|
| • Additional output economiser | kW | 17 | 21 | 27 | 33 | 36 | 52 |
| • Boiler efficiency with economiser | % | 94 | 94 | 94 | 94 | 94 | 94 |
| • Flue gas resistance economiser | mbar | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| • Feed water temperature | inlet °C | 103 | 103 | 103 | 103 | 103 | 103 |
| | outlet °C | 132 | 130 | 131 | 131 | 129 | 130 |
| • Flue gas temperature after economiser | °C | 140 | 140 | 140 | 140 | 140 | 140 |

Dimensions and weights (without economiser)

| Type | | (500) | (650) | (800) | (1000) | (1200) | (1600) |
|---|----|-------|-------|-------|--------|--------|--------|
| • Diameter boiler body, without insulation | mm | 1100 | 1150 | 1250 | 1250 | 1300 | 1400 |
| • Boiler length (pressure body) | mm | 1600 | 1750 | 1900 | 2150 | 2500 | 2600 |
| • Diameter (inner) flame tube | mm | 575 | 575 | 650 | 650 | 700 | 725 |
| • Flame tube length | mm | 1495 | 1645 | 1795 | 2045 | 2395 | 2495 |
| • Boiler length with insulation, without burner | mm | 2285 | 2435 | 2585 | 2835 | 3185 | 3285 |
| • Boiler width with insulation, with pump | mm | 1935 | 1985 | 2085 | 2085 | 2135 | 2235 |
| • Boiler height with insulation, with armatures | mm | 1950 | 2000 | 2100 | 2100 | 2150 | 2250 |
| • | | | | | | | |
| • Diameter flue gas outlet | mm | 200 | 200 | 250 | 250 | 300 | 350 |
| • Transport weight at 10 bar, without equipment | kg | 1590 | 1960 | 2330 | 2720 | 3260 | 3680 |

THD-U (500-1600)

Armatures

| Type | | (500) | (650) | (800) | (1000) | (1200) | (1600) |
|---|--------|----------|----------|----------|----------|----------|----------|
| • 1 flue gas tube cleaning equipment | | yes | yes | yes | yes | yes | yes |
| • 1 main steam valve | 10 bar | DN 40 | DN 40 | DN 50 | DN 50 | DN 65 | DN 65 |
| | 13 bar | DN 32 | DN 40 | DN 50 | DN 50 | DN 50 | DN 65 |
| | 16 bar | DN 32 | DN 32 | DN 40 | DN 50 | DN 50 | DN 50 |
| • 2 safety valves | 10 bar | DN 25/40 | DN 25/40 | DN 25/40 | DN 25/40 | DN 25/40 | DN 25/40 |
| | 13 bar | DN 25/40 | DN 25/40 | DN 25/40 | DN 25/40 | DN 25/40 | DN 25/40 |
| | 16 bar | DN 25/40 | DN 25/40 | DN 25/40 | DN 25/40 | DN 25/40 | DN 25/40 |
| • 2 water level gauge valves | | DN 20 | DN 20 | DN 20 | DN 20 | DN 20 | DN 20 |
| • 2 reflection indicators | | M=320 | M=320 | M=320 | M=320 | M=320 | M=320 |
| • 1 sample taking valve | | DN 15 | DN 15 | DN 15 | DN 15 | DN 15 | DN 15 |
| • 1 purge shut-off valve | | DN 25 | DN 25 | DN 32 | DN 32 | DN 32 | DN 32 |
| • 1 purge ball valve | | DN 25 | DN 25 | DN 32 | DN 32 | DN 32 | DN 32 |
| • 1 pressure gauge with three-way valve | | R ½" | R ½" | R ½" | R ½" | R ½" | R ½" |
| • 3 feed water/pump valves | | DN 25 | DN 25 | DN 25 | DN 25 | DN 25 | DN 25 |
| • 3 feed water backstroke/non return valves | | DN 25 | DN 25 | DN 25 | DN 25 | DN 25 | DN 25 |
| • 2 strainers (pump suction side) | | DN 25 | DN 25 | DN 25 | DN 40 | DN 40 | DN 40 |
| • 2 ball valves (pump suction side) | | DN 25 | DN 25 | DN 25 | DN 40 | DN 40 | DN 40 |
| • 1 pressure gauge pump with shut-off valve | | R ¼" | R ¼" | R ¼" | R ¼" | R ¼" | R ¼" |
| • 2 feed water pumps, Grundfos | | CR | CR | CR | CR | CR | CR |
| Motor rating | 10 bar | 1.1 kW | 1.1 kW | 1.1 kW | 1.1 kW | 1.1 kW | 1.5 kW |
| • 2 feed water pumps, Grundfos | | CR | CR | CR | CR | CR | CR |
| Motor rating | 13 bar | 1.5 kW | 1.5 kW | 1.5 kW | 1.5 kW | 1.5 kW | 2.2 kW |
| • 2 feed water pumps, Grundfos | | CR | CR | CR | CR | CR | CR |
| Motor rating | 16 bar | 1.5 kW | 1.5 kW | 2.2 kW | 2.2 kW | 2.2 kW | 3.0 kW |

THD-U (2000-5000)

Technical data without economiser

| Type | | (2000) | (2500) | (3000) | (3500) | (4000) | (4500) | (5000) |
|---|-----------------|--------|--------|--------|--------|--------|--------|--------|
| • Saturated steam output (oil- and gas-fired) | kg/h | 2000 | 2500 | 3000 | 3500 | 4000 | 4500 | 5000 |
| • Heat conduction | kW | 1304 | 1631 | 1957 | 2283 | 2609 | 2935 | 3261 |
| • Feed water temperature | °C | 103 | 103 | 103 | 103 | 103 | 103 | 103 |
| • Safety valve pressure | bar | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| | bar | 13 | 13 | 13 | 13 | 13 | 13 | 13 |
| | bar | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| • Boiler efficiency without economiser (10 bar) % | | 89.6 | 89.5 | 89.4 | 89.5 | 89.7 | 89.7 | 89.8 |
| • Flue gas resistance | mbar | 5.7 | 6.5 | 6.7 | 5.0 | 7.3 | 6.9 | 6.9 |
| • Water content | up to low water | I | 2254 | 2636 | 3074 | 3952 | 4261 | 4783 |
| | full | I | 2914 | 3353 | 4162 | 5426 | 6436 | 7253 |
| • Flue gas temperature after boiler without economiser at 10 bar | °C | 238 | 238 | 241 | 240 | 234 | 233 | 234 |

Data economiser

| Type | | (2000) | (2500) | (3000) | (3500) | (4000) | (4500) | (5000) |
|--|--------|--------|--------|--------|--------|--------|--------|--------|
| • Additional output economiser | kW | 65 | 81 | 101 | 116 | 125 | 139 | 156 |
| • Boiler efficiency with economiser | % | 94 | 94 | 94 | 94 | 94 | 94 | 94 |
| • Flue gas resistance economiser | mbar | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| • Feed water temperature | inlet | °C | 103 | 103 | 103 | 103 | 103 | 103 |
| | outlet | °C | 130 | 130 | 131 | 131 | 129 | 129 |
| • Flue gas temperature after economiser | °C | 140 | 140 | 140 | 140 | 140 | 140 | 140 |

Dimensions and weights (without economiser)

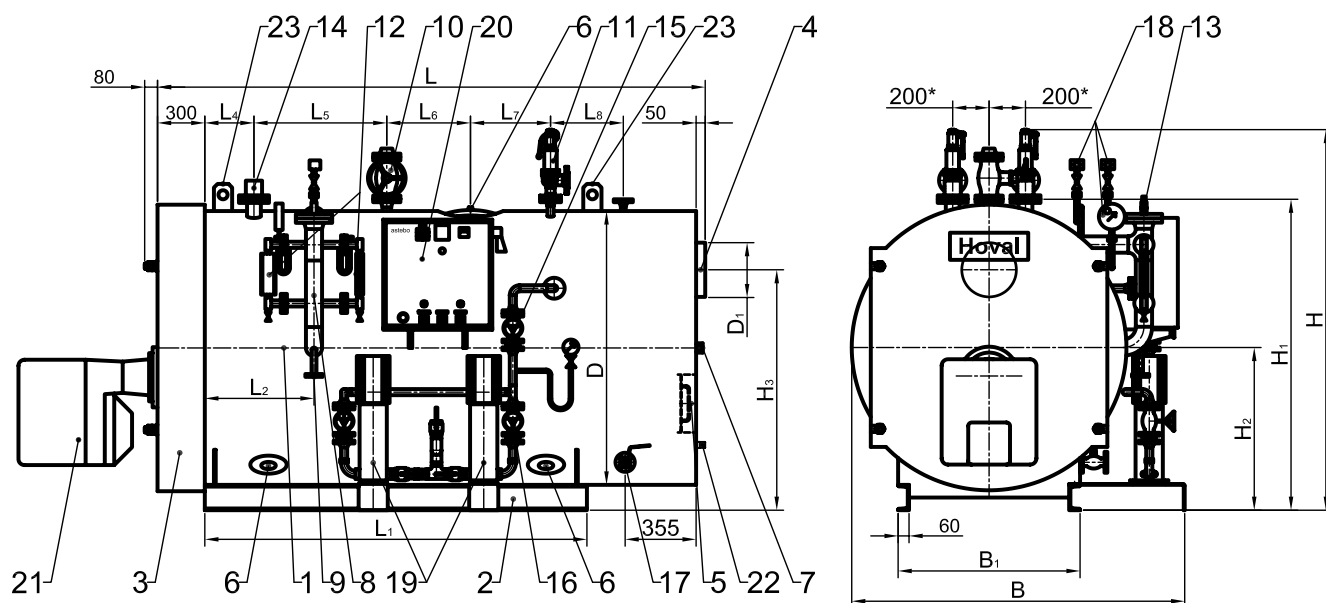
| Type | | (2000) | (2500) | (3000) | (3500) | (4000) | (4500) | (5000) |
|--|----|--------|--------|--------|--------|--------|--------|--------|
| • Diameter boiler body, without insulation | mm | 1500 | 1600 | 1750 | 1950 | 1950 | 2000 | 2100 |
| • Boiler length (pressure body) | mm | 2650 | 2750 | 3000 | 300 | 3500 | 3500 | 3500 |
| • Diameter (inner) flame tube | mm | 850 | 925 | 975 | 1100 | 1100 | 1150 | 1200 |
| • Flame tube length | mm | 2540 | 2640 | 2890 | 2890 | 3390 | 3390 | 3390 |
| • Boiler length with insulation, without burner | mm | 3335 | 3435 | 3685 | 3685 | 4185 | 4185 | 4185 |
| • Boiler width with insulation, with pump | mm | 2335 | 2435 | 2585 | 2785 | 2785 | 2835 | 2935 |
| • Boiler height with insulation, with armatures | mm | 2410 | 2510 | 2660 | 2950 | 2950 | 3000 | 3150 |
| • Diameter flue gas outlet | mm | 350 | 400 | 450 | 500 | 500 | 550 | 600 |
| • Transport weight at 10 bar, without equipment | kg | 4700 | 5560 | 6150 | 8415 | 9230 | 9860 | 10520 |

THD-U (2000-5000)

Armatures

| Type | | (2000) | (2500) | (3000) | (3500) | (4000) | (4500) | (5000) |
|--|--------|----------|----------|----------|----------|----------|----------|----------|
| • 1 flue gas tube cleaning equipment | | yes | yes | yes | yes | yes | yes | yes |
| • 1 main steam valve | 10 bar | DN 80 | DN 100 | DN 100 | DN 100 | DN 100 | DN 125 | DN 125 |
| | 13 bar | DN 65 | DN 80 | DN 80 | DN 100 | DN 100 | DN 100 | DN 100 |
| | 16 bar | DN 65 | DN 65 | DN 80 | DN 80 | DN 100 | DN 100 | DN 100 |
| • 2 safety valve | 10 bar | DN 25/40 | DN 25/40 | DN 25/40 | DN 25/40 | DN 32/50 | DN 32/50 | DN 32/50 |
| | 13 bar | DN 25/40 | DN 25/40 | DN 25/40 | DN 25/40 | DN 25/40 | DN 32/50 | DN 32/50 |
| | 16 bar | DN 25/40 | DN 25/40 | DN 25/40 | DN 25/40 | DN 25/40 | DN 25/40 | DN 24/40 |
| • 2 water level gauge valves | | DN 20 | DN 20 | DN 20 | DN 20 | DN 20 | DN 20 | DN 20 |
| • 2 reflection indicators | | M=320 | M=320 | M=450 | M=450 | M=450 | M=450 | M=450 |
| • 1 sample taking valve | | DN 15 | DN 15 | DN 15 | DN 15 | DN 15 | DN 15 | DN 15 |
| • 1 purge-shut-off valve | | DN 40 | DN 40 | DN 40 | DN 40 | DN 40 | DN 40 | DN 40 |
| • 1 purge-ball valve | | DN 40 | DN 40 | DN 40 | DN 40 | DN 40 | DN 40 | DN 40 |
| • 1 pressure gauge with three-way valve | | R ½" | R ½" | R ½" | R ½" | R ½" | R ½" | R ½" |
| • 3 feed water/pump valves | | DN 25 | DN 32 | DN 32 | DN 32 | DN 32 | DN 32 | DN 32 |
| • 3 feed water backstroke/ non return valves | | DN 25 | DN 32 | DN 32 | DN 32 | DN 32 | DN 32 | DN 32 |
| • 2 strainers (pump suction side) | | DN 40 | DN 50 | DN 50 | DN 50 | DN 50 | DN 50 | DN 50 |
| • 2 ball valves (pump suction side) | | DN 40 | DN 50 | DN 50 | DN 50 | DN 50 | DN 50 | DN 50 |
| • 1 pressure gauge pump with shut-off valve | | R ¼" | R ¼" | R ¼" | R ¼" | R ¼" | R ¼" | R ¼" |
| • 2 feed water pumps, Grundfos | | CR | CR | CR | CR | CR | CR | CR |
| Motor rating | 10 bar | 2.2 kW | 3.0 kW | 3.0 kW | 3.0 kW | 3.0 kW | 4.0 kW | 4.0 kW |
| • 2 feed water pumps, Grundfos | | CR | CR | CR | CR | CR | CR | CR |
| Motor rating | 13 bar | 2.2 kW | 4.0 kW | 4.0 kW | 4.0 kW | 4.0 kW | 4.0 kW | 4.0 kW |
| • 2 feed water pumps, Grundfos | | CR | CR | CR | CR | CR | CR | CR |
| Motor rating | 16 bar | 3.0 kW | 4.0 kW | 4.0 kW | 5.5 kW | 5.5 kW | 5.5 kW | 5.5 kW |

THD-U without economiser - subject to construction-caused alterations



- | | | |
|---------------------------------------|--------------------------------------|--------------------------------|
| 1 Boiler | 9 Continuous blowdown valve | 17 Blow down/purge valve |
| 2 Boiler base | 10 Steam valve | 18 Pressure gauge and manostat |
| 3 Hinged front door | 11 Safety valve(s) | 19 Feed water pump(s) |
| 4 Flue gas outlet | 12 Water level gauge | 20 Electric control panel |
| 5 Explosion flap and cleaning opening | 13 Water level control | 21 Burner |
| 6 Inspection opening | 14 Water insufficiency control 1 + 2 | 22 Condensate drain nozzle |
| 7 Inspection glass (flame tube) | 15 Boiler feed socket - valve group | 23 Crane hooks |
| 8 Fitting pipe | 16 Boiler feed pump(s) - valve group | |

| Capacity kg/h | Main dimensions | | | | Connecting dimensions | | | | | | | Base frame | | Flue gas connection | | Required space B x H (for transport) | | | |
|------------------|-----------------|------|------|------|-----------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|----------------|---|------|-------------------|------|
| | L | B ** | H | D | L ₂ | L ₄ | L ₅ | L ₆ | L ₇ | H ₁ | H ₂ | L ₁ | B ₁ | H ₃ | D ₁ | with armatures | | without armatures | |
| 500 | 2205 | 1935 | 1950 | 1300 | 350 | 200 | 300 | 350 | 350 | 1560 | 800 | 1250 | 850 | 1150 | 200 | 2050 | 2100 | 1750 | 1750 |
| 650 | 2355 | 1985 | 2000 | 1350 | 350 | 200 | 300 | 350 | 350 | 1610 | 825 | 1400 | 900 | 1200 | 200 | 2200 | 2150 | 1800 | 1800 |
| 800 | 2505 | 2085 | 2100 | 1450 | 400 | 200 | 400 | 400 | 400 | 1710 | 875 | 1550 | 1000 | 1300 | 250 | 2300 | 2250 | 1900 | 1900 |
| 1000 | 2755 | 2085 | 2100 | 1450 | 500 | 250 | 500 | 450 | 450 | 1710 | 875 | 1800 | 1000 | 1300 | 250 | 2300 | 2250 | 1900 | 1900 |
| 1200 | 3105 | 2135 | 2150 | 1500 | 500 | 250 | 500 | 600 | 600 | 1760 | 900 | 2150 | 1050 | 1350 | 300 | 2350 | 2300 | 1950 | 1950 |
| 1600 | 3205 | 2235 | 2250 | 1600 | 500 | 250 | 500 | 600 | 600 | 1860 | 950 | 2250 | 1150 | 1400 | 350 | 2450 | 2400 | 2050 | 2050 |
| 2000 | 3255 | 2335 | 2410 | 1700 | 650 | 300 | 500 | 600 | 600 | 1960 | 1000 | 2300 | 1250 | 1500 | 350 | 2550 | 2550 | 2150 | 2150 |
| 2500 | 3355 | 2435 | 2510 | 1800 | 650 | 300 | 500 | 600 | 600 | 2060 | 1050 | 2400 | 1350 | 1550 | 400 | 2650 | 2650 | 2250 | 2250 |
| 3000 | 3355 | 2585 | 2660 | 1950 | 750 | 350 | 600 | 650 | 650 | 2210 | 1125 | 2650 | 1450 | 1675 | 450 | 2800 | 2800 | 2400 | 2400 |
| 3500 | 3605 | 2785 | 2950 | 2150 | 750 | 350 | 600 | 650 | 650 | 2410 | 1225 | 2650 | 1650 | 1825 | 500 | 3000 | 3100 | 2600 | 2600 |
| 4000 | 4105 | 2785 | 2950 | 2150 | 950 | 350 | 600 | 850 | 850 | 2410 | 1225 | 3150 | 1650 | 1825 | 500 | 3000 | 3100 | 2600 | 2600 |
| 4500 | 4105 | 2835 | 3000 | 2200 | 950 | 350 | 600 | 850 | 850 | 2460 | 1250 | 3150 | 1700 | 1825 | 550 | 3050 | 3150 | 2650 | 2650 |
| 5000 | 4105 | 2935 | 3150 | 2300 | 950 | 350 | 600 | 850 | 850 | 2560 | 1300 | 3150 | 1700 | 1925 | 600 | 3150 | 3300 | 2750 | 2750 |

* From THD-U 2000 (and higher) distance = 250 mm

** Dimension may vary to used pumps

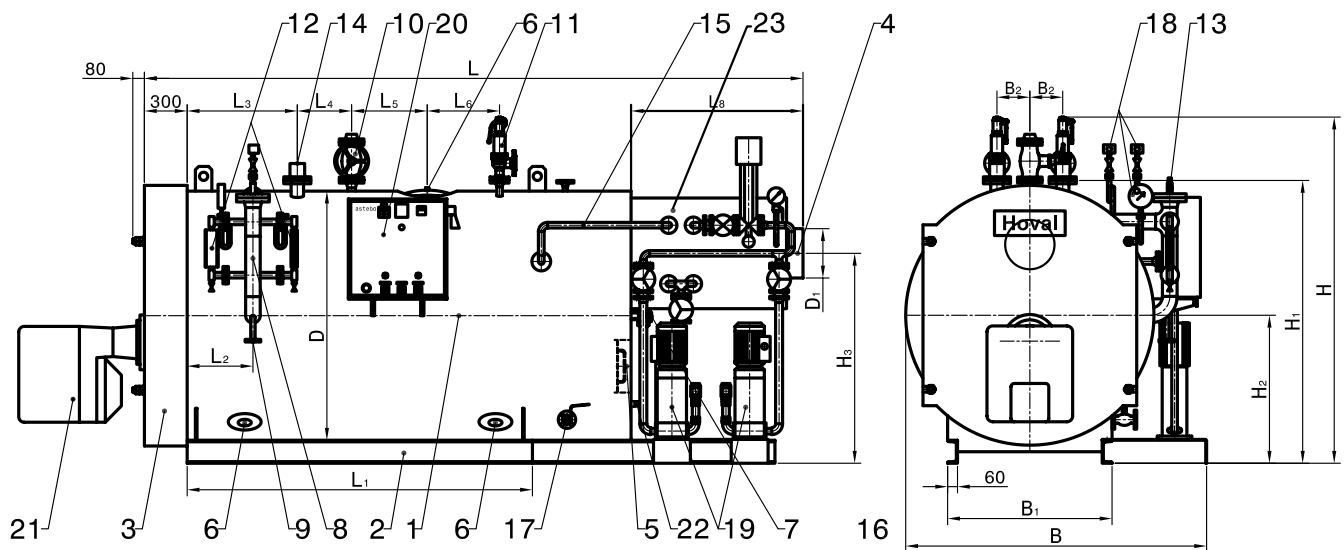
Design pressure 10, 13 and 16 bar (gauge)

Other pressure levels on request!

