ENTROPIE
INDUSTRIAL BOILERS

PRODUCTION OF INDUSTRIAL BOILERS

TT250 STEAM BOILER

www.entropie.de

Acceptance at the workshop:
according to the European Pressure Equipment Directive PED (2014/68/EU)

CE-Marking on the Pressure Vessel:
according to the European Pressure Equipment Directive PED (2014/68/EU)

Design code: EN 12953

Contents

OUR COMPANY

ENTROPIE® is a manufacturer of industrial boilers and boiler equipment. ENTROPIE's corporate headquarters is located in Munich, Germany.

The company's foundation is its experienced skilled specialists and full-cycle manufacturing complex. Production capacity — 1000 boilers per year.

The design of our industrial boilers is the optimal combination of strength, developed heat-exchange surfaces, low hydraulic and gas-dynamic resistance, and a large volume of heat-carrying medium, which has ensured a high level of reliability and efficiency in our products for over 25 years of operation.

The employees working at ENTROPIE®'s representative offices are always ready to give professional support to our partners.

Our experience enables us to find the optimal solution to complex technical problems that may arise when designing, installing, commissioning, and servicing the thermal power generation and distribution equipment.

OUR CAPABILITIES

ENTROPIE Manufacturing Complex

ENTROPIE's Manufacturing Complex is equipped with testing, metal-cutting and welding equipment made by the best global manufacturers. Critical operations are performed by robotic systems.

Accredited laboratory

The test laboratory is accredited according to applicable EU standards. Qualified personnel are equipped with state-of-the-art equipment for incoming material inspection, welds and hydraulic tests.

Quality control system

The automated quality and production control technology enables us to deliver industrial boilers with guaranteed operational parameters in a timely manner.

TÜVRheinland®
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Module D
Valid until:
3 years

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Purpose of TT250 boilers

Steam boilers of the TT250 series are two-pass gas-fired horizontal steel boilers equipped with a firebox for pressurized combustion of fuel. The general view of the boiler is given in Fig., the main parameters and technical characteristics of the boilers are given in the tables.

Boilers of the TT250 series are mass produced within a rated steam capacity range from 500 to 3000 kg/h with a design pressure of 8 and 12 bar, and are designed to produce saturated steam.

To increase their efficiency, TT250 steam gas-fired boilers may be equipped with an economizer.

Thanks to developed heat-exchange surfaces and unique design solutions, the boiler allows to achieve high energy efficiency, depending on load and operating conditions.

The preferred areas of application for TT250 steam boilers are industrial enterprises, which need saturated steam for engineering processes, manufacturing processes and heating.

Provided that the transportation, storage, installation and operation conditions are met, the warranty period is as follows:

- when operating on gas and diesel fuel — 36 months from the date of commissioning but no more than 42 months from the date of shipping from the manufacturer;
- when operating on heavy fuel (fuel oil, crude petroleum, etc.) — 12 months from the date of commissioning but no more than 18 months from the date of shipping from the manufacturer.

General view of TT250 boiler

Optimal choice for reliable operation:

- wide capacity range for any tasks. Steam capacity from 0.5 to 3 t/h;
- wide choice of possible configurations. In full and partial configuration, the boilers are equipped with an ENTROMATIC automated control system, EBC501.10 series, light version EBC503 (up to 5 t/h) or new version EBC701, as well as with all required sensors and safety devices that make the boiler operation reliable and accident-free;
- universal front door design. The unique design of the loop assemblies allows to chose the opening direction (left/right);
- fastening of the burner using the burner plate and extension flange. This solution means that burner devices from any manufacturer can be installed. The burner head length is no longer a problem;
- full opening of the front door together with the burner device. It is not necessary to remove the burner in order to carry out scheduled

maintenance and cleaning of heat-exchange surfaces. The front tube plate, the inner surface of the flue tube and the fire tubes are fully accessible for inspection and cleaning;
- symmetrical arrangement of fire tubes. This makes it possible to arrange inspection holes not only in the upper part of the boiler, but also in the lower part, which enables inspection and cleaning of the "dead" zone — the space under the flue tube;
- rigid base. The base structure is made from steel structural channels. The boiler does not require a special foundation to be designed and manufactured. The weight load from the boiler when filled with water is uniformly distributed over the bearing surface. The boiler does not require additional fastening to the embedded parts of the base when installed in stationary boiler houses;
- compatibility with any type of burner device. Correct operation with automatic multi-stage and modulating burners.