Transport dimensions for design pressure 10 bar

Add 40 mm to H₁ for crane hooks
Dimensions incl. 100 mm insulation.

THD-U with economiser - subject to construction-caused alterations



- | | | |
|---------------------------------------|--------------------------------------|--------------------------------|
| 1 Boiler | 9 Continuous blowdown valve | 17 Blow down/purge valve |
| 2 Boiler base | 10 Steam valve | 18 Pressure gauge and manostat |
| 3 Hinge | 11 Safety valve(s) | 19 Feed water pump(s) |
| 4 Flue gas outlet | 12 Water level gauge | 20 Electric control panel |
| 5 Explosion flap and cleaning opening | 13 Water level control | 21 Burner |
| 6 Inspection opening | 14 Water insufficiency control 1 + 2 | 22 Condensate drain nozzle |
| 7 Inspection glass (flame tube) | 15 Boiler feed socket - valve group | 23 Economiser |
| 8 Fitting pipe | 16 Boiler feed pump(s) - valve group | |

| Capacity kg/h | Main dimensions | | | | Connecting dimensions | | | | | | | | Base frame | | Flue gas connection | | Required space B x H (for transport) | | | |
|------------------|-----------------|------|------|------|-----------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|----------------|---|------|-------------------|------|
| | L | B ** | H | D | L ₂ | L ₃ | L ₄ | L ₅ | L ₆ | L ₈ | H ₁ | H ₂ | L ₁ | B ₁ | H ₃ | D ₁ | with armatures | | without armatures | |
| 500 | 3162 | 1935 | 1950 | 1300 | 350 | 200 | 300 | 350 | 350 | 1007 | 1560 | 800 | 1250 | 850 | 1130 | 150 | 2050 | 2100 | 1750 | 1750 |
| 650 | 3312 | 1985 | 2000 | 1350 | 350 | 200 | 300 | 350 | 350 | 1007 | 1610 | 825 | 1400 | 900 | 1160 | 150 | 2200 | 2150 | 1800 | 1800 |
| 800 | 3500 | 2085 | 2100 | 1450 | 400 | 200 | 400 | 400 | 400 | 1045 | 1710 | 875 | 1550 | 1000 | 1250 | 200 | 2300 | 2250 | 1900 | 1900 |
| 1000 | 3750 | 2085 | 2100 | 1450 | 500 | 250 | 500 | 450 | 450 | 1045 | 1710 | 875 | 1800 | 1000 | 1250 | 200 | 2300 | 2250 | 1900 | 1900 |
| 1200 | 4137 | 2136 | 2150 | 1500 | 500 | 250 | 500 | 600 | 600 | 1082 | 1760 | 900 | 2150 | 1050 | 1270 | 250 | 2350 | 2300 | 1950 | 1950 |
| 1600 | 4275 | 2235 | 2250 | 1600 | 500 | 250 | 500 | 600 | 600 | 1120 | 1860 | 950 | 2250 | 1150 | 1370 | 300 | 2450 | 2400 | 2050 | 2050 |
| 2000 | 4325 | 2335 | 2410 | 1700 | 650 | 300 | 500 | 600 | 600 | 1120 | 1960 | 1000 | 2300 | 1250 | 1400 | 300 | 2550 | 2550 | 2150 | 2150 |
| 2500 | 4462 | 2435 | 2510 | 1800 | 650 | 300 | 500 | 600 | 600 | 1157 | 2060 | 1050 | 2400 | 1350 | 1500 | 350 | 2650 | 2650 | 2250 | 2250 |
| 3000 | 4750 | 2585 | 2660 | 1950 | 750 | 350 | 600 | 650 | 650 | 1195 | 2210 | 1125 | 2650 | 1450 | 1600 | 400 | 2800 | 2800 | 2400 | 2400 |
| 3500 | 4750 | 2785 | 2950 | 2150 | 750 | 350 | 600 | 650 | 650 | 1195 | 2410 | 1225 | 2650 | 1650 | 1700 | 400 | 3000 | 3100 | 2600 | 2600 |
| 4000 | 5287 | 2785 | 2950 | 2150 | 950 | 350 | 600 | 850 | 850 | 1232 | 2410 | 1225 | 3150 | 1650 | 1760 | 450 | 3000 | 3100 | 2600 | 2600 |
| 4500 | 5325 | 2835 | 3000 | 2200 | 950 | 350 | 600 | 850 | 850 | 1270 | 2460 | 1250 | 3150 | 1700 | 1760 | 500 | 3050 | 3150 | 2650 | 2650 |
| 5000 | 5325 | 2935 | 3150 | 2300 | 950 | 350 | 600 | 850 | 850 | 1270 | 2560 | 1300 | 3150 | 1700 | 1830 | 550 | 3150 | 3300 | 2750 | 2750 |

* From THD-U 2000 (and higher) distance = 250 mm

** Dimension may vary to used pumps

Design pressure 10, 13 and 16 bar (gauge)

Other pressure levels on request!

Transport dimensions for design pressure 10 bar

Add 40 mm to H₁ for crane hooks
Dimensions incl. 100 mm insulation.

Rules and regulations

The following rules and regulations have to be respected:

- Hoval technical information and installation guide
- hydraulic and control technical regulations, to guarantee the min. admissible boiler temperature and the conditions for a safe operation according to national regulations
- fire protection regulations
- national regulations concerning permission, installation and operation of boiler appliances
- Boiler appliances have to be installed according to national laws and regulations and accessories requirements.
- Besides the national and local regulations the project specific circumstances of the boiler supplier have to be considered for every application.

Water treatment/water quality

- The quality of the boiler water has to be guaranteed according to Hoval technical information and national regulations.
- Hoval boilers may only be operated with treated water. The national regulations for the treatment of water apply for the values to be kept.
- Required water quality see attachment.
- Don't use chemical additives like anti-freeze etc. Except chemicals which are necessary for normal boiler operation (see water quality specification).
- Old and new installations must be well flushed before filling.
- The water quality has to be checked daily.

Planning, operation and maintenance

- The heating of the feed water and the degassing takes place in the feed water tank.
- To increase the efficiency, especially for natural gas operation, an economiser can be added to preheat the feed water.
- Pumps (especially horizontal rotary pumps and hot water/condensate pumps, NPSH pumps) need to be installed with the necessary flow, return pipework and positive suction pressure according to requirements. The installation has to be completely free of tension (anti-vibration proof).
- National and local rules and regulations have to be considered for the fuel supply.
- The operation and water analysis data are to be recorded daily in the operation booklet.
- Safety valves and blow-off pipes must discharge the system overpressure riskless.
- Filters and strainers have to be cleaned periodically, especially if installed in front of control devices.
- The drain of the desalting, blow down, drainage, overflow, etc. has to be safely discharged into a dislodging tank.
- All heating components and pipework are to be insulated in order to reduce radiation losses.

Combustion air

- The supply of combustion air must be guaranteed for a safe and economic operation. There must be no possibility of the air supply being shut off.
- Ventilation of the boiler house has to also be provided.
- In the installation room no negative pressure larger than 3 N/m² is allowed. To adhere to this demand, plan a free area for the air supply opening of at least 200 cm², plus 2 cm² per kW output. The aspect ratio for rectangular openings should not be more than 1.5 : 1. If the opening is louvred ensure the free area is sufficient. National laws have to be respected.
- Boiler houses have to be fitted with the relevant outer pressure relief surface.
- Steam boilers are not to be installed in rooms where halogen compounds occur which can enter the combustion air. (e.g. laundries, drying and hobby rooms, etc.).

Noise level reduction

The following measures for noise level reduction are possible:

- Solid construction of heating room walls, ceiling and floor, installation of silencer in fresh air supply, noise insulation for support and bracket of pipes.
- Installation of sound attenuation cowl for the burner.
- A substantial part of the sound caused in the combustion chamber and in the top heating surfaces is radiated from the flue outlet as sound transmitted by air. In addition to this, resonance features, depending on chimney dimensioning and inlet, may occur which are triggered by the oscillation of the combustion process. These sounds can be reduced by burner-lateral measures, e.g. changes of flame geometry, atomisation characteristics or fuel throughput.
- Flue gas attenuators cause a substantial sound level reduction as well. These sound absorbers should usually be tuned at low frequencies of 60-250 Hz. Flue gas attenuators function according to the principle of sound absorption. The kinetic energy of the exhaust gases is reduced by friction requiring an increase in chimney draft in the flue system. This has to be considered for burner sizing. The connection piece from the boiler to the flue gas sound absorber has to be gas-tight.
- The necessary space requirement of approx. 2 m for the later installation of a flue gas sound absorber should be included when planning.

Chimney/flue gas system

- A properly designed chimney/flue arrangement must be provided to match each particular application.
- To achieve a smooth discharge of the exhaust gases from the boiler into the chimney, the flue connection must enter the chimney at approx. 30-45 °.
- From a length of greater than 1 m thermal insulation is necessary.
- Adequate provision should be made to drain of condensate from the base of the chimney ensuring condensate does not run back into the boiler smokebox.

Boiler and feed water specifications for steam boiler plants

Boiler water - general

Boiler water must be free of hardness components. pH-value should be above neutral level. Please refer to following tables for water composition.

During a BOSB-operation feed- and boiler water have to be checked every 72 h, without BOSB- operation daily checks are necessary! The values must be recorded in the operating log book!

Feed water specifications for natural circulating boilers – shell boilers (table 1)

| Parameter | Unit | Feed water for steam boilers | |
|--|------------------|--|---------------------|
| Operating pressure | bar (0.1 MPa) | > 0.5 to 20 | > 20 |
| Appearance | - | clear, free from suspended solids and foam | |
| Direct conductivity at 25 °C | µS/cm | not specified, only guide values relevant for boiler water - see table 2 | |
| pH value at 25 °C ¹⁾ | - | > 9.2 ²⁾ | > 9.2 ²⁾ |
| Total hardness ^{3), 6)} (Ca + Mg) | mmol/l | < 0.01 ³⁾ | < 0.01 |
| Iron (Fe) concentration | mg/l | < 0.3 | < 0.1 |
| Copper (Cu) concentration | mg/l | < 0.05 | < 0.03 |
| Silica (SiO ₂) concentration | mg/l | not specified, only guide values for boiler water relevant, see table 2 | |
| Oxygen (O ₂) concentration | mg/l | < 0.05 ⁴⁾ | < 0.02 |
| Oil/grease concentration (see EN 12953-6) | mg/l | < 1 | < 1 |
| Organic substances (as TOC) concentration | - | see footnote ⁵⁾ | |

¹⁾ With copper alloys in the system the pH value shall be maintained in the range 8.7 to 9.2.

²⁾ With softened water pH value > 7.0 the pH value of boiler water according to table 2 should be considered.

³⁾ At operating pressure < 1 bar total hardness max. 0.05 mmol/l shall be acceptable.

⁴⁾ Value for continuous operation and/ or if a deaerator is used; if the operation is discontinuous or without deaerator film forming agents and/or excess of oxygen scavenger shall be used.

⁵⁾ Organic substances are generally a mixture of several different compounds. The composition of such mixtures and the behaviour of their individual components under the conditions of boiler operation are difficult to predict. Organic substances may be decomposed to form carbonic acid or other acidic decomposition products which increase the acid conductivity and cause corrosion or deposits. They also may lead to foaming and/or priming which shall be kept as low as possible.

⁶⁾ Noted in the past as °dH, conversion factor: 1 mmol/l = 5.6°dH (German hardness)

Source: EN12953-10:2003 (E) + Hoval handbook

Boiler and feed water specifications for steam boiler plants

Boiler water specifications for natural circulating boilers – shell boilers - (table 2)

| Parameter | Unit | Boiler water for steam boilers using | | |
|--|------------------|--|--|--------------------------------|
| | | Feedwater direct conductivity > 30 µS/cm | Feedwater direct conductivity ≤ 30 µS/cm | |
| Operating pressure | bar (0.1 MPa) | > 0.5 to 20 | > 20 | > 0.5 |
| Appearance | - | clear, free from suspended solids and foam | | |
| Direct conductivity at 25 °C ⁸⁾ | µS/cm | < 6 000 ¹⁾ | see figure 1 ¹⁾ | < 1 500 |
| pH value at 25 °C | - | 10.5 to 12.0 | 10.5 to 11.8 | 10.0 to 11.0 ^{2), 3)} |
| Total hardness ^{10), 11)} (Ca + Mg) | mmol/l | < 0.01 | | |
| Composite alkalinity ⁷⁾ | mmol/l | 1 to 15 ¹⁾ | 1 to 10 ¹⁾ | 0.1 to 1.0 ³⁾ |
| Silica (SiO ₂) concentration ⁹⁾ | mg/l | pressure dependent, according to figure 2 | | |
| Phosphate (PO ₄) ^{4), 6)} | mg/l | 10 to 30 | 10 to 30 | 6 to 15 |
| Sodium Sulphite (Na ₂ SO ₃) ⁶⁾ | mg/l | 5 to 10 | 5 to 10 | 5 to 10 |
| Organic substances (as TOC) concentration | - | see footnote ⁵⁾ | | |

¹⁾ With super heater consider 50 % of the indicated upper value as maximum value.

²⁾ Basic pH adjustment by injecting Na₃PO₄, additional NaOH injection only if the pH value is < 10.

³⁾ If the acid conductivity of the boiler feedwater is < 0.2 µS/cm, and its Na + K concentration is < 0.010 mg/l, phosphate injection is not necessary. Under the conditions AVT (all volatile treatment, feedwater pH ≥ 9.2 and boiler water pH ≥ 8.0) can be applied, in this case the acid conductivity of the boiler water is < 5 µS/cm.

⁴⁾ If coordinated phosphate treatment is used; considering all other values higher PO₄-concentrations are acceptable (see clause 4 of EN 12953-10 for details).

⁵⁾ See ⁵⁾ in table 1.

⁶⁾ Measuring only necessary if dosing chemicals are used which contains these composition

⁷⁾ Noted in the past as p-value, conversion factor: KS 8.2 = 1 according p-value = 1

⁸⁾ For level electrodes minimum conductivity = > 5 µS/cm

⁹⁾ It's not necessary to make continuous control of following parameters: Silica (SiO₂) concentration

¹⁰⁾ At operating pressure < 1 bar total hardness max. 0.05 mmol/l shall be acceptable.

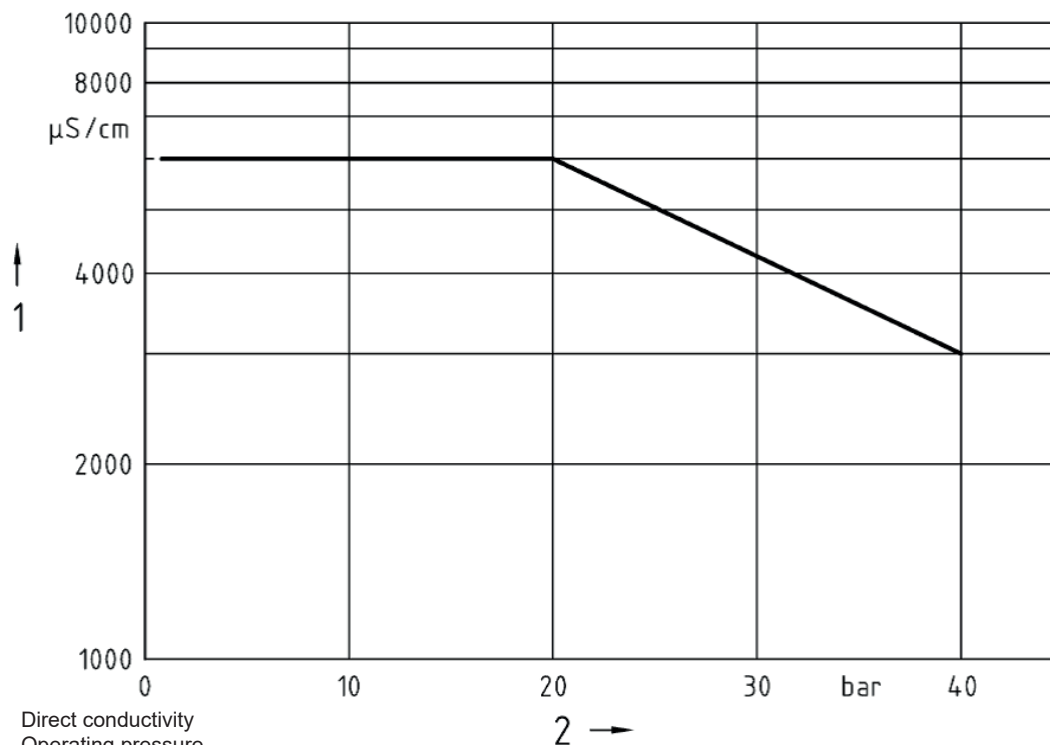
¹¹⁾ Noted in the past as °dH, conversion factor: 1 mmol/l = 5.6°dH (German hardness)

Source: EN12953-10:2003 (E) + Hoval handbook

Boiler and feed water specifications for steam boiler plants

Fig. 1 Maximum acceptable direct conductivity of the boiler water dependent on the pressure; feedwater direct conductivity > 30 $\mu\text{S}/\text{cm}$

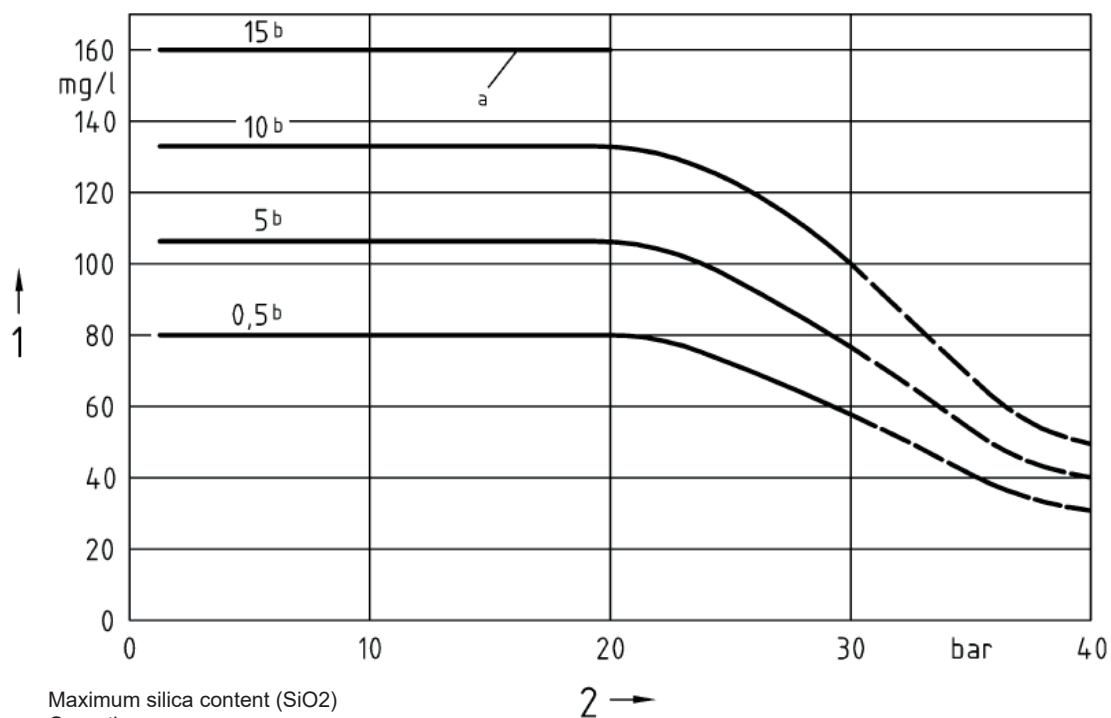
Source: EN12953-10:2003 (E)



1 Direct conductivity
2 Operating pressure

Fig. 2 Maximum acceptable silica content (SiO_2) of the boiler water dependent on the pressure

Source: EN12953-10:2003 (E)



1 Maximum silica content (SiO_2)
2 Operating pressure

a This level of alkalinity is not permissible > 20 bar
b Alkalinity in mmol/l

Important notice

Hoval recommends that a water treatment specialist is employed to carry out routine monitoring of the supply water in order to ensure it remains within specification.

THSD-I E

Hoval steam boiler

The Hoval high output steam boilers are made of high quality steel and are distinguished by their solid, robust and flexible construction, particularly by their operational ease, their easy maintenance and an optimal efficiency. The client receives an economical, environment friendly compact unit, ready for installation. The boilers are constructed for oil or gas firing.

Boiler type THSD-I E without economiser

The type THSD-I E classical 3 pass flame tube flue gas tube boiler with inner fully water cooled flue gas turning chamber with finned tube wall guarantees high efficiency. The boiler consists of a cylindric shell, the two head plates, the flame tube including the back flue gas turning chamber with water cooled finned tube wall, the two flue gas passes and the fitting pipe, placed either on the right (standard) or on the left. The boiler door is insulated and flue gas proof for burner mounting. The boiler is completely electrically welded and provided with all required inspection openings.

The spacious flame tube with low thermal charges results in an excellent combustion and reduced emissions. The large water content secures an even burner running time and thus reduces the number of boiler starts.

Boiler body type THSD-I E with economiser

Design according to THSD-I E **with** economiser for further reduction of flue gas temperature. Therefore a higher efficiency of up to 95 % with minimum space requirements can be achieved.

Admissible max. safety valve pressure

Standard pressures: 10, 13 and 16 bar.

Higher pressure on request.

Thermal insulation

The boiler is fully insulated with mineral wool insulation. The casing is made of structured aluminium plate. Fittings and out-cuts are properly rimmed. The flue gas collector is thermally insulated.

Connection fittings and sockets

The connection fittings and sockets on the boiler and on the fitting pipe are meant for the attachment of:

water level regulation and water level control, water level indicator (reflection indicator), manostat for pressure regulation and pressure supervision, pressure gauge set, main steam valve, safety valve(s), boiler feeding, sludging/drainage, desalting.

Large equipment

- 2 boiler supports in heavy construction
- 1 flue gas collector with integrated flue gas exit backwards with cleaning door and integrated bleeder valve.
- 1 boiler door for burner mounting, thermally insulated and designed flue gas proof, placed on left and right swivelable hinges for the flue gas sided cleaning of boiler
- 1 feed water distribution pipe
- 1 boiler plate
- 1 low water mark NW
- 1 water separator
- 1 flue gas tube cleaning kit

High efficiency

Due to the above technical facts an efficiency of up to 90 % resp. up to 95 % with economiser, can be achieved. Thus continuous working costs are kept low. The sources of energy are used more efficiently and Hoval spares the environment.

**Construction guiding, quality approval**

The boiler is designed with all necessary inspection doors.

Construction and production is done acc. to the European Pressure Equipment Directive (PED) 2014/68/EU - EN 12953 with CE-conformity. The quality approval at our factory is done by TÜV or a national authorised quality institution. The ISO 9001:2000 certification and the quality approval at our factory with our Hoval quality performance department guarantees the highest product quality.

For installation and operation of the boiler the local laws and norms are to be respected. If gas fired the value Nitrogen oxides (NO_x) < 100 mg/Nm³ is guaranteed at nominal output.

Control panel

The control panel for the Hoval boiler can be equipped with the required control units and indicators for control and supervision of boiler and burner. The operation and alarm reports may be shown as fault indication. The control panel will be made upon customer requirements and depending on the burner to be used.

Feed water quality

For operation the Hoval and the country specific feed and boiler water regulations have to be respected and local waste water regulations have to be paid attention to.

Detailed information for the feed water quality can be found in the appendix.

Delivery

The pressure body is provided with a primer. Due to transport reasons the insulation can be fixed at the factory. Burner armatures and control panel are either pre-mounted (as far as transport technically possible) or packed loosely in a separate box. The mounting and wiring can be done at the factory or at site. Connection openings are covered.

On request

- Second safety valve
- Second water level indicator
- Second feed water pump
- Modulating feed water control
- Automatic boiler blow down
- Economiser
- PLC (programmable logic controller) S7-1200/300
- Volt-free contacts for BMS (Building Management System)

THSD-I E (25/20-90/80)

Technical data without economiser

| Type | | | (25/20) | (30/25) | (35/30) | (45/40) | (55/50) | (70/60) | (90/80) |
|---|-----------|------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| • Steam output (oil- and gas-fired) | | kg/h | 2500/2000 | 3000/2500 | 3500/3000 | 4500/4000 | 5500/5000 | 7000/6000 | 9000/8000 |
| • Output | at 10 bar | kW | 1630/1304 | 1956/1630 | 2283/1956 | 2934/2608 | 3586/3260 | 4564/3912 | 5868/5216 |
| | at 13 bar | kW | 1635/1308 | 1963/1635 | 2290/1963 | 2944/2617 | 3596/3271 | 4579/3925 | 5888/5234 |
| | at 16 bar | kW | 1639/1311 | 1967/1639 | 2295/1967 | 2951/2623 | 3606/3278 | 4590/3934 | 5901/5246 |
| • Feed water temperature | | °C | 103 | 103 | 103 | 103 | 103 | 103 | 103 |
| • Safety valve pressure | | bar | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| | | bar | 13 | 13 | 13 | 13 | 13 | 13 | 13 |
| | | bar | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| • Boiler efficiency without economiser | | | | | | | | | |
| Natural gas | at 10 bar | % | 89.4/89.9 | 89.3/89.7 | 89.2/89.6 | 89.2/89.5 | 89.7/89.9 | 89.8/90.2 | 89.3/89.6 |
| | at 13 bar | % | 88.9/89.4 | 88.9/98.3 | 88.7/89.2 | 88.7/89.1 | 89.2/89.5 | 89.4/89.8 | 88.8/89.2 |
| | at 16 bar | % | 88.5/89.0 | 88.4/88.9 | 88.3/88.8 | 88.4/88.7 | 88.8/89.1 | 89.0/89.4 | 88.5/88.8 |
| Diesel oil | at 10 bar | % | 90.0/90.5 | 90.0/90.4 | 89.9/90.3 | 89.9/90.2 | 90.4/90.6 | 90.5/90.8 | 90.0/90.3 |
| | at 13 bar | % | 89.6/90.1 | 89.6/90.0 | 89.5/89.9 | 89.5/89.8 | 89.9/90.1 | 90.0/90.4 | 89.5/89.9 |
| | at 16 bar | % | 89.2/89.7 | 89.2/89.6 | 89.1/89.5 | 89.1/89.4 | 89.5/89.8 | 89.7/90.0 | 89.2/89.5 |
| • Flue gas resistance | | mbar | 11.0/8.5 | 12.0/9.0 | 12.0/9.5 | 12.0/10.0 | 12.5/10.0 | 13.0/10.5 | 13.0/11.0 |
| • Water content * | up to LW | l | 3610 | 4310 | 4790 | 5840 | 7100 | 7940 | 9970 |
| | full | l | 4500 | 5400 | 5860 | 7180 | 8790 | 10010 | 13100 |
| • Flue gas temperature after boiler without economiser | | | | | | | | | |
| Natural gas | at 10 bar | °C | 241/229 | 243/233 | 246/236 | 246/239 | 237/231 | 234/226 | 247/239 |
| | at 13 bar | °C | 250/238 | 252/242 | 256/245 | 256/248 | 246/241 | 244/235 | 257/249 |
| | at 16 bar | °C | 259/247 | 260/251 | 264/254 | 264/256 | 255/249 | 252/244 | 264/256 |
| Diesel oil | at 10 bar | °C | 236/225 | 237/228 | 241/231 | 241/234 | 232/227 | 230/222 | 242/235 |
| | at 13 bar | °C | 245/234 | 247/238 | 250/241 | 251/243 | 242/237 | 240/232 | 252/242 |
| | at 16 bar | °C | 254/243 | 255/246 | 259/249 | 259/252 | 250/245 | 248/240 | 259/251 |

* for boiler design pressure 10 bar

Technical data economiser (gas firing only)

| Type | | | (25/20) | (30/25) | (35/30) | (45/40) | (55/50) | (70/60) | (90/80) |
|--|-----------|------|---------|---------|---------|---------|---------|---------|---------|
| • Additional output economiser | | | | | | | | | |
| | at 10 bar | kW | 92/62 | 114/86 | 136/107 | 170/141 | 192/165 | 237/186 | 355/294 |
| | at 13 bar | kW | 100/72 | 124/94 | 147/117 | 185/155 | 210/182 | 258/205 | 385/322 |
| | at 16 bar | kW | 107/77 | 132/101 | 158/126 | 197/166 | 226/196 | 280/224 | 402/337 |
| • Boiler efficiency with economiser | | % | 94.4 | 94.4 | 94.4 | 94.4 | 94.4 | 94.4 | 94.4 |
| • Flue gas resistance economiser | | mbar | 1.5 | 1.5 | 2.0 | 2.0 | 2.0 | 2.2 | 2.2 |
| • Feed water temperature | inlet | °C | 103 | 103 | 103 | 103 | 103 | 103 | 103 |
| • Feed water temperature | outlet | | | | | | | | |
| | at 10 bar | °C | 134/130 | 135/132 | 136/133 | 135/133 | 133/131 | 132/129 | 136/134 |
| | at 13 bar | °C | 137/133 | 138/135 | 139/136 | 138/136 | 135/134 | 134/132 | 139/137 |
| | at 16 bar | °C | 139/136 | 140/137 | 141/138 | 140/138 | 138/136 | 137/135 | 141/139 |
| • Flue gas temperature after economiser | | °C | 140 * | 140 * | 140 * | 140 * | 140 * | 140 * | 140 * |

* on request: 130 °C

THSD-I E (25/20-90/80)

Dimensions and weights

| Type | | (25/20) | (30/25) | (35/30) | (45/40) | (55/50) | (70/60) | (90/80) |
|--|--------------|---------|---------|---------|---------|---------|---------|-----------|
| • Boiler body diameter, without insulation | mm | 1750 | 1850 | 1900 | 2000 | 2100 | 2200 | 2400 |
| • Boiler length (pressure body) | mm | 2800 | 3000 | 3200 | 3550 | 4000 | 4200 | 4700 |
| • Inner flame tube diameter | at 10 bar mm | 650 | 700 | 750 | 800 | 850 | 900 | 1000 |
| | at 13 bar mm | 650 | 700 | 750 | 800 | 850 | 900 | 1000 |
| | at 16 bar mm | 650 | 700 | 750 | 800 | 850 | 900 | 1000/1150 |
| • Flame tube length, with turning chamber | mm | 2680 | 2880 | 3080 | 3430 | 3880 | 4080 | 4580 |
| • Boiler length with insulation, without burner | mm | 3330 | 3530 | 3730 | 4080 | 4530 | 4830 | 5330 |
| • Boiler width with insulation, without pump | mm | 2255 | 2355 | 2405 | 2505 | 2605 | 2705 | 2905 |
| • Boiler height with insulation, without armatures | mm | 2290 | 2390 | 2440 | 2590 | 2690 | 2790 | 2990 |
| • Flue gas outlet diameter | mm | 400 | 450 | 450 | 550 | 600 | 650 | 750 |
| • Transport weight without burner and without economiser incl. accessories | at 10 bar kg | 5000 | 6000 | 7000 | 8000 | 9500 | 11000 | 14500 |
| | at 13 bar kg | 5500 | 6500 | 7500 | 8500 | 10500 | 12500 | 15500 |
| | at 16 bar kg | 6000 | 7000 | 8000 | 9500 | 11000 | 13500 | 16500 |

Armatures

| Type | | (25/20) | (30/25) | (35/30) | (45/40) | (55/50) | (70/60) | (90/80) |
|--|--------|----------|----------|----------|----------|----------|----------|----------|
| • 1 flue gas tube cleaning equipment | | yes | yes | yes | yes | yes | yes | yes |
| • 1 main steam valve | 10 bar | DN 80 | DN 100 | DN 100 | DN 125 | DN 125 | DN 150 | DN 150 |
| | 13 bar | DN 80 | DN 80 | DN 80 | DN 100 | DN 125 | DN 125 | DN 150 |
| | 16 bar | DN 65 | DN 65 | DN 80 | DN 100 | DN 100 | DN 125 | DN 125 |
| • 1 vent valve | | DN 25 | DN 25 | DN 25 | DN 25 | DN 25 | DN 25 | DN 25 |
| • 2 safety valves | 10 bar | DN 25/40 | DN 25/40 | DN 25/40 | DN 32/50 | DN 32/50 | DN 40/65 | DN 40/65 |
| | 13 bar | DN 25/40 | DN 25/40 | DN 25/40 | DN 32/50 | DN 32/50 | DN 32/50 | DN 40/65 |
| | 16 bar | DN 25/40 | DN 25/40 | DN 25/40 | DN 25/40 | DN 25/40 | DN 32/50 | DN 32/50 |
| • 2 water level gauge valves | | DN 20 | DN 20 | DN 20 | DN 20 | DN 20 | DN 20 | DN 20 |
| • 2 reflection indicators | | M=420 | M=420 | M=420 | M=420 | M=420 | M=420 | M=420 |
| • 1 sample taking and desalting shut-off valve | | DN 15 | DN 15 | DN 15 | DN 15 | DN 15 | DN 15 | DN 15 |
| • 1 purge shut-off valve | | DN 40 | DN 40 | DN 40 | DN 40 | DN 40 | DN 40 | DN 40 |
| • 1 purge ball valve | | DN 40 | DN 40 | DN 40 | DN 40 | DN 40 | DN 40 | DN 40 |
| • 1 pressure gauge with three-way valve | | R ½" | R ½" | R ½" | R ½" | R ½" | R ½" | R ½" |
| • 3 feed water/pump valves | | DN 25 | DN 25 | DN 25 | DN 32 | DN 32 | DN 40 | DN 40 |
| • 3 feed water backstroke/no return valves | | DN 25 | DN 25 | DN 25 | DN 32 | DN 32 | DN 40 | DN 40 |
| • 2 strainers (pump suction side) | | DN 40 | DN 40 | DN 40 | DN 50 | DN 50 | DN 65 | DN 65 |
| • 2 ball valve pumps (suction side) | | DN 40 | DN 40 | DN 40 | DN 50 | DN 50 | DN 65 | DN 65 |
| • 1 pressure gauge pump with shut-off valve | | R ¼" | R ¼" | R ¼" | R ¼" | R ¼" | R ¼" | R ¼" |
| • 2 feed water pumps | 10 bar | CR | CR | CR | CR | CR | CR | CR |
| Motor rating | 10 bar | 2.2 | 3.0 | 3.0 | 4.0 | 4.0 | 5.5 | 7.5 |
| • 2 feed water pumps | 13 bar | CR | CR | CR | CR | CR | CR | CR |
| Motor rating | 13 bar | 3.0 | 4.0 | 4.0 | 4.0 | 5.5 | 7.5 | 11.0 |
| • 2 feed water pumps | 16 bar | CR | CR | CR | CR | CR | CR | CR |
| Motor rating | 16 bar | 4.0 | 4.0 | 5.5 | 5.5 | 7.5 | 7.5 | 11.0 |

THSD-I E (110/100-220/200)

Technical data without economiser

| Type | | | (110/100) | (130/120) | (150/140) | (170/160) | (190/180) | (220/200) |
|---|-----------|----|-------------|-------------|-------------|-------------|-------------|-------------|
| • Steam output (gas-fired) - 10 bar | kg/h | | 11000/10000 | 13000/12000 | 15000/14000 | 17000/16000 | 19000/18000 | 21450/20000 |
| • Steam output (oil-fired) - 10 bar | kg/h | | 10960/10000 | 12044/12044 | 12966/12966 | 13920/13920 | 14860/14860 | 16750/16750 |
| • Output | at 10 bar | kW | 7120/6520 | 8476/7824 | 9780/9128 | 11084/10432 | 12364/11736 | 13962/13040 |
| | at 13 bar | kW | 7196/6542 | 8505/7850 | 9813/9159 | 11121/10467 | 12409/11776 | 13896/13084 |
| | at 16 bar | kW | 7213/6557 | 8524/7868 | 9835/9180 | 11147/10491 | 12442/11802 | 13838/13114 |
| • Feed water temperature | °C | | 103 | 103 | 103 | 103 | 103 | 103 |
| • Safety valve pressure | bar | | 10 | 10 | 10 | 10 | 10 | 10 |
| | bar | | 13 | 13 | 13 | 13 | 13 | 13 |
| | bar | | 16 | 16 | 16 | 16 | 16 | 16 |
| • Boiler efficiency without economiser | | | | | | | | |
| Natural gas | at 10 bar | % | 89.1/89.4 | 89.5/89.7 | 89.2/89.5 | 89.3/89.5 | 89.2/89.4 | 89.5/89.7 |
| | at 13 bar | % | 88.7/89.0 | 89.1/89.3 | 88.9/89.1 | 88.9/89.1 | 88.8/89.0 | 89.0/89.2 |
| | at 16 bar | % | 88.4/89.0 | 88.7/88.9 | 88.4/88.7 | 88.5/88.7 | 88.4/88.6 | 88.7/88.8 |
| Diesel oil | at 10 bar | % | 90.1/90.4 | 90.4/90.4 | 90.3/90.3 | 90.5/90.5 | 90.6/90.6 | 90.8/90.8 |
| | at 13 bar | % | 89.4/89.7 | 89.8/90.0 | 89.8/89.8 | 90.0/90.0 | 90.1/90.1 | 90.4/90.4 |
| | at 16 bar | % | 89.1/89.4 | 89.5/89.6 | 89.4/89.4 | 89.6/89.6 | 89.7/89.7 | 90.0/90.0 |
| • Flue gas resistance | mbar | | 15.0/13.0 | 15.0/13.0 | 15.0/13.0 | 15.0/13.0 | 15.0/13.0 | 15.0/13.0 |
| • Water content * | up to LW | l | 13400 | 13520 | 17610 | 19310 | 21860 | 22980 |
| | full | l | 17700 | 19220 | 24030 | 26300 | 29750 | 31930 |
| • Flue gas temperature after boiler without economiser | | | | | | | | |
| Natural gas | at 10 bar | °C | 250/244 | 243/238 | 249/244 | 248/244 | 250/246 | 245/240 |
| | at 13 bar | °C | 260/253 | 251/246 | 257/252 | 256/252 | 258/254 | 254/250 |
| | at 16 bar | °C | 267/260 | 260/255 | 265/261 | 265/261 | 266/262 | 262/258 |
| Diesel oil | at 10 bar | °C | 246/239 | 234/234 | 235/235 | 231/231 | 230/230 | 226/226 |
| | at 13 bar | °C | 255/249 | 246/242 | 247/247 | 243/243 | 241/241 | 235/235 |
| | at 16 bar | °C | 262/256 | 254/251 | 255/255 | 251/251 | 249/249 | 243/243 |

* for boiler design pressure 10 bar

Technical data economiser (gas firing only)

| Type | | | (110/100) | (130/120) | (150/140) | (170/160) | (190/180) | (220/200) |
|--|-----------|----|-----------|-----------|-----------|-----------|-----------|-----------|
| • Additional output economiser | | | | | | | | |
| | at 10 bar | kW | 435/374 | 505/444 | 580/519 | 670/608 | 771/707 | 840/741 |
| | at 13 bar | kW | 473/408 | 529/468 | 617/556 | 712/648 | 817/752 | 991/809 |
| | at 16 bar | kW | 494/429 | 566/503 | 660/595 | 768/694 | 871/803 | 972/866 |
| • Boiler efficiency with economiser | % | | 94.4 | 94.4 | 94.4 | 94.4 | 94.4 | 94.4 |
| • Flue gas resistance economiser | mbar | | 2.5 | 2.5 | 2.5 | 3.0 | 3.0 | 3.0 |
| • Feed water temperature | inlet | °C | 103 | 103 | 103 | 103 | 103 | 103 |
| • Feed water temperature | outlet | | | | | | | |
| | at 10 bar | °C | 136/135 | 136/134 | 136/134 | 136/135 | 137/136 | 136/134 |
| | at 13 bar | °C | 139/138 | 137/136 | 138/137 | 138/137 | 139/138 | 139/137 |
| | at 16 bar | °C | 141/139 | 140/138 | 140/139 | 141/140 | 142/141 | 141/140 |
| • Flue gas temperature after economiser | °C | | 140 * | 140 * | 140 * | 140 * | 140 * | 140 * |

* on request: 130 °C

THSD-I E (110/100 - 220/200)

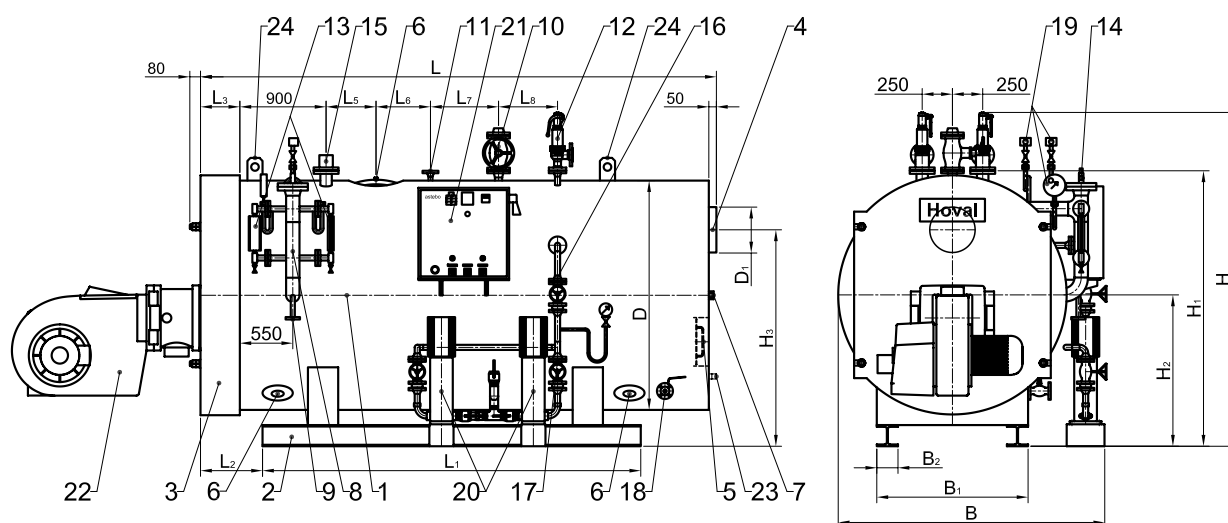
Dimensions and weights

| Type | | (110/100) | (130/120) | (150/140) | (170/160) | (190/180) | (220/200) |
|--|--------------|-----------|-----------|-----------|-----------|-----------|-----------|
| • Boiler body diameter, without insulation | mm | 2600 | 2800 | 2900 | 3000 | 3100 | 3200 |
| • Boiler length (pressure body) | mm | 5100 | 5500 | 5800 | 6100 | 6300 | 6800 |
| • Inner flame tube diameter | at 10 bar mm | 1050 | 1100 | 1150 | 1200 | 1250 | 1300/1450 |
| | at 13 bar mm | 1050 | 1100/1250 | 1150/1300 | 1200/1350 | 1250/1400 | 1300/1450 |
| | at 16 bar mm | 1050/1200 | 1100/1250 | 1150/1300 | 1200/1350 | 1250/1400 | 1300/1450 |
| • Flame tube length, with turning chamber | mm | 4930 | 5330 | 5630 | 5930 | 6130 | 6630 |
| • Boiler length with insulation, without burner | mm | 5850 | 6180 | 6480 | 6650 | 7015 | 7515 |
| • Boiler width with insulation, with pump | mm | 3105 | 3305 | 3405 | 3505 | 3605 | 3705 |
| • Boiler height with insulation, without armatures | mm | 3200 | 3410 | 3510 | 3610 | 3710 | 3810 |
| • Flue gas outlet diameter | mm | 850 | 950 | 1000 | 1050 | 1100 | 1200 |
| • Transport weight without burner and without economiser incl. accessories | at 10 bar kg | 17500 | 22000 | 26000 | 28500 | 30500 | 34000 |
| | at 13 bar kg | 19000 | 23000 | 26500 | 29000 | 31000 | 36500 |
| | at 16 bar kg | 19500 | 24500 | 28500 | 31500 | 35500 | 40000 |

Armatures

| Type | | (110/100) | (130/120) | (150/140) | (170/160) | (190/180) | (220/200) |
|--|--------|-----------|-----------|-----------|-----------|-----------|-----------|
| • 1 flue gas tube cleaning equipment | | yes | yes | yes | yes | yes | yes |
| • 1 main steam valve | 10 bar | DN 200 | DN 200 | DN 200 | DN 200 | DN 250 | DN 250 |
| | 13 bar | DN 150 | DN 150 | DN 200 | DN 200 | DN 200 | DN 250 |
| | 16 bar | DN 150 | DN 150 | DN 150 | DN 200 | DN 200 | DN 200 |
| • 1 vent valve | | DN 25 | DN 25 | DN 25 | DN 25 | DN 25 | DN 25 |
| • 2 safety valves | 10 bar | DN 50/80 | DN 50/80 | DN 65/100 | DN 65/100 | DN 65/100 | DN 65/100 |
| | 13 bar | DN 40/65 | DN 50/80 | DN 50/80 | DN 50/80 | DN 65/100 | DN 65/100 |
| | 16 bar | DN 40/65 | DN 40/65 | DN 50/80 | DN 50/80 | DN 50/80 | DN 50/80 |
| • 2 water level gauge valves | | DN 20 | DN 20 | DN 20 | DN 20 | DN 20 | DN 20 |
| • 2 reflection indicators | | M=420 | M=420 | M=420 | M=420 | M=420 | M=420 |
| • 1 sample taking and desalting shut-off valve | | DN 15 | DN 15 | DN 15 | DN 15 | DN 15 | DN 15 |
| • 1 purge shut-off valve | | DN 40 | DN 40 | DN 40 | DN 40 | DN 40 | DN 40 |
| • 1 purge ball valve | | DN 40 | DN 40 | DN 40 | DN 40 | DN 40 | DN 40 |
| • 1 pressure gauge with three-way valve | | R ½" | R ½" | R ½" | R ½" | R ½" | R ½" |
| • 2 feed water/pump valves | | DN 50 | DN 50 | DN 50 | DN 50 | DN 65 | DN 65 |
| • 2 feed water backstroke/no return valves | | DN 50 | DN 50 | DN 50 | DN 50 | DN 65 | DN 65 |
| • 1 strainers (pump suction side) | | DN 80 | DN 80 | DN 80 | DN 100 | DN 100 | DN 100 |
| • 1 ball valve pump (suction side) | | DN 80 | DN 80 | DN 80 | DN 100 | DN 100 | DN 100 |
| • 1 pressure gauge pump with shut-off valve | | R ¼" | R ¼" | R ¼" | R ¼" | R ¼" | R ¼" |
| • 2 feed water pumps | 10 bar | CR | CR | CR | CR | CR | CR |
| Motor rating | 10 bar | 7.5 | 11.0 | 11.0 | 11.0 | 15.0 | 15.0 |
| • 2 feed water pumps | 13 bar | CR | CR | CR | CR | CR | CR |
| Motor rating | 13 bar | 11.0 | 11.0 | 15.0 | 15.0 | 18.5 | 18.5 |
| • 2 feed water pumps | 16 bar | CR | CR | CR | CR | CR | CR |
| Motor rating | 16 bar | 15.0 | 15.0 | 18.5 | 18.5 | 22.0 | 22.0 |

Steam boiler THSD-I E without economiser



- | | | |
|---------------------------------------|--------------------------------------|--------------------------------|
| 1 Boiler | 9 Continuous blowdown valve | 17 Feed water valve(s) |
| 2 Boiler base | 10 Steam valve | 18 Blow down/purge valve |
| 3 Hinged front door | 11 Vent valve | 19 Pressure gauge and manostat |
| 4 Flue gas outlet | 12 Safety valve(s) | 20 Feed water pump(s) |
| 5 Explosion flap and cleaning opening | 13 Water level gauge | 21 Electrical control panel |
| 6 Inspection opening | 14 Water level control | 22 Burner |
| 7 Inspection glass (flame tube) | 15 Water insufficiency control 1 + 2 | 23 Condensate drain nozzle |
| 8 Fitting pipe | 16 Feed water piping | 24 Crane hooks |

| Type | Main dimensions | | | | Connecting dimensions | | | | | | | | Base frame | | | | Flue gas connection | | Required space B x H (for transport) | | | |
|---------|-----------------|------|------|------|-----------------------|----------------|----------------|----------------|----------------|----------------|----------------|--|----------------|----------------|----------------|----------------|---------------------|----------------|--------------------------------------|------|-------------------|------|
| | L | B ** | H | D | L ₃ | L ₅ | L ₆ | L ₇ | L ₈ | H ₁ | H ₂ | | L ₁ | L ₂ | B ₁ | B ₂ | H ₃ | D ₁ | with armatures | | without armatures | |
| 25/20 | 3330 | 2585 | 2710 | 1950 | 230 | 350 | 350 | 300 | 600 | 2260 | 1175 | | 2200 | 380 | 1500 | 160 | 1750 | 400 | 2600 | 2750 | 2300 | 2300 |
| 30/25 | 3530 | 2685 | 2810 | 2050 | 230 | 350 | 350 | 300 | 800 | 2360 | 1225 | | 2400 | 380 | 1500 | 160 | 1825 | 450 | 2700 | 2850 | 2400 | 2400 |
| 35/30 | 3730 | 2735 | 2950 | 2100 | 230 | 400 | 350 | 350 | 350 | 2410 | 1250 | | 2600 | 380 | 1550 | 160 | 1850 | 450 | 2750 | 3000 | 2450 | 2500 |
| 45/40 | 4080 | 2835 | 3100 | 2200 | 230 | 500 | 400 | 400 | 400 | 2560 | 1350 | | 2950 | 380 | 1650 | 160 | 1950 | 550 | 2850 | 3100 | 2550 | 2600 |
| 55/50 | 4530 | 2935 | 3250 | 2300 | 230 | 600 | 500 | 500 | 500 | 2660 | 1400 | | 3400 | 380 | 1700 | 160 | 2050 | 600 | 2950 | 3300 | 2650 | 2700 |
| 70/60 | 4830 | 3035 | 3350 | 2400 | 230 | 600 | 500 | 600 | 600 | 2760 | 1450 | | 3600 | 380 | 1800 | 160 | 2100 | 650 | 3050 | 3400 | 2750 | 2800 |
| 90/80 | 5330 | 3235 | 3680 | 2600 | 230 | 600 | 600 | 600 | 600 | 2960 | 1550 | | 4100 | 380 | 1950 | 160 | 2250 | 750 | 3250 | 3700 | 2950 | 3000 |
| 110/100 | 5850 | 3435 | 3930 | 2800 | 280 | 600 | 600 | 600 | 800 | 3210 | 1700 | | 4500 | 430 | 2050 | 200 | 2450 | 850 | 3450 | 3950 | 3150 | 3250 |
| 130/120 | 6180 | 3635 | 4220 | 3000 | 280 | 600 | 600 | 700 | 1000 | 3410 | 1800 | | 4900 | 430 | 2200 | 200 | 2650 | 950 | 3650 | 4250 | 3350 | 3450 |
| 150/140 | 6480 | 3735 | 4320 | 3100 | 280 | 600 | 600 | 800 | 1100 | 3510 | 1850 | | 5200 | 430 | 2250 | 200 | 2675 | 1000 | 3750 | 4350 | 3450 | 3550 |
| 170/160 | 6680 | 3835 | 4420 | 3200 | 280 | 600 | 600 | 900 | 1200 | 3610 | 1900 | | 5400 | 430 | 2300 | 200 | 2750 | 1050 | 3850 | 4450 | 3550 | 3650 |
| 190/180 | 7015 | 3935 | 4630 | 3300 | 315 | 600 | 600 | 1000 | 1300 | 3710 | 1950 | | 5700 | 430 | 2400 | 200 | 2800 | 1100 | 3950 | 4650 | 3650 | 3750 |
| 220/200 | 7515 | 4035 | 4730 | 3400 | 315 | 600 | 600 | 1100 | 1400 | 3810 | 2000 | | 6000 | 430 | 2500 | 200 | 2850 | 1200 | 4050 | 4750 | 3750 | 3850 |

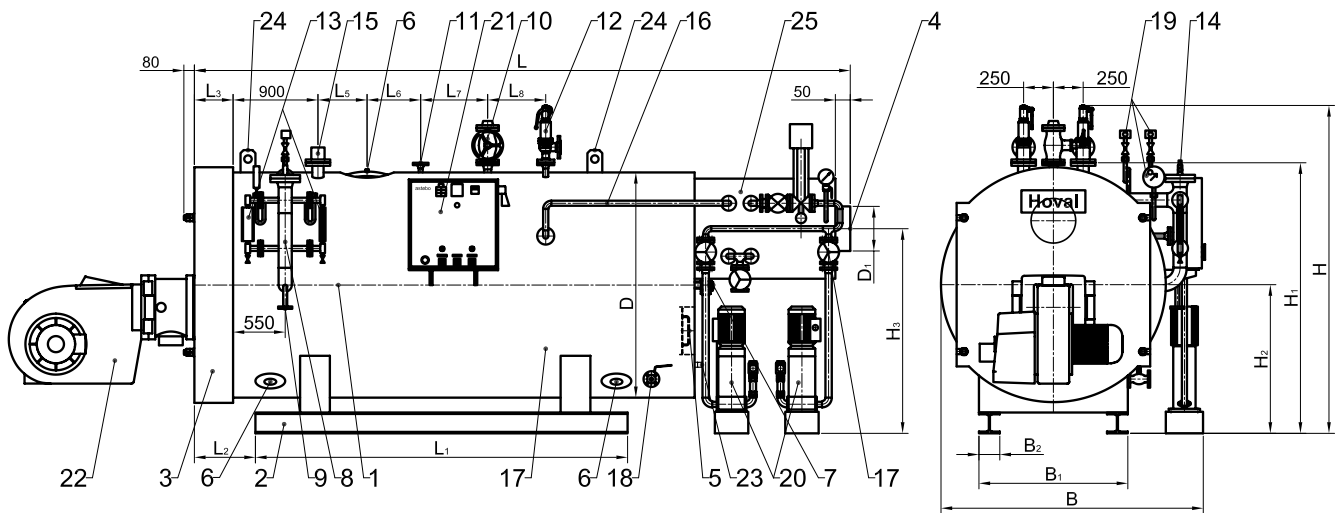
Design pressure 10, 13 and 16 bar (gauge).
Other pressure levels on request!

Add 100 mm to H₁ for crane hooks.
Dimensions incl. 100 mm isolation.

Transport dimensions for design pressure 10 bar

** Dimension may vary to used pumps

Steam boiler THSD-I E with economiser



- | | | |
|---------------------------------------|--------------------------------------|--------------------------------|
| 1 Boiler | 9 Continuous blowdown valve | 17 Feed water valve(s) |
| 2 Boiler base | 10 Steam valve | 18 Blow down/purge valve |
| 3 Hinged front door | 11 Vent valve | 19 Pressure gauge and manostat |
| 4 Flue gas outlet | 12 Safety valve(s) | 20 Feed water pump(s) |
| 5 Explosion flap and cleaning opening | 13 Water level gauge | 21 Electrical control panel |
| 6 Inspection opening | 14 Water level control | 22 Burner |
| 7 Inspection glass (flame tube) | 15 Water insufficiency control 1 + 2 | 23 Condensate drain nozzle |
| 8 Fitting pipe | 16 Feed water piping | 24 Crane hooks |
| | | 25 Economiser |

| Type | Main dimensions | | | | Connecting dimensions | | | | | | | Base frame | | | | Flue gas connection | | Required space B x H (for transport) | | | |
|---------|-----------------|------|------|------|-----------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|----------------|--------------------------------------|------|-------------------|------|
| | L | B ** | H | D | L ₃ | L ₅ | L ₆ | L ₇ | L ₈ | H ₁ | H ₂ | L ₁ | L ₂ | B ₁ | B ₂ | H ₃ | D ₁ | with armatures | | without armatures | |
| 25/20 | 4437 | 2585 | 2710 | 1950 | 230 | 350 | 350 | 300 | 600 | 2260 | 1175 | 2200 | 380 | 1500 | 160 | 1540 | 350 | 2600 | 2750 | 2300 | 2300 |
| 30/25 | 4637 | 2685 | 2810 | 2050 | 230 | 350 | 350 | 300 | 800 | 2360 | 1225 | 2400 | 380 | 1500 | 160 | 1645 | 350 | 2700 | 2850 | 2400 | 2400 |
| 35/30 | 4875 | 2735 | 2950 | 2100 | 230 | 400 | 350 | 350 | 350 | 2410 | 1250 | 2600 | 380 | 1550 | 160 | 1655 | 400 | 2750 | 3000 | 2450 | 2500 |
| 45/40 | 5262 | 2835 | 3100 | 2200 | 230 | 500 | 400 | 400 | 400 | 2560 | 1350 | 2950 | 380 | 1650 | 160 | 1720 | 450 | 2850 | 3100 | 2550 | 2600 |
| 55/50 | 5750 | 2935 | 3250 | 2300 | 230 | 600 | 500 | 500 | 500 | 2660 | 1400 | 3400 | 380 | 1700 | 160 | 1795 | 500 | 2950 | 3300 | 2650 | 2700 |
| 70/60 | 6087 | 3035 | 3350 | 2400 | 230 | 600 | 500 | 600 | 600 | 2760 | 1450 | 3600 | 380 | 1800 | 160 | 1845 | 550 | 3050 | 3400 | 2750 | 2800 |
| 90/80 | 6662 | 3235 | 3680 | 2600 | 230 | 600 | 600 | 600 | 600 | 2960 | 1550 | 4100 | 380 | 1950 | 160 | 1965 | 650 | 3250 | 3700 | 2950 | 3000 |
| 110/100 | 7220 | 3435 | 3930 | 2800 | 280 | 600 | 600 | 600 | 800 | 3210 | 1700 | 4500 | 430 | 2050 | 200 | 2140 | 700 | 3450 | 3950 | 3150 | 3250 |
| 130/120 | 7587 | 3635 | 4220 | 3000 | 280 | 600 | 600 | 700 | 1000 | 3410 | 1800 | 4900 | 430 | 2200 | 200 | 2295 | 750 | 3650 | 4250 | 3350 | 3450 |
| 150/140 | 7925 | 3735 | 4320 | 3100 | 280 | 600 | 600 | 800 | 1100 | 3510 | 1850 | 5200 | 430 | 2250 | 200 | 2330 | 800 | 3750 | 4350 | 3450 | 3550 |
| 170/160 | 8162 | 3835 | 4420 | 3200 | 280 | 600 | 600 | 900 | 1200 | 3610 | 1900 | 5400 | 430 | 2300 | 200 | 2365 | 850 | 3850 | 4450 | 3550 | 3650 |
| 190/180 | 8535 | 3935 | 4630 | 3300 | 315 | 600 | 600 | 1000 | 1300 | 3710 | 1950 | 5700 | 430 | 2400 | 200 | 2425 | 900 | 3950 | 4650 | 3650 | 3750 |
| 220/200 | 9110 | 4035 | 4730 | 3400 | 315 | 600 | 600 | 1100 | 1400 | 3810 | 2000 | 6000 | 430 | 2500 | 200 | 2435 | 1000 | 4050 | 4750 | 3750 | 3850 |

Design pressure 10, 13 and 16 bar (gauge).
Other pressure levels on request!

Transport dimensions for design pressure 10 bar

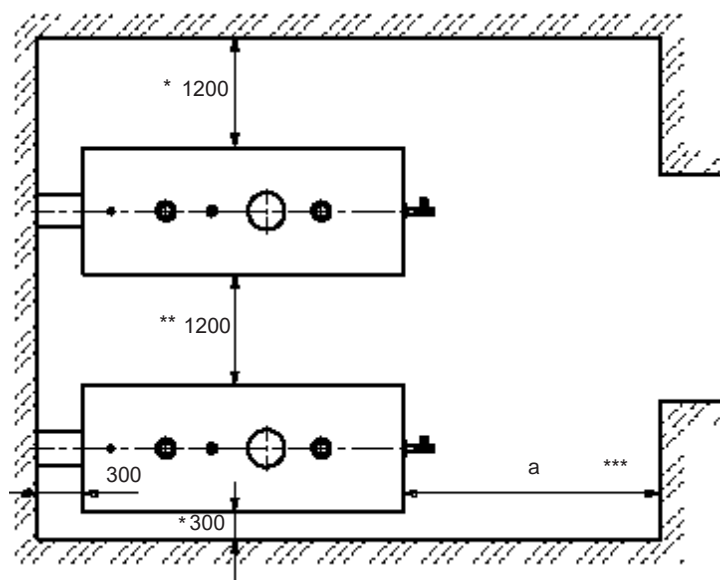
** Dimension may vary to used pumps

Add 100 mm to H₁ for crane hooks.
Dimensions incl. 100 mm isolation.

Space requirements

Installation

(Dimensions in mm)



To facilitate installation and maintenance the given measures should be kept.

Minimal space refers to boiler.
Depending on equipment (accessories) the minimal space have to be examined according to TRD 403.

Positioning

- No air pollution through halogenated hydrocarbon (contained e.g. in sprays, paints, solvents and cleaners)
- No large amounts of dust
- No high atmospheric humidity
- Frost-resistant and well ventilated

Otherwise errors and damages to the installation may occur.

The boiler may only be installed in rooms where air pollution through halogenated hydrocarbon can occur if sufficient measures are taken ensuring the supply of unpolluted combustion air.

* 300 mm/1200 mm + burner overall length (consider pivoting range/pivoting side of boiler front door too)

** Consider control panel, pump build-up

*** Flame tube length (cleaning)

| | | | | | | | | |
|--------------------|-----------|-----------|-----------|-----------|-----------|---------|---------|-----------|
| Steam output (t/h) | 2.5/2.0 | 3.0/2.5 | 3.5/3.0 | 4.5/4.0 | 5.5/5.0 | 7.0/6.0 | 9.0/8.0 | 11.5/10.0 |
| THSD-I E a (mm) | 2800 | 3000 | 3200 | 3550 | 4000 | 4200 | 4700 | 5100 |
| Steam output (t/h) | 13.0/12.0 | 15.0/14.0 | 17.0/16.0 | 19.0/18.0 | 22.0/20.0 | | | |
| THSD-I E a (mm) | 5500 | 5800 | 6100 | 6300 | 6800 | | | |

Rules and regulations

The following rules and regulations have to be respected:

- Hoval technical information and installation guide
- hydraulic and control technical regulations, to guarantee the min. admissible boiler temperature and the conditions for a safe operation according to national regulations
- fire protection regulations
- national regulations concerning permission, installation and operation of boiler appliances
- Boiler appliances have to be installed according to national laws and regulations and accessories requirements.
- Besides the national and local regulations the project specific circumstances of the boiler supplier have to be considered for every application.

Water treatment/water quality

- The quality of the boiler water has to be guaranteed according to Hoval technical information and national regulations.
- Hoval boilers may only be operated with treated water. The national regulations for the treatment of water apply for the values to be kept.
- Required water quality see attachment.
- Don't use chemical additives like anti-freeze etc. Except chemicals which are necessary for normal boiler operation (see water quality specification).
- Old and new installations must be well flushed before filling.
- The water quality has to be checked daily.

Planning, operation and maintenance

- The heating of the feed water and the degassing takes place in the feed water tank.
- To increase the efficiency, especially for natural gas operation, an economiser can be added to preheat the feed water.
- Pumps (especially horizontal rotary pumps and hot water/condensate pumps, NPSH pumps) need to be installed with the necessary flow, return pipework and positive suction pressure according to requirements. The installation has to be completely free of tension (anti-vibration proof).
- National and local rules and regulations have to be considered for the fuel supply.
- The operation and water analysis data are to be recorded daily in the operation booklet.
- Safety valves and blow-off pipes must discharge the system overpressure riskless.
- Filters and strainers have to be cleaned periodically, especially if installed in front of control devices.
- The drain of the desalting, blow down, drainage, overflow, etc. has to be safely discharged into a dislodging tank.
- All heating components and pipework are to be insulated in order to reduce radiation losses.

Combustion air

- The supply of combustion air must be guaranteed for a safe and economic operation. There must be no possibility of the air supply being shut off.
- Ventilation of the boiler house has to also be provided.
- In the installation room no negative pressure larger than 3 N/m² is allowed. To adhere to this demand, plan a free area for the air supply opening of at least 200 cm², plus 2 cm² per kW output. The aspect ratio for rectangular openings should not be more than 1.5 : 1. If the opening is louvred ensure the free area is sufficient. National laws have to be respected.
- Boiler houses have to be fitted with the relevant outer pressure relief surface.
- Steam boilers are not to be installed in rooms where halogen compounds occur which can enter the combustion air. (e.g. laundries, drying and hobby rooms, etc.).

Noise level reduction

The following measures for noise level reduction are possible:

- Solid construction of heating room walls, ceiling and floor, installation of silencer in fresh air supply, noise insulation for support and bracket of pipes.
- Installation of sound attenuation cowl for the burner.
- A substantial part of the sound caused in the combustion chamber and in the top heating surfaces is radiated from the flue outlet as sound transmitted by air. In addition to this, resonance features, depending on chimney dimensioning and inlet, may occur which are triggered by the oscillation of the combustion process. These sounds can be reduced by burner-lateral measures, e.g. changes of flame geometry, atomisation characteristics or fuel throughput.
- Flue gas attenuators cause a substantial sound level reduction as well. These sound absorbers should usually be tuned at low frequencies of 60-250 Hz. Flue gas attenuators function according to the principle of sound absorption. The kinetic energy of the exhaust gases is reduced by friction requiring an increase in chimney draft in the flue system. This has to be considered for burner sizing. The connection piece from the boiler to the flue gas sound absorber has to be gas-tight.
- The necessary space requirement of approx. 2 m for the later installation of a flue gas sound absorber should be included when planning.

Chimney/flue gas system

- A properly designed chimney/flue arrangement must be provided to match each particular application.
- To achieve a smooth discharge of the exhaust gases from the boiler into the chimney, the flue connection must enter the chimney at approx. 30-45 °.
- From a length of greater than 1 m thermal insulation is necessary.
- Adequate provision should be made to drain of condensate from the base of the chimney ensuring condensate does not run back into the boiler smokebox.

Boiler and feed water specifications for steam boiler plants

Boiler water - general

Boiler water must be free of hardness components. pH-value should be above neutral level. Please refer to following tables for water composition.

During a BOSB-operation feed- and boiler water have to be checked every 72 h, without BOSB- operation daily checks are necessary! The values must be recorded in the operating log book!

Feed water specifications for natural circulating boilers – shell boilers (table 1)

| Parameter | Unit | Feed water for steam boilers | |
|--|------------------|--|---------------------|
| Operating pressure | bar (0.1 MPa) | > 0.5 to 20 | > 20 |
| Appearance | - | clear, free from suspended solids and foam | |
| Direct conductivity at 25 °C | µS/cm | not specified, only guide values relevant for boiler water - see table 2 | |
| pH value at 25 °C ¹⁾ | - | > 9.2 ²⁾ | > 9.2 ²⁾ |
| Total hardness ^{3), 6)} (Ca + Mg) | mmol/l | < 0.01 ³⁾ | < 0.01 |
| Iron (Fe) concentration | mg/l | < 0.3 | < 0.1 |
| Copper (Cu) concentration | mg/l | < 0.05 | < 0.03 |
| Silica (SiO ₂) concentration | mg/l | not specified, only guide values for boiler water relevant, see table 2 | |
| Oxygen (O ₂) concentration | mg/l | < 0.05 ⁴⁾ | < 0.02 |
| Oil/grease concentration (see EN 12953-6) | mg/l | < 1 | < 1 |
| Organic substances (as TOC) concentration | - | see footnote ⁵⁾ | |

¹⁾ With copper alloys in the system the pH value shall be maintained in the range 8.7 to 9.2.

²⁾ With softened water pH value > 7.0 the pH value of boiler water according to table 2 should be considered.

³⁾ At operating pressure < 1 bar total hardness max. 0.05 mmol/l shall be acceptable.

⁴⁾ Value for continuous operation and/ or if a deaerator is used; if the operation is discontinuous or without deaerator film forming agents and/or excess of oxygen scavenger shall be used.

⁵⁾ Organic substances are generally a mixture of several different compounds. The composition of such mixtures and the behaviour of their individual components under the conditions of boiler operation are difficult to predict. Organic substances may be decomposed to form carbonic acid or other acidic decomposition products which increase the acid conductivity and cause corrosion or deposits. They also may lead to foaming and/or priming which shall be kept as low as possible.

⁶⁾ Noted in the past as °dH, conversion factor: 1 mmol/l = 5.6°dH (German hardness)

Source: EN12953-10:2003 (E) + Hoval handbook

Boiler water specifications for natural circulating boilers – shell boilers - (table 2)

| Parameter | Unit | Boiler water for steam boilers using | | |
|--|------------------|--|----------------------------|--|
| | | Feedwater direct conductivity > 30 µS/cm | | Feedwater direct conductivity ≤ 30 µS/cm |
| Operating pressure | bar (0.1 MPa) | > 0.5 to 20 | > 20 | > 0.5 |
| Appearance | - | clear, free from suspended solids and foam | | |
| Direct conductivity at 25 °C ⁸⁾ | µS/cm | < 6 000 ¹⁾ | see figure 1 ¹⁾ | < 1 500 |
| pH value at 25 °C | - | 10.5 to 12.0 | 10.5 to 11.8 | 10.0 to 11.0 ^{2), 3)} |
| Total hardness ^{10), 11)} (Ca + Mg) | mmol/l | < 0.01 | | |
| Composite alkalinity ⁷⁾ | mmol/l | 1 to 15 ¹⁾ | 1 to 10 ¹⁾ | 0.1 to 1.0 ³⁾ |
| Silica (SiO ₂) concentration ⁹⁾ | mg/l | pressure dependent, according to figure 2 | | |
| Phosphate (PO ₄) ^{4), 6)} | mg/l | 10 to 30 | 10 to 30 | 6 to 15 |
| Sodium Sulphite (Na ₂ SO ₃) ⁶⁾ | mg/l | 5 to 10 | 5 to 10 | 5 to 10 |
| Organic substances (as TOC) concentration | - | see footnote ⁵⁾ | | |

¹⁾ With super heater consider 50 % of the indicated upper value as maximum value.

²⁾ Basic pH adjustment by injecting Na₃PO₄, additional NaOH injection only if the pH value is < 10.

³⁾ If the acid conductivity of the boiler feedwater is < 0.2 µS/cm, and its Na + K concentration is < 0.010 mg/l, phosphate injection is not necessary. Under the conditions AVT (all volatile treatment, feedwater pH ≥ 9.2 and boiler water pH ≥ 8.0) can be applied, in this case the acid conductivity of the boiler water is < 5 µS/cm.

⁴⁾ If coordinated phosphate treatment is used; considering all other values higher PO₄-concentrations are acceptable (see clause 4 of EN 12953-10 for details).

⁵⁾ See ⁵⁾ in table 1.

⁶⁾ Measuring only necessary if dosing chemicals are used which contains these composition

⁷⁾ Noted in the past as p-value, conversion factor: KS 8.2 = 1 according p-value = 1

⁸⁾ For level electrodes minimum conductivity = > 5 µS/cm

⁹⁾ It's not necessary to make continuous control of following parameters: Silica (SiO₂) concentration

¹⁰⁾ At operating pressure < 1 bar total hardness max. 0.05 mmol/l shall be acceptable.

¹¹⁾ Noted in the past as °dH, conversion factor: 1 mmol/l = 5.6°dH (German hardness)

Source: EN12953-10:2003 (E) + Hoval handbook

Fig. 1 Maximum acceptable direct conductivity of the boiler water dependent on the pressure; feedwater direct conductivity > 30 µS/cm

Source: EN12953-10:2003 (E)

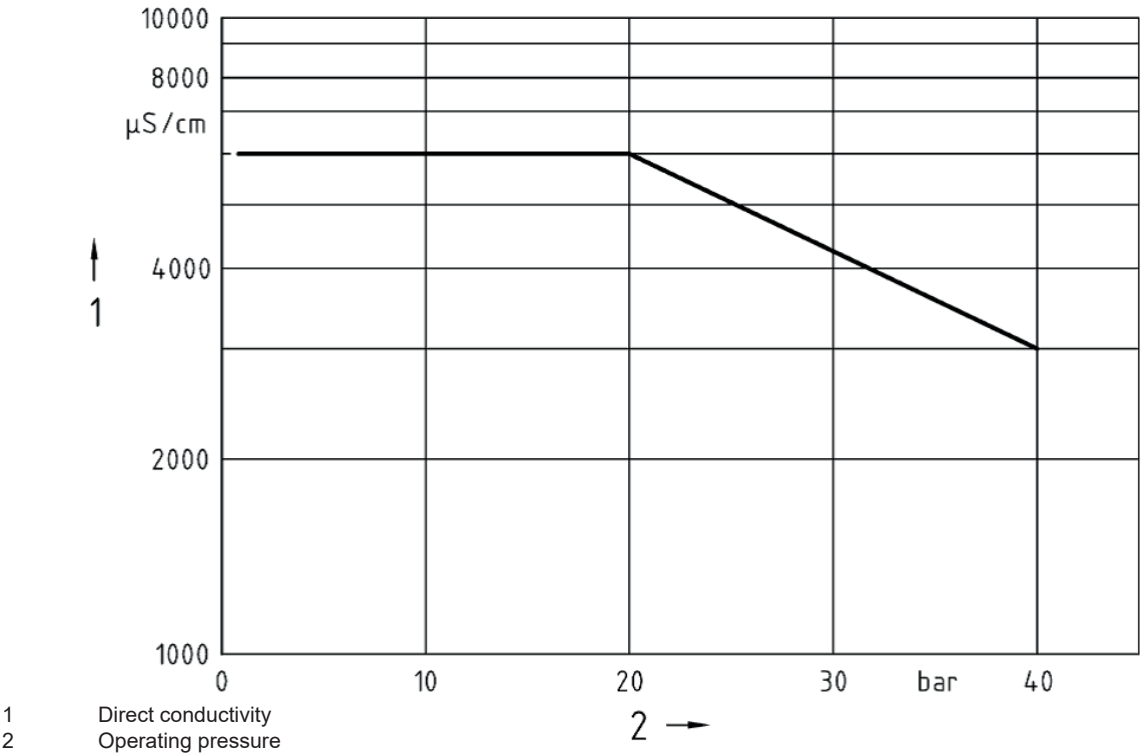
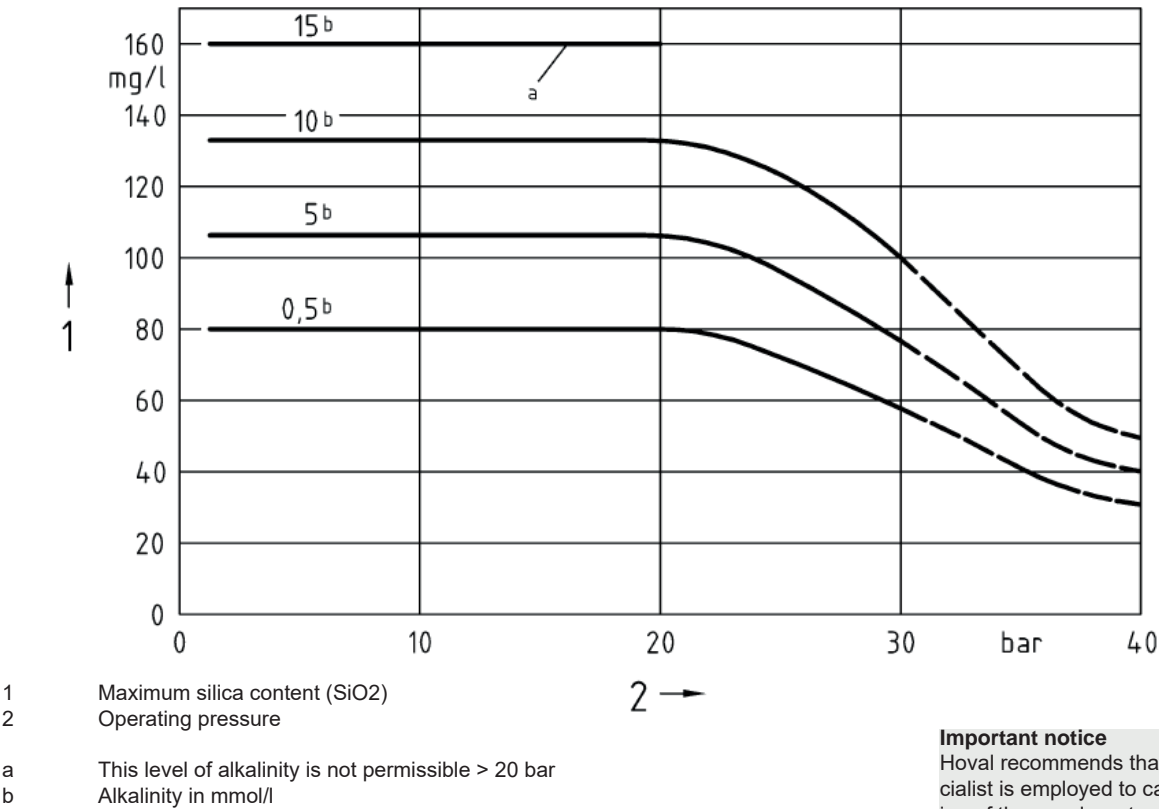


Fig. 2 Maximum acceptable silica content (SiO2) of the boiler water dependent on the pressure

Source: EN12953-10:2003 (E)



Important notice
Hoval recommends that a water treatment specialist is employed to carry out routine monitoring of the supply water in order to ensure it remains within specification.

SPW-D

Feed water tank pressureless
SPW-D (500) - SPW-D (3000)

Description

SPW-D

Feed water tank SPW-D

The Hoval feed water tank type SPW-D is made of steel sheet St 37.2. The pressureless tank with ventilation into the atmosphere is completely electrically welded and provided with all necessary links. The tank must be positioned approx. 2-3 metres above boiler level. Installed in the container is a heat up feature, consisting of a special heating tube for a direct steam heat up of the tank.

Admissible operating temperature

Operating temperature: 95 °C

Thermal insulation

The tank is completely insulated with mineral wool. The casing is made of structured aluminium plate. Fittings and out-cuts are properly rimmed.

Armatures

The feed water tank will be supplied with the following armatures:

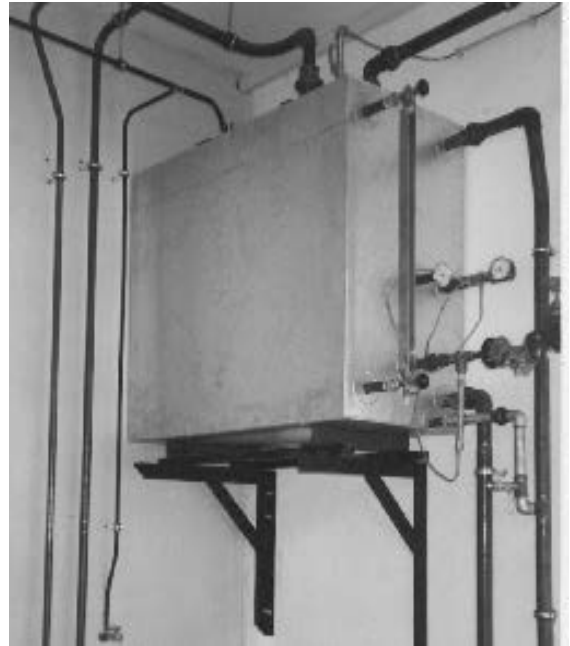
- 1 water level indicator with glass protection
- 1 drain valve
- 1 thermometer diameter 100 mm
- 1 shut-off valve (water)
- 1 additional water backfeed with float valve
(on request solenoid valve)

Armatures for heat up equipment:

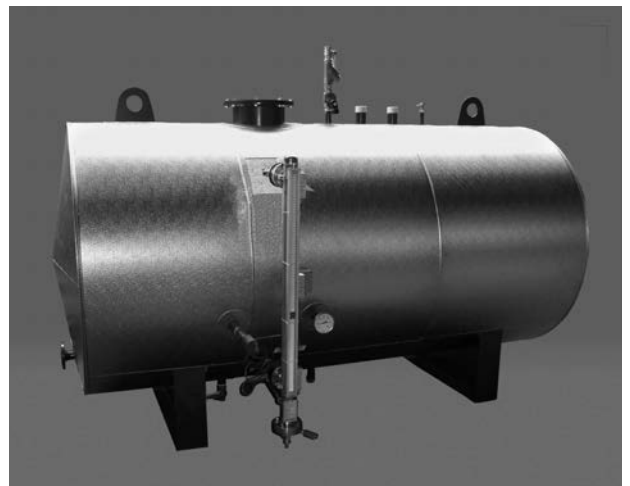
- 1 temperature regulator with capillar pipe and impulse connection line
- 1 steam regulator valve (shut-off valve)
- 1 strainer (steam)
- 1 shut-off valve (steam)
- 1 metering valve

Delivery

The feed water tank is provided with a primer. The insulation and the armatures are either mounted or packed loosely in a separate box according to size.



SPW-D 500 L - 1500 L



SPW-D 2000 L - 3000 L

SPW-D 500 L - 1500 L, angular
SPW-D 2000 L - 3000 L, round

| Type | | (500) | (1000) | (1500) | (2000) | (3000) |
|--|------|---------|---------|---------|---------|---------|
| • Water content | l | 500 | 1000 | 1500 | 2000 | 3000 |
| • Construction | | angular | angular | angular | angular | angular |
| • Material | | St 37.2 | St 37.2 | St 37.2 | St 37.2 | St 37.2 |
| • Wall thickness | mm | 5 | 5 | 5 | 4 | 4 |
| • Regenerated water amount max. | m³/h | 0.5 | 1.0 | 1.5 | 2.0 | 3.0 |
| • Heating steam output | | | | | | |
| from 15 °C to 95 °C | kW | 47 | 93 | 140 | 185 | 279 |
| Saturated steam | kg/h | 84 | 168 | 252 | 336 | 504 |
| • Length without insulation | mm | 1100 | 1650 | 2100 | 2100 | 2900 |
| • Height without insulation | mm | 1000 | 1000 | 1000 | 1725 | 1725 |
| • Width without insulation | mm | 500 | 700 | 700 | - | - |
| • Diameter without insulation | mm | - | - | - | 1350 | 1350 |
| • Length with insulation, without armatures | mm | 1280 | 1830 | 2280 | 2180 | 2980 |
| • Height with insulation, without armatures | mm | 1340 | 1340 | 1340 | 1725 | 1725 |
| • Width with insulation, without armatures | mm | 600 | 800 | 800 | 1450 | 1450 |

Sockets

| Type | (500) | (1000) | (1500) | (2000) | (3000) |
|--------------------------------|--------|--------|--------|--------|--------|
| • Socket for thermostat | R 2" | R 2" | R 2" | R 2" | R 2" |
| • Socket for condensate return | R 2" | R 2" | R 2" | R 2" | R 2" |
| • Socket for venting | R 2" | R 2" | R 2" | R 2" | R 2" |
| • Socket for over flow | R 5/4" | R 5/4" | R 5/4" | R 5/4" | R 5/4" |
| • Socket for boiler feeding | R 6/4" | R 6/4" | R 6/4" | R 6/4" | R 6/4" |

Fine armatures with float valve

| Type | (500) | (1000) | (1500) | (2000) | (3000) |
|---------------------------|--------|--------|--------|--------|--------|
| • 1 fluid level indicator | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" |
| • 1 thermometer | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" |
| • 1 draining | R 1" | R 1" | R 1" | R 1" | R 1" |
| • 1 dosing ball valve | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" |
| • 1 float valve | R 1/2" | R 1/2" | R 3/4" | R 3/4" | R 1" |
| • 1 shut-off valve | R 1/2" | R 1/2" | R 3/4" | R 3/4" | R 1" |

Fine armatures with magnetic valve

| Type | (500) | (1000) | (1500) | (2000) | (3000) |
|---------------------------|--------|--------|--------|--------|--------|
| • 1 fluid level indicator | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" |
| • 1 thermometer | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" |
| • 1 draining | R 1" | R 1" | R 1" | R 1" | R 1" |
| • 1 dosing ball valve | R 1/2" | R 1/2" | R 1/2" | R 1/2" | R 1/2" |
| • 1 solenoid valve | R 1/2" | R 1/2" | R 3/4" | R 3/4" | R 1" |
| • 1 shut-off valve | R 1/2" | R 1/2" | R 3/4" | R 3/4" | R 1" |
| • 1 two step control | DN 20 | DN 20 | DN 20 | DN 20 | DN 20 |

SPW-D 500 L - 1500 L, angular
 SPW-D 2000 L - 3000 L, round

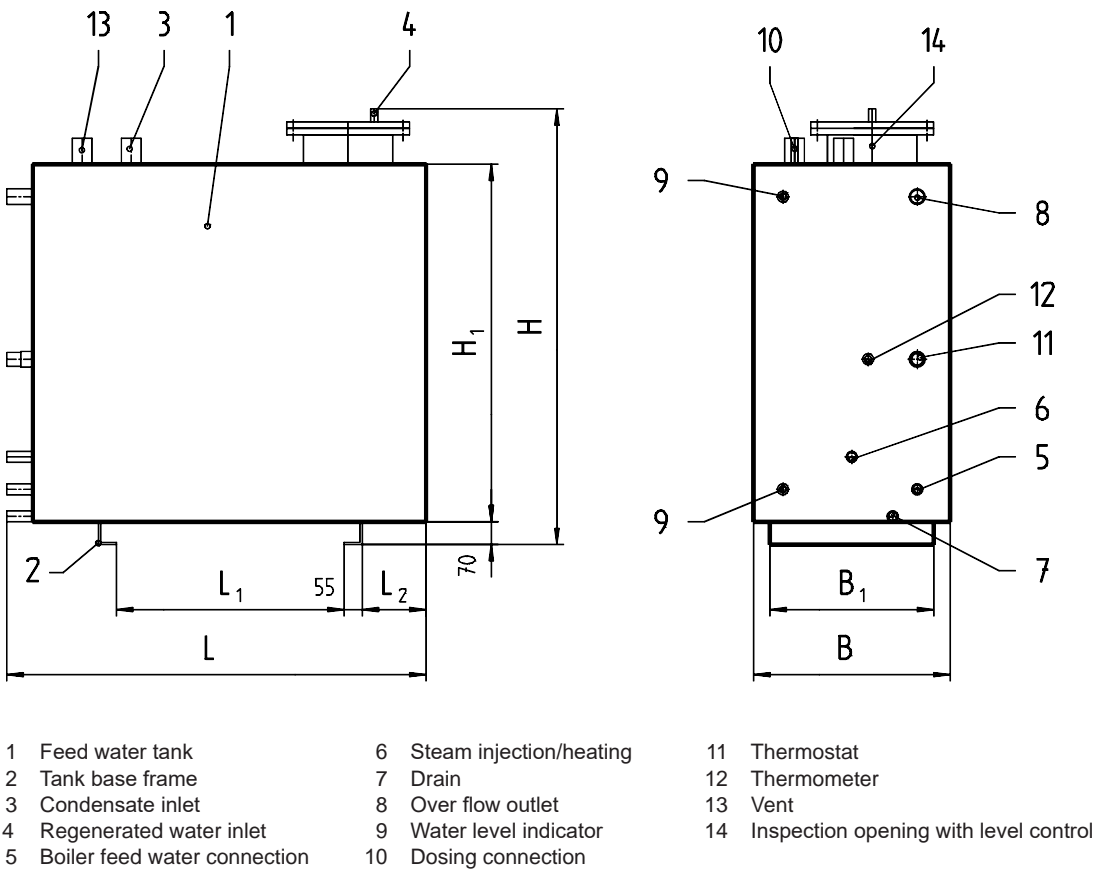
Direct heat up equipment

| Type | (500) | (1000) | (1500) | (2000) | (3000) |
|-----------------|-------|--------|--------|--------|--------|
| • 1 nozzle pipe | yes | yes | yes | yes | yes |

Fine armatures, heating steam

| Type | | (500) | (1000) | (1500) | (2000) | (3000) |
|--|---------|--------|--------|--------|--------|--------|
| • 1 shut-off valve incl. temperature regulator | | | | | | |
| | 0.5 bar | R 1" | DN 40 | DN 50 | DN 65 | DN 65 |
| | 6 bar | R ½" | R ½" | R ¾" | DN 25 | DN 25 |
| | 10 bar | R ½" | R ½" | R ½" | DN 20 | DN 25 |
| | 13 bar | R ½" | R ½" | DN 15 | DN 15 | DN 32 |
| | 16 bar | R ½" | R ½" | DN 15 | DN 15 | DN 32 |
| • 1 shut-off valve | | | | | | |
| | 0.5 bar | R 5/4" | R 2" | DN 65 | DN 80 | DN 80 |
| | 6 bar | DN 20 | DN 25 | DN 32 | DN 40 | DN 50 |
| | 10 bar | DN 15 | DN 20 | DN 25 | DN 32 | DN 40 |
| | 13 bar | DN 15 | DN 20 | DN 25 | DN 25 | DN 32 |
| | 16 bar | DN 15 | DN 20 | DN 20 | DN 25 | DN 32 |
| • 1 strainer | | | | | | |
| | 0.5 bar | R 5/4" | R 2" | DN 65 | DN 80 | DN 80 |
| | 6 bar | DN 20 | DN 25 | DN 32 | DN 40 | DN 50 |
| | 10 bar | DN 15 | DN 20 | DN 25 | DN 32 | DN 40 |
| | 13 bar | DN 15 | DN 20 | DN 25 | DN 25 | DN 32 |
| | 16 bar | DN 15 | DN 20 | DN 20 | DN 25 | DN 32 |

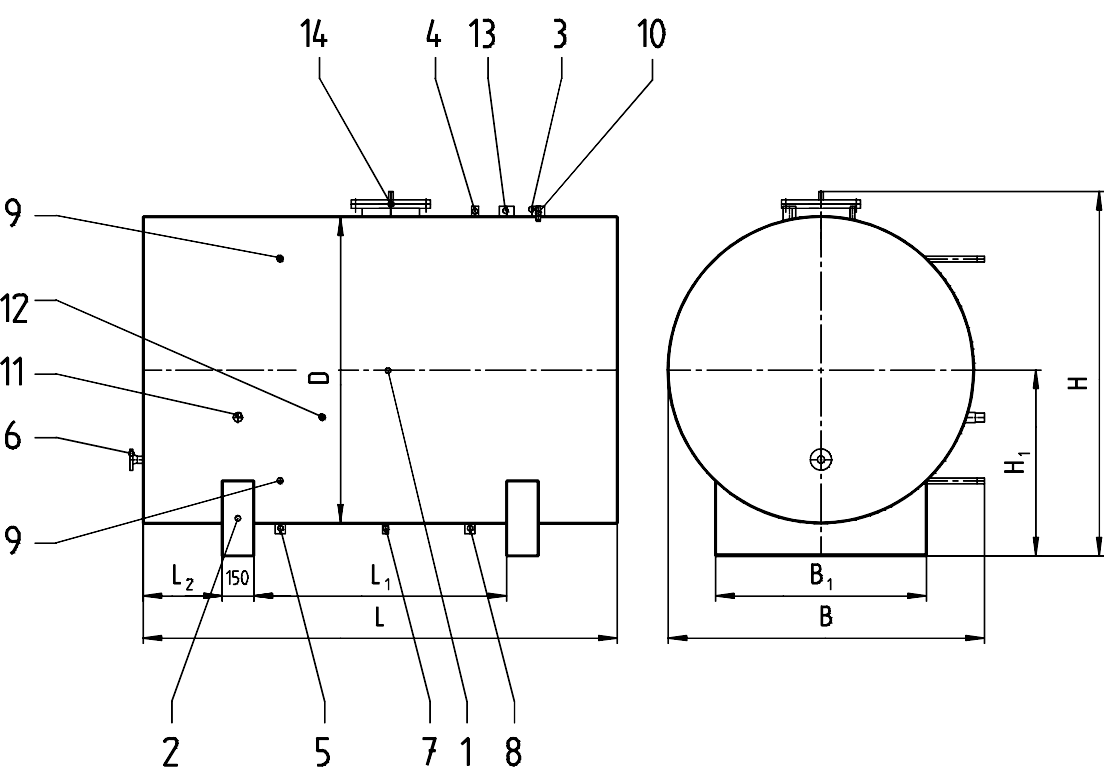
SPW-D 500 L - 1500 L, angular



| Content [litres] | Main dimensions | | | | Base frame | | |
|---------------------|-----------------|-----|------|----------------|----------------|----------------|----------------|
| | L | B | H | H ₁ | L ₁ | L ₂ | B ₁ |
| (500) | 1280 | 600 | 1340 | 1000 | 695 | 195 | 500 |
| (1000) | 1830 | 800 | 1340 | 1000 | 945 | 345 | 700 |
| (1500) | 2280 | 800 | 1340 | 1000 | 1195 | 445 | 700 |

Dimensions incl. 50 mm insulation.

SPW-D 2000 L - 3000 L, round



- 1 Feed water tank

2 Tank base frame

3 Condensate inlet

4 Regenerated water inlet
(not if float valve)

5 Boiler feed water connection
- 6 Steam injection (direct)
(optional) indirect heat up

7 Drain

8 Over flow outlet

9 Water level indicator

10 Dosing connection
- 11 Thermostat

12 Thermometer

13 Vent

14 Inspection opening with
level control by electrode (optional)
level control by float valve

| Content [litres] | Main dimensions | | | | | Base frame | | |
|---------------------|-----------------|------|------|----------------|------|----------------|----------------|----------------|
| | L | B | H | H ₁ | D | L ₁ | L ₂ | B ₁ |
| (2000) | 2650 | 1150 | 1400 | 750 | 1100 | 1200 | 500 | 700 |
| (3000) | 2980 | 1450 | 1725 | 870 | 1350 | 1750 | 400 | 900 |

Dimensions incl. 50 mm insulation.

SPW-E**Feed water tank SPW-E**

The Hoval feed water tank type SPW-E is made of steel St 37.2. The tank is completely electrically welded and provided with all necessary links. The tank must be positioned approx. 2-4 meters above boiler level (sub-construction to be made on site). Installed in the tank is a bottom heating equipment consisting of a special heating tube for a direct steam heat up of the tank. The trickle plate deaerator is made of special Inox high quality steel 1.4301. It consists of all the required fixtures, as well as the linking fittings with attachment flange.

Admissible operating pressure/temperature

Max. operating temperature: 110 °C

Max. operating pressure: 0.5 bar

Thermal insulation

The tank is completely insulated with mineral wool. The casing is made of structured aluminium plate. Fittings and out-cuts are properly rimmed.

Armatures

The feed water tank will be supplied with the following armatures:

- 1 magnetic level indicator
- 1 drainage ball valve
- 1 boiler feed water valve
- 1 safety valve
- 1 thermometer diameter 100 mm
- 1 pressure gauge set
- 1 overflow with condensate discharger
- 1 vapour valve made of quality steel

Delivery

The feed water tank is provided with a primer. The accessories are supplied loosely in a separate box.

Level regulation

- 2 magnetic switches for magnetic valve on/off
- 1 electronic control panel for wall mounting

**Additional water group**

- 1 magnetic valve
- 1 shut-off/surrounding set (ball valves)

Condensate group

- 1 condensate shut-off valve
- 1 condensate non-return valve

Heating steam group

- 1 medium control mechanical pressure regulator
- 1 strainer heat steam
- 1 shut-off valve heat steam
- 1 manual shut-off valve - bottom heat up
- 1 non-return valve - bottom heat up

SPW-E

Feed water tank 0.5 bar

| Type | | (3000) | (4000) | (5000) | (6000) | (8000) | (10000) | (12000) |
|---|----|---------|---------|---------|---------|---------|---------|---------|
| • Water content | l | 3000 | 4000 | 5000 | 6000 | 8000 | 10000 | 12000 |
| • Construction | | round | round | round | round | round | round | round |
| • Material | | St 37.2 | St 37.2 | St 37.2 | St 37.2 | St 37.2 | St 37.2 | St 37.2 |
| • Wall thickness | mm | 4 | 4 | 5 | 5 | 5 | 6 | 6 |
| • Weight | kg | 510 | 560 | 800 | 1020 | 1330 | 1600 | 1660 |
| • Length without insulation | mm | 2875 | 3275 | 3700 | 4400 | 5000 | 5200 | 5400 |
| • Diameter without insulation | mm | 1250 | 1250 | 1400 | 1400 | 1600 | 1600 | 1600 |
| • Length with insulation, without armatures | mm | 2925 | 3325 | 3750 | 4450 | 5050 | 5250 | 5450 |
| • Height with insulation, without armatures | mm | 1725 | 1725 | 1870 | 1870 | 2100 | 2100 | 2100 |
| • Width with insulation, without armatures | mm | 1450 | 1450 | 1600 | 1600 | 1800 | 1800 | 1800 |

Fine armatures tank

| Type | | (3000) | (4000) | (5000) | (6000) | (8000) | (10000) | (12000) |
|---|--|--------|--------|--------|--------|--------|---------|---------|
| • 1 fluid level indicator | | R ½" | R ½" | R ½" | R ½" | R ½" | R ½" | R ½" |
| • 1 anti vacuum valve | | DN 15 | DN 15 | DN 15 | DN 15 | DN 15 | DN 15 | DN 15 |
| • 1 dosing ball valve | | R ½" | R ½" | R ½" | R ½" | R ½" | R ½" | R ½" |
| • 1 draining | | R 2" | R 2" | R 2" | R 2" | R 2" | R 2" | R 2" |
| • 1 thermometer | | R ½" | R ½" | R ½" | R ½" | R ½" | R ½" | R ½" |
| • 1 pressure gauge with three-way valve | | R ½" | R ½" | R ½" | R ½" | R ½" | R ½" | R ½" |
| • 1 boiler feed water ball valve | | R 2" | R 2" | R 2 ½" | R 2 ½" | R 3" | R 3" | R 3" |
| • 1 condensate trap | | R 2" | R 2" | R 2" | R 2" | R 2" | R 2" | R 2" |
| • 1 condensate trap ball valve | | R 2" | R 2" | R 2" | R 2" | R 2" | R 2" | R 2" |
| • 1 magnetic level gauge | | yes | yes | yes | yes | yes | yes | yes |

SPW-E

Feed water tank 0.5 bar

| Type | | (14000) | (16000) | (20000) | (25000) | (30000) |
|---|----|---------|---------|---------|---------|---------|
| • Water content | l | 14000 | 16000 | 20000 | 25000 | 30000 |
| • Construction | | round | round | round | round | round |
| • Material | | St 37.2 | St 37.2 | St 37.2 | St 37.2 | St 37.2 |
| • Wall thickness | mm | 6 | 6 | 8 | 10 | 10 |
| • Weight | kg | 1710 | 2300 | 3500 | 4700 | 5000 |
| • Length without insulation | mm | 5430 | 5650 | 6100 | 5520 | 6200 |
| • Diameter without insulation | mm | 1600 | 2000 | 2200 | 2500 | 2500 |
| • Length with insulation, without armatures | mm | 5700 | 5700 | 6150 | 5570 | 6250 |
| • Height with insulation, without armatures | mm | 2100 | 2470 | 2470 | 2870 | 2870 |
| • Width with insulation, without armatures | mm | 1800 | 2200 | 2200 | 2650 | 2650 |

Fine armatures tank

| Type | (14000) | (16000) | (20000) | (25000) | (30000) |
|---|---------|---------|---------|---------|---------|
| • 1 fluid level indicator | R ½" | R ½" | R ½" | R ½" | R ½" |
| • 1 anti vacuum valve | DN 15 | DN 15 | DN 15 | DN 15 | DN 15 |
| • 1 dosing ball valve | R ½" | R ½" | R ½" | R ½" | R ½" |
| • 1 draining | R 2" | R 2" | R 2" | R 2" | R 2" |
| • 1 thermometer | R ½" | R ½" | R ½" | R ½" | R ½" |
| • 1 pressure gauge with three-way valve | R ½" | R ½" | R ½" | R ½" | R ½" |
| • 1 boiler feed water ball valve | DN 100 | DN 100 | DN 125 | DN 150 | DN 150 |
| • 1 condensate trap | R 2" | R 2" | R 2" | R 2" | R 2" |
| • 1 condensate trap ball valve | R 2" | R 2" | R 2" | R 2" | R 2" |
| • 1 magnetic level gauge | yes | yes | yes | yes | yes |

SPW-E (3000-12000)

Deaerator 0.5 bar - condensate 50 %

| Type | | (3000) | (4000) | (6000) | (8000) | (10000) | (12000) |
|---|------|--------|--------|--------|--------|---------|---------|
| • Deaerator output | kg/h | 3000 | 4000 | 6000 | 8000 | 10000 | 12000 |
| • Construction | | round | round | round | round | round | round |
| • Material | | 1.4301 | 1.4301 | 1.4301 | 1.4301 | 1.4301 | 1.4301 |
| • Wall thickness | mm | 3 | 3 | 3 | 3 | 3 | 3 |
| • Weight | kg | 165 | 186 | 186 | 258 | 264 | 276 |
| • Cylindric height | mm | 1350 | 1430 | 1490 | 1600 | 1600 | 1650 |
| • Diameter | mm | 700 | 700 | 700 | 900 | 900 | 900 |
| • Width without armatures | mm | 1020 | 1020 | 1020 | 1220 | 1220 | 1220 |
| • Length without armatures | mm | 1020 | 1020 | 1020 | 1250 | 1250 | 1250 |
| • Height without armatures of flange | mm | 1490 | 1570 | 1630 | 1740 | 1740 | 1790 |

Fine armatures exhaust vapour

| | | | | | | |
|--------------------------|-------|-------|-------|-------|-------|-------|
| • 1 exhaust vapour valve | DN 15 | DN 25 | DN 25 | DN 25 | DN 25 | DN 32 |
|--------------------------|-------|-------|-------|-------|-------|-------|

Additional water group

| Type | | (3000) | (4000) | (6000) | (8000) | (10000) | (12000) |
|---------------------------------------|-------------------|--------|--------|--------|--------|---------|---------|
| • Regenerated water amount | m ³ /h | 1 | 2 | 3 | 4 | 5 | 6 |
| • Heating up output from 10 to 107 °C | kW | 113 | 226 | 338 | 451 | 564 | 677 |
| • Heating steam output | kg/h | 204 | 407 | 611 | 815 | 1019 | 1222 |
| Fine armatures | | | | | | | |
| • 1 magnetic valve | | R 1" | R 1" | R 1" | R 5/4" | R 5/4" | R 6/4" |
| • 3 bypass ball valve | | R 1" | R 1" | R 1" | R 5/4" | R 5/4" | R 6/4" |
| • 1 non-return valve | | R 1" | R 1" | R 1" | R 5/4" | R 5/4" | R 6/4" |

Condensate group

| Type | | (3000) | (4000) | (6000) | (8000) | (10000) | (12000) |
|---------------------------------------|-------------------|--------|--------|--------|--------|---------|---------|
| • Condensate water amount | m ³ /h | 1 | 2 | 3 | 4 | 5 | 6 |
| • Heating up output from 80 to 107 °C | kW | 31 | 63 | 94 | 126 | 157 | 188 |
| • Heating steam output | kg/h | 57 | 113 | 170 | 227 | 284 | 340 |
| Fine armatures | | | | | | | |
| • 1 condensate shut-off valve | | DN 25 | DN 25 | DN 25 | DN 32 | DN 32 | DN 40 |
| • 1 condensate non-return valve | | DN 25 | DN 25 | DN 25 | DN 32 | DN 32 | DN 40 |

SPW-E (3000-12000)

Deaerator 0.5 bar - condensate 50 %

| Type | | (16000) | (20000) | (25000) | (30000) |
|--|------|---------|---------|---------|---------|
| • Deaerator output | kg/h | 16000 | 20000 | 25000 | 30000 |
| • Construction | | round | round | round | round |
| • Material | | 1.4301 | 1.4301 | 1.4301 | 1.4301 |
| • Wall thickness | mm | 3 | 3 | 3 | 3 |
| • Weight | kg | 300 | 321 | 400 | 420 |
| • Cylindric height | mm | 1650 | 1650 | 2000 | 1890 |
| • Diameter | mm | 900 | 1100 | 1250 | 1250 |
| • Width complete without armatures | mm | 1220 | 1420 | 1570 | 1570 |
| • Length complete without armatures | mm | 1250 | 1500 | 1650 | 1650 |
| • Height complete without armatures of flange | mm | 1790 | 1790 | 2030 | 2030 |

Fine armatures exhaust vapour

| | | | | |
|--------------------------|-------|-------|-------|-------|
| • 1 exhaust vapour valve | DN 32 | DN 40 | DN 40 | DN 40 |
|--------------------------|-------|-------|-------|-------|

Additional water group

| Type | | (16000) | (20000) | (25000) | (30000) |
|---------------------------------------|-------------------|---------|---------|---------|---------|
| • Regenerated water amount | m ³ /h | 8 | 10 | 12.5 | 15 |
| • Heating up output from 10 to 107 °C | kW | 902 | 1128 | 1410 | 1692 |
| • Heating steam output | kg/h | 1630 | 2037 | 2546 | 3056 |
| Fine armatures | | | | | |
| • 1 magnetic valve | | R 6/4" | R 2" | R 2" | R 2" |
| • 3 bypass ball valve | | R 6/4" | R 2" | R 2" | R 2" |
| • 1 non-return valve | | R 6/4" | R 2" | R 2" | R 2" |

Condensate group

| Type | | (16000) | (20000) | (25000) | (30000) |
|---------------------------------------|-------------------|---------|---------|---------|---------|
| • Condensate water amount | m ³ /h | 8 | 10 | 12.5 | 15 |
| • Heating up output from 80 to 107 °C | kW | 251 | 314 | 393 | 471 |
| • Heating steam output | kg/h | 454 | 567 | 708 | 851 |
| Fine armatures | | | | | |
| • 1 condensate shut-off valve | | DN 40 | DN 50 | DN 50 | DN 50 |
| • 1 condensate non-return valve | | DN 40 | DN 50 | DN 50 | DN 50 |

SPW-E (3000-12000)

Deaerator 0.5 bar - condensate 50 %

Heating steam group

| Type | | | (3000) | (4000) | (6000) | (8000) | (10000) | (12000) |
|--|-----------|------|-----------|-----------|-----------|-----------|-----------|------------|
| • Heating steam amount | | | | | | | | |
| | at 10 bar | kg/h | 260 | 521 | 781 | 1042 | 1302 | 1562 |
| | at 13 bar | kg/h | 260 | 521 | 781 | 1042 | 1302 | 1562 |
| | at 16 bar | kg/h | 260 | 521 | 781 | 1042 | 1302 | 1562 |
| • 1 steam pressure reducing valve (partially with range limiter) | | | | | | | | |
| | at 10 bar | | DN 25 | DN 32 | DN 32 | DN 40 | DN 50 | DN 50 |
| | at 13 bar | | DN 25 | DN 25 | DN 32 | DN 32 | DN 40 | DN 50 |
| | at 16 bar | | DN 25 | DN 25 | DN 25 | DN 32 | DN 32 | DN 40 |
| • Q_{adjusted} | | | | | | | | |
| | at 10 bar | kg/h | 350 | 700 | 900 | 1200 | 1400 | 1800 |
| | at 13 bar | kg/h | 350 | 700 | 900 | 1200 | 1400 | 1800 |
| | at 16 bar | kg/h | 350 | 700 | 900 | 1200 | 1400 | 1800 |
| • 2 shut-off valves | | | | | | | | |
| | at 10 bar | | DN 25 | DN 32 | DN 32 | DN 40 | DN 50 | DN 50 |
| | at 13 bar | | DN 25 | DN 25 | DN 32 | DN 32 | DN 40 | DN 50 |
| | at 16 bar | | DN 25 | DN 25 | DN 32 | DN 32 | DN 40 | DN 50 |
| • 1 strainer | | | | | | | | |
| | at 10 bar | | DN 25 | DN 32 | DN 32 | DN 40 | DN 50 | DN 50 |
| | at 13 bar | | DN 25 | DN 25 | DN 32 | DN 32 | DN 40 | DN 50 |
| | at 16 bar | | DN 25 | DN 25 | DN 32 | DN 32 | DN 40 | DN 50 |
| • 1 valve - floor heat-up | | | | | | | | |
| | at 10 bar | | DN 15 | DN 15 | DN 15 | DN 25 | DN 25 | DN 25 |
| | at 13 bar | | DN 15 | DN 15 | DN 15 | DN 15 | DN 25 | DN 25 |
| | at 16 bar | | DN 15 | DN 15 | DN 15 | DN 15 | DN 15 | DN 25 |
| • Q_{max} | | | | | | | | |
| | at 10 bar | kg/h | 403 | 403 | 403 | 857 | 857 | 857 |
| | at 13 bar | kg/h | 538 | 538 | 538 | 538 | 1142 | 1142 |
| | at 16 bar | kg/h | 672 | 672 | 672 | 672 | 672 | 1428 |
| • 1 non-return valve | | | | | | | | |
| | at 10 bar | | DN 15 | DN 15 | DN 15 | DN 25 | DN 25 | DN 25 |
| | at 13 bar | | DN 15 | DN 15 | DN 15 | DN 15 | DN 25 | DN 25 |
| | at 16 bar | | DN 15 | DN 15 | DN 15 | DN 15 | DN 15 | DN 25 |
| • 1 safety valve 0.5 bar | | | | | | | | |
| | at 10 bar | | DN 50/80 | DN 65/100 | DN 65/100 | DN 80/125 | DN 80/125 | DN 100/150 |
| | at 13 bar | | DN 50/80 | DN 65/100 | DN 65/100 | DN 80/125 | DN 80/125 | DN 100/150 |
| | at 16 bar | | DN 80/125 | DN 80/125 | DN 80/125 | DN 80/125 | DN 80/125 | DN 100/150 |
| • Output necessary | | | | | | | | |
| | at 10 bar | kg/h | 753 | 1103 | 1303 | 2057 | 2257 | 2657 |
| | at 13 bar | kg/h | 888 | 1238 | 1438 | 1738 | 2542 | 2942 |
| | at 16 bar | kg/h | 1730 | 1730 | 1730 | 2352 | 2352 | 3228 |

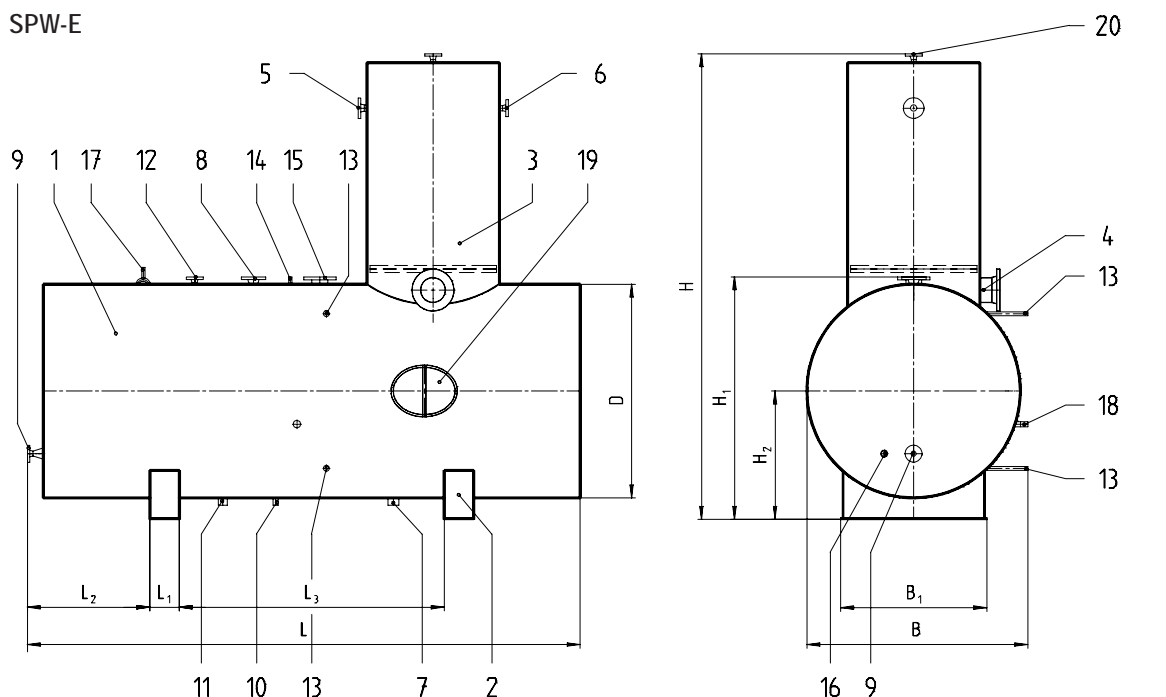
SPW-E (16000-30000)

Deaerator 0.5 bar - condensate 50 %

Heating steam group

| Type | | | (16000) | (20000) | (25000) | (30000) |
|--|-----------|------|------------|--------------|--------------|--------------|
| • Heating steam amount | | | | | | |
| | at 10 bar | kg/h | 2038 | 2604 | 3255 | 3906 |
| | at 13 bar | kg/h | 2038 | 2604 | 3255 | 3906 |
| | at 16 bar | kg/h | 2038 | 2604 | 3255 | 3906 |
| • 1 steam pressure reducing valve (partially with range limiter) | | | | | | |
| | at 10 bar | | DN 65 | DN 65 | DN 80 | DN 80 |
| | at 13 bar | | DN 50 | DN 65 | DN 65 | DN 65 |
| | at 16 bar | | DN 50 | DN 50 | DN 65 | DN 65 |
| • Q_{adjusted} | | | | | | |
| | at 10 bar | kg/h | 2200 | 2800 | 3500 | 4100 |
| | at 13 bar | kg/h | 2200 | 2800 | 3500 | 4100 |
| | at 16 bar | kg/h | 2200 | 2800 | 3500 | 4100 |
| • 2 shut-off valves | | | | | | |
| | at 10 bar | | DN 65 | DN 65 | DN 80 | DN 80 |
| | at 13 bar | | DN 50 | DN 65 | DN 65 | DN 65 |
| | at 16 bar | | DN 50 | DN 65 | DN 65 | DN 65 |
| • 1 strainer | | | | | | |
| | at 10 bar | | DN 65 | DN 65 | DN 80 | DN 80 |
| | at 13 bar | | DN 50 | DN 65 | DN 65 | DN 65 |
| | at 16 bar | | DN 50 | DN 65 | DN 65 | DN 65 |
| • 1 valve - floor heat-up | | | | | | |
| | at 10 bar | | DN 32 | DN 32 | DN 32 | DN 32 |
| | at 13 bar | | DN 25 | DN 32 | DN 32 | DN 32 |
| | at 16 bar | | DN 25 | DN 25 | DN 32 | DN 32 |
| • Q_{max} | | | | | | |
| | at 10 bar | kg/h | 1613 | 1613 | 1613 | 1613 |
| | at 13 bar | kg/h | 1142 | 2150 | 2150 | 2150 |
| | at 16 bar | kg/h | 1428 | 1428 | 2688 | 2688 |
| • 1 non-return valve | | | | | | |
| | at 10 bar | | DN 32 | DN 32 | DN 32 | DN 32 |
| | at 13 bar | | DN 25 | DN 32 | DN 32 | DN 32 |
| | at 16 bar | | DN 25 | DN 25 | DN 32 | DN 32 |
| • 1 safety valve 0.5 bar | | | | | | |
| | at 10 bar | | DN 100/150 | 2xDN 100/150 | 2xDN 100/150 | 2xDN 100/150 |
| | at 13 bar | | DN 100/150 | 2xDN 100/150 | 2xDN 100/150 | 2xDN 100/150 |
| | at 16 bar | | DN 100/150 | 2xDN 100/150 | 2xDN 100/150 | 2xDN 100/150 |
| • Output necessary | | | | | | |
| | at 10 bar | kg/h | 3813 | 4413 | 5113 | 5713 |
| | at 13 bar | kg/h | 3342 | 4950 | 5600 | 6250 |
| | at 16 bar | kg/h | 3628 | 4228 | 6188 | 6788 |

SPW-E



- | | | |
|----------------------------------|---------------------------------------|-------------------------------|
| 1 Feed water tank | 8 Safety valve socket | 15 Level control socket |
| 2 Tank base frame | 9 Steam floor heat up/Steam injection | 16 Thermostat |
| 3 Deaerator | 10 Drain | 17 Pressure gauge |
| 4 Deaerator heat up steam socket | 11 Over flow outlet | 18 Thermometer |
| 5 Condensate inlet | 12 Anti vacuum valve socket | 19 Inspection opening |
| 6 Regenerated water inlet | 13 Water level indicator | 20 Exhaust steam valve socket |
| 7 Boiler feed water connection | 14 Dosing connection | |

| Tank content [litres] | Deaerator output [m³/h] | Main dimensions | | | | | | Base frame | | | |
|--------------------------|----------------------------|-----------------|------|------|----------------|----------------|------|----------------|----------------|----------------|----------------|
| | | L | B | H | H ₁ | H ₂ | D | L ₁ | L ₂ | L ₃ | B ₁ |
| (3000) | 3 | 2925 | 1450 | 3225 | 1725 | 870 | 1350 | 150 | 735 | 1800 | 900 |
| (4000) | 4 | 3325 | 1450 | 3225 | 1725 | 870 | 1350 | 150 | 735 | 2200 | 900 |
| (5000) | 5 | 3750 | 1600 | 3450 | 1870 | 870 | 1500 | 200 | 735 | 2600 | 1000 |
| (6000) | 6 | 4450 | 1600 | 3500 | 1870 | 870 | 1500 | 200 | 735 | 3000 | 1000 |
| (8000) | 8 | 5050 | 1800 | 3850 | 2100 | 1050 | 1700 | 200 | 1050 | 2450 | 1200 |
| (10000) | 10 | 5250 | 1800 | 3850 | 2100 | 1050 | 1700 | 200 | 1050 | 2650 | 1200 |
| (12000) | 12 | 5450 | 1800 | 3900 | 2100 | 1050 | 1700 | 300 | 1050 | 2850 | 1200 |
| (16000) | 16 | 5700 | 2200 | 4275 | 2470 | 1200 | 2100 | 300 | 735 | 3200 | 1400 |
| (20000) | 20 | 6150 | 2200 | 4275 | 2470 | 1200 | 2300 | 300 | 735 | 3750 | 1600 |
| (25000) | 25 | 5570 | 2650 | 4900 | 2870 | 1450 | 2600 | 500 | 735 | 3300 | 1900 |
| (30000) | 30 | 6250 | 2650 | 4900 | 2870 | 1450 | 2600 | 500 | 735 | 3980 | 1900 |

The total height in this data sheet refer to 50% condensate and 50 % fresh water.
For other deaerator outputs (relation condensate/fresh water) please see deaerator data sheet!

Operating pressure max. 0.5 bar (overpressure)

Dimensions incl. 50 mm insulation.

KDS

Condensate station KDS

The Hoval condensate station type KDS is made of stainless steel 1.4301. The pressureless tank with ventilation into the atmosphere is completely electrically welded and provided with all necessary sockets and tank supports.

Thermal insulation

The tank is completely insulated with mineral wool. The casing is made of structured aluminium plate. Fittings and out-cuts are properly rimmed.

Control panel

The control panel for the condensate station is equipped with all required control units and indicators for the control and supervision of the tank.

Armatures

The condensate station will be supplied with the following armatures:

- 1 water level indicator
- 1 thermometer
- 1 drainage valve

Regulation:

- 1 level electrode with switch amplifier or magnetic level indicator for condensate pump on/off
- 1 contact with low water cut-off
- 1 contact for over flow alarm



Delivery

The tank is completely insulated. Armatures and pumps are mounted up to a content of 3000 litres. Above 3000 litres the tank is insulated. Armatures and pumps are packed loosely in a separate box.

Condensate pump station:

- 2 condensate pumps
- 2 ball valve pumps (suction side)
- 2 strainers
- 2 ball valve pumps (pressure side)
- 2 non-return valves
- 1 pressure gauge set

KDS (500-3000)

Condensate tank

| Type | | (500) | (1000) | (1500) | (2000) | (2500) | (3000) |
|---|----|---------|---------|---------|--------|--------|--------|
| • Content | l | 500 | 1000 | 1500 | 2000 | 2500 | 3000 |
| • Construction | | angular | angular | angular | round | round | round |
| • Material | | 1.4301 | 1.4301 | 1.4301 | 1.4301 | 1.4301 | 1.4301 |
| • Wall thickness | mm | 3 | 3 | 3 | 3 | 3 | 3 |
| • Weight | kg | 120 | 200 | 270 | 300 | 320 | 380 |
| • Length without insulation without pump set | mm | 920 | 1570 | 2020 | 1950 | 2350 | 2750 |
| • Height without insulation | mm | 1200 | 1200 | 1200 | - | - | - |
| • Width without insulation | mm | 500 | 700 | 700 | - | - | - |
| • Diameter without insulation | mm | - | - | - | 1250 | 1250 | 1250 |
| • Length with insulation, without armat., with pump approx. | mm | 1920 | 2520 | 2970 | 2750 | 3150 | 3650 |
| • Length with insulation, without armat., without pump approx. | mm | - | - | - | - | - | - |
| • Height with insulation, without armatures | mm | 1300 | 1300 | 1300 | 1725 | 1725 | 1725 |
| • Width with insulation, without armatures | mm | 600 | 800 | 800 | 1450 | 1450 | 1450 |

Fine armatures

| Type | | (500) | (1000) | (1500) | (2000) | (2500) | (3000) |
|---------------------------|--|-------|--------|--------|--------|--------|--------|
| • 1 fluid level indicator | | R ½" | R ½" | R ½" | R ½" | R ½" | DN 20 |
| • 1 thermometer | | R ½" | R ½" | R ½" | R ½" | R ½" | R ½" |
| • 1 draining | | R 1" | R 1" | R 1" | R 1" | R 1" | R 1" |
| • 1 two-step control | | yes | yes | yes | yes | yes | yes |
| • 1 magnet cap indicator | | | | | | | yes |

Condensate group

| Type | | (500) | (1000) | (1500) | (2000) | (2500) | (3000) |
|---------------------------------------|------|-------|--------|--------|--------|--------|--------|
| • Condensate pump output | m³/h | 1 | 2 | 3 | 4 | 5 | 6 |
| • 2 condensate pumps | | | | | | | |
| Grundfos 2 bar | | CR | CR | CR | CR | CR | CR |
| Motor rating 2 bar | | 0.37 | 0.37 | 0.55 | 0.55 | 0.55 | 0.75 |
| • 2 pump valves (pressure side) | | DN 15 | DN 20 | DN 25 | DN 25 | DN 32 | DN 32 |
| • 2 non-return valves (pressure side) | | DN 15 | DN 20 | DN 25 | DN 25 | DN 32 | DN 32 |
| • Pressure gauge with shut off valve | | R ¼" | R ¼" | R ¼" | R ¼" | R ¼" | R ¼" |
| • 2 ball valves (suction side) | | R 1" | R 6/4" | R 2" | R 2" | R 2 ½" | R 3" |
| • 2 strainers (suction side) | | R 1" | R 6/4" | R 2" | R 2" | R 2 ½" | R 3" |

KDS (4000-10000)

Condensate tank

| Type | | (4000) | (5000) | (6000) | (8000) | (10000) |
|---|----|--------|--------|--------|--------|---------|
| • Content | l | 4000 | 5000 | 6000 | 8000 | 10000 |
| • Construction | | round | round | round | round | round |
| • Material | | 1.4301 | 1.4301 | 1.4301 | 1.4301 | 1.4301 |
| • Wall thickness | mm | 4 | 4 | 4 | 4 | 4 |
| • Weight | kg | 430 | 500 | 540 | 900 | 1000 |
| • Length without insulation without pump set | mm | 3150 | 3550 | 4250 | 4850 | 5050 |
| • Height without insulation | mm | - | - | - | - | - |
| • Width without insulation | mm | - | - | - | - | - |
| • Diameter without insulation | mm | 1250 | 1400 | 1400 | 1600 | 1600 |
| • Length with insulation, without armat., with pump approx. | mm | - | - | - | - | - |
| • Length with insulation, without armat., without pump approx. | mm | 3550 | 3650 | 4350 | 4950 | 5150 |
| • Height with insulation, without armatures | mm | 1725 | 1870 | 1870 | 2100 | 2100 |
| • Width with insulation, without armatures | mm | 1450 | 1600 | 1600 | 1800 | 1800 |

Fine armatures

| Type | | (4000) | (5000) | (6000) | (8000) | (10000) |
|---------------------------|--|--------|--------|--------|--------|---------|
| • 1 fluid level indicator | | DN 20 | DN 20 | DN 20 | DN 20 | DN 20 |
| • 1 thermometer | | R ½" | R ½" | R ½" | R ½" | R ½" |
| • 1 draining | | R 2" | R 2" | R 2" | R 2" | R 2" |
| • 1 two-step control | | yes | yes | yes | yes | yes |
| • 1 magnet cap indicator | | yes | yes | yes | yes | yes |

Condensate group

| Type | | (4000) | (5000) | (6000) | (8000) | (10000) |
|---------------------------------------|------|--------|--------|--------|--------|---------|
| • Condensate pump output | m³/h | 8 | 10 | 12 | 16 | 20 |
| • 2 condensate pumps | | | | | | |
| Grundfos 2 bar | | CR | CR | CR | CR | CR |
| Motor rating 2 bar | | 1.10 | 1.10 | 2.20 | 2.20 | 3.00 |
| • 2 pump valves (pressure side) | | DN 40 | DN 40 | DN 50 | DN 50 | DN 65 |
| • 2 non-return valves (pressure side) | | DN 40 | DN 40 | DN 50 | DN 50 | DN 65 |
| • Pressure gauge with shut off valve | | R ¼" | R ¼" | R ¼" | R ¼" | R ¼" |
| • 2 ball valves (suction side) | | R 3" | R 3" | R 3" | DN 100 | DN 125 |
| • 2 strainers (suction side) | | R 3" | R 3" | R 3" | DN 100 | DN 125 |

KDS (12000-30000)

Condensate tank

| Type | | (12000) | (16000) | (20000) | (25000) | (30000) |
|---|----|---------|---------|---------|---------|---------|
| • Content | l | 12000 | 16000 | 20000 | 25000 | 30000 |
| • Construction | | round | round | round | round | round |
| • Material | | 1.4301 | 1.4301 | 1.4301 | 1.4301 | 1.4301 |
| • Wall thickness | mm | 4 | 5 | 5 | 5 | 5 |
| • Weight | kg | 1100 | 2000 | 2500 | 3000 | 3500 |
| • Length without insulation without pump set | mm | 5250 | 5500 | 5950 | 5400 | 6050 |
| • Height without insulation | mm | - | - | - | - | - |
| • Width without insulation | mm | - | - | - | - | - |
| • Diameter without insulation | mm | 1600 | 2000 | 2200 | 2500 | 2500 |
| • Length with insulation, without armat., with pump approx. | mm | - | - | - | - | - |
| • Length with insulation, without armat., without pump approx. | mm | 5350 | 5600 | 6050 | 5500 | 6150 |
| • Height with insulation, without armatures | mm | 2100 | 2470 | 2470 | 2870 | 2870 |
| • Width with insulation, without armatures | mm | 1800 | 2200 | 2200 | 2650 | 2650 |

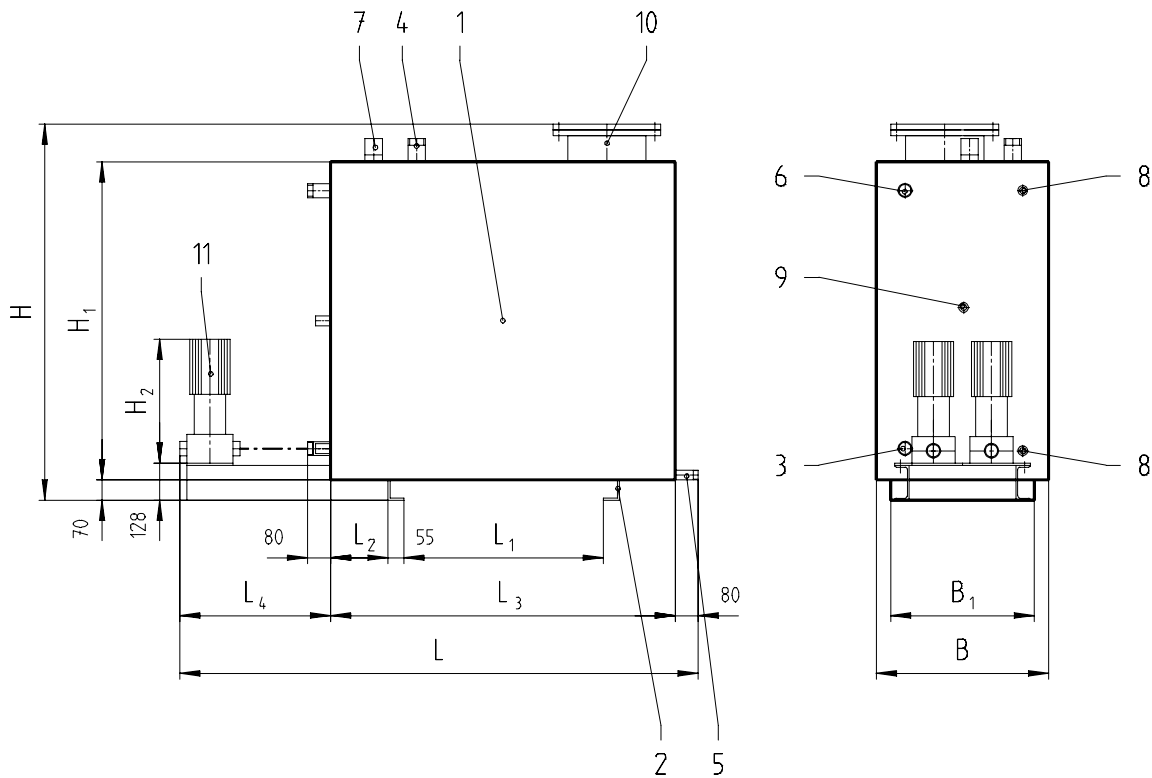
Fine armatures

| Type | | (12000) | (16000) | (20000) | (25000) | (30000) |
|---------------------------|--|---------|---------|---------|---------|---------|
| • 1 fluid level indicator | | DN 20 | DN 20 | DN 20 | DN 20 | DN 20 |
| • 1 thermometer | | R ½" | R ½" | R ½" | R ½" | R ½" |
| • 1 draining | | R 2" | R 2" | R 2" | R 2" | R 2" |
| • 1 two-step control | | yes | yes | yes | yes | yes |
| • 1 magnet cap indicator | | yes | yes | yes | yes | yes |

Condensate group

| Type | | (12000) | (16000) | (20000) | (25000) | (30000) |
|---------------------------------------|------|---------|---------|---------|---------|---------|
| • Condensate pump output | m³/h | 24 | 32 | 40 | 40 | 40 |
| • 2 condensate pumps | | | | | | |
| Grundfos 2 bar | | CR | CR | CR | CR | CR |
| Motor rating 2 bar | | 3.00 | 5.50 | 5.50 | 5.50 | 5.50 |
| • 2 pump valves (pressure side) | | DN 65 | DN 80 | DN 100 | DN 100 | DN 100 |
| • 2 non-return valves (pressure side) | | DN 65 | DN 80 | DN 100 | DN 100 | DN 100 |
| • Pressure gauge with shut off valve | | R ¼" | R ¼" | R ¼" | R ¼" | R ¼" |
| • 2 ball valves (suction side) | | DN 125 | DN 150 | DN 150 | DN 150 | DN 150 |
| • 2 strainers (suction side) | | DN 125 | DN 150 | DN 150 | DN 150 | DN 150 |

KDS 500 L - 1500 L, angular

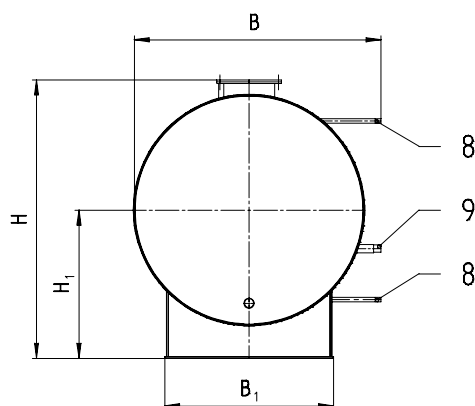
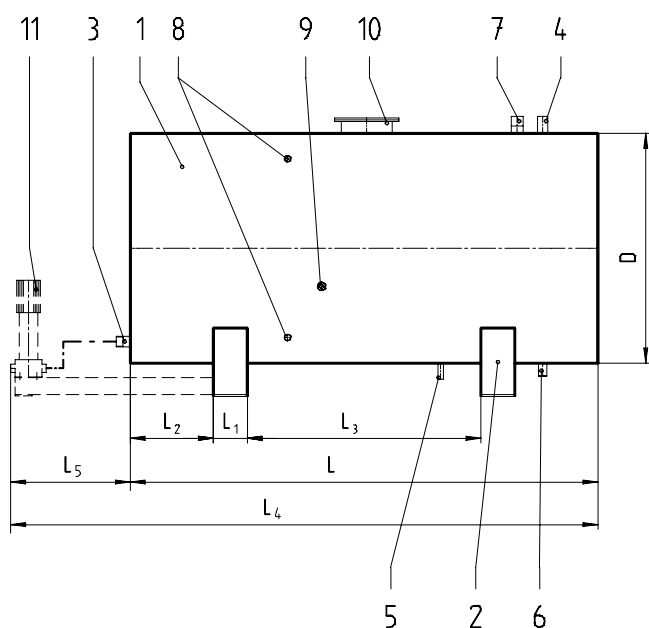


- | | |
|-----------------------------|--|
| 1 Condensate tank | 7 Vent |
| 2 Tank base frame | 8 Water level indicator |
| 3 Outlet to condensate pump | 9 Thermometer |
| 4 Condensate inlet | 10 Inspection opening with level control |
| 5 Condensate drain outlet | 11 Condensate pump station |
| 6 Overflow outlet | |

Dimensions incl. 50 mm insulation

| Tank content [litres] | Main dimensions | | | | | | Base frame | | | |
|--------------------------|-----------------|-----|------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| | L | B | H | L ₃ | L ₄ | H ₁ | H ₂ | L ₁ | L ₂ | B ₁ |
| (500) | 1920 | 600 | 1300 | 1020 | 720 | 1100 | 427 | 700 | 195 | 500 |
| (1000) | 2520 | 800 | 1300 | 1670 | 770 | 1100 | 427 | 950 | 345 | 700 |
| (1500) | 2970 | 800 | 1300 | 2120 | 770 | 1100 | 427 | 1200 | 445 | 700 |

KDS 2000 L - 30000 L, round



- | | |
|-----------------------------|--|
| 1 Condensate tank | 7 Vent |
| 2 Tank base frame | 8 Water level indicator |
| 3 Outlet to condensate pump | 9 Thermometer |
| 4 Condensate inlet | 10 Inspection opening with level control |
| 5 Condensate drain outlet | 11 Condensate pump station |
| 6 Overflow outlet | |

Dimensions incl. 50 mm insulation

| Tank content [litres] | Main dimensions | | | | | | | Base frame | | | |
|--------------------------|-----------------|------|------|----------------|----------------|----------------|------|----------------|----------------|----------------|----------------|
| | L | B | H | L ₄ | L ₅ | H ₁ | D | L ₁ | L ₂ | L ₃ | B ₁ |
| (2000) | 2050 | 1450 | 1725 | 2750 | 700 | 870 | 1350 | 150 | 400 | 950 | 900 |
| (2500) | 2450 | 1450 | 1725 | 3150 | 700 | 870 | 1350 | 150 | 400 | 1350 | 900 |
| (3000) | 2850 | 1450 | 1725 | 3650 | 800 | 870 | 1350 | 150 | 400 | 1750 | 900 |
| (4000) | 3550 | 1450 | 1725 | - | - | 870 | 1350 | 200 | 475 | 2200 | 1000 |
| (5000) | 3650 | 1600 | 1870 | - | - | 870 | 1500 | 200 | 650 | 2600 | 1000 |
| (6000) | 4350 | 1600 | 1870 | - | - | 870 | 1500 | 200 | 650 | 3000 | 1000 |
| (8000) | 4950 | 1800 | 2100 | - | - | 1050 | 1700 | 200 | 950 | 2450 | 1200 |
| (10000) | 5150 | 1800 | 2100 | - | - | 1050 | 1700 | 200 | 950 | 2650 | 1200 |
| (12000) | 5350 | 1800 | 2100 | - | - | 1050 | 1700 | 300 | 950 | 2850 | 1200 |
| (16000) | 5600 | 2200 | 2470 | - | - | 1200 | 2100 | 300 | 650 | 3200 | 1400 |
| (20000) | 6050 | 2200 | 2470 | - | - | 1200 | 2300 | 300 | 650 | 3750 | 1600 |
| (25000) | 5500 | 2650 | 2870 | - | - | 1450 | 2600 | 500 | 650 | 3300 | 1900 |
| (30000) | 6150 | 2650 | 2870 | - | - | 1450 | 2600 | 500 | 650 | 3980 | 1900 |