High efficiency with minimal operational costs:

- maximum operating efficiency among boilers of this class. High efficiency is achieved by the following means:
  1. Intensive convective heat transfer. Flue gas turbulators are installed in the second pass fire tubes. The turbulators are made of heat-resistant high-alloy steel and have a long service life.
  2. Intensive radiant heat exchange. The smooth-walled cylindrical flue tube is fully washed out with the heating medium. This allows the flame radiation to be absorbed to the maximum and the received heat to transfer to the heating medium.
  3. Maximum area of effective heat-exchange surfaces with moderate dimensions.
  4. High-quality heat insulation. Mineral mats with low heat-conduction coefficients are used for boiler heat insulation, which minimizes energy losses through boiler lagging.
- boiler unit. The complete delivery set includes the burner device, automatic module, electrical cabinets, all required sensors and safety devices, piping, and the pump module. This solution means the customer can purchase a turnkey boiler with no extra cost on piping and mounting, which is economically attractive and guarantees the correct selection of components.

Manufacturability and quality — in parts:

- high-quality sheet and rolled tubular products. Sheets and tubes made by leading Russian iron-and-steel works are used to manufacture the boilers. All materials undergo incoming inspection in order to check their physical properties and chemical composition for compliance with the specified steel grades selected based on the strength analysis results for each boiler size;
- multilevel quality control at all production stages. The certified laboratory carries out non-destructive testing and visual measuring inspection in accordance with the requirements of the inspection chart for each product;
- mandatory hydraulic tests. Each product is pressure tested at the final stage of production;
- maximum manufacturing process automation. During manufacturing, automatic welding is performed. The work centers are equipped with all the necessary equipment and tooling, which enables them to produce welded parts with good assembling qualities and high-quality edge preparation.

Operation of TT250 boiler

The TT250 boiler is designed as a two-pass gas-fired boiler. The diagram of the TT250 boiler is given in Fig.

Fuel combustion takes place in the combustion chamber, formed by the flue tube 1 and the flat anchor head 2. The flue gases reverse along the flue tube walls 1 and return to the area of the front face of the boiler 6. They turn round in the first reversal chamber 5 formed by the front door lining 7 and the front face 6. Then, they are transported through the second pass 3 fire tubes to the area of the rear face 21. During this process, they give off some of their energy to the water in the boiler volume limited by the flue tube 1, the anchor head 2, the second pass fire tubes 3, the front face 6, the rear face 21 and the boiler outer casing shell 20. After exiting from the second pass fire tubes 3, the gases that have given off their energy go to the flue gas collector 10 and leave the boiler through the flue gas discharge nozzle 18.

During fuel combustion in the combustion chamber, alongside the convective heat transfer between reversing gases, radiation also operates efficiently to transfer the flame heat to the walls of the flue tube 1 and then to the water in the boiler. To increase the convective heat transfer, heat resistant intensifiers 4 made of high-quality stainless steel are installed on the second pass fire tubes 3.

Visual inspection of the flare spread out in the flue tube 1 is carried out via the sight glass 17, which is located on the front wall of the boiler front door 8.

The boiler front door 8 can be fully opened in any direction with the installed burner device 9. The initial opening direction shall be indicated when ordering the boiler. After that, the opening direction may be changed by the customer at their discretion. Opening the front door provides access for inspecting and leaning the internal heat-exchange surfaces of the boiler on the gas side, such as the second pass fire tubes 3, the fire tube 1, the front face 6, as well as for inspecting and replacing (if necessary) the heat resistant intensifiers 4.

A special cleaning kit shall be used to clean the second pass fire tubes 3. The deposits of the combustion products get pushed out to the flue gas collector 10, from where they are removed through the inspection hole of the flue gas collector 11.

The feed water inlet nozzle 12 and the continuous blowing nozzles 32 are arranged on the boiler rear face. The steam outlet nozzles 13 and emergency line 14 nozzles are located on top of the boiler. On the boiler outer casing shell 20, on the water side in the area where the steam outlet nozzle 13 is located, the droplet separator 15 is installed. This element makes it possible to efficiently separate suspended drops of unevaporated water.

For installation of the burner device 9, on the boiler front door 8 an adaptor element — the burner plate 16 — is used, or, if necessary, an extension flange. The burner plate (/extension flange) 16 shall be ordered separately and developed specifically for this particular burner device. By default, the boilers are equipped with a blind burner plate.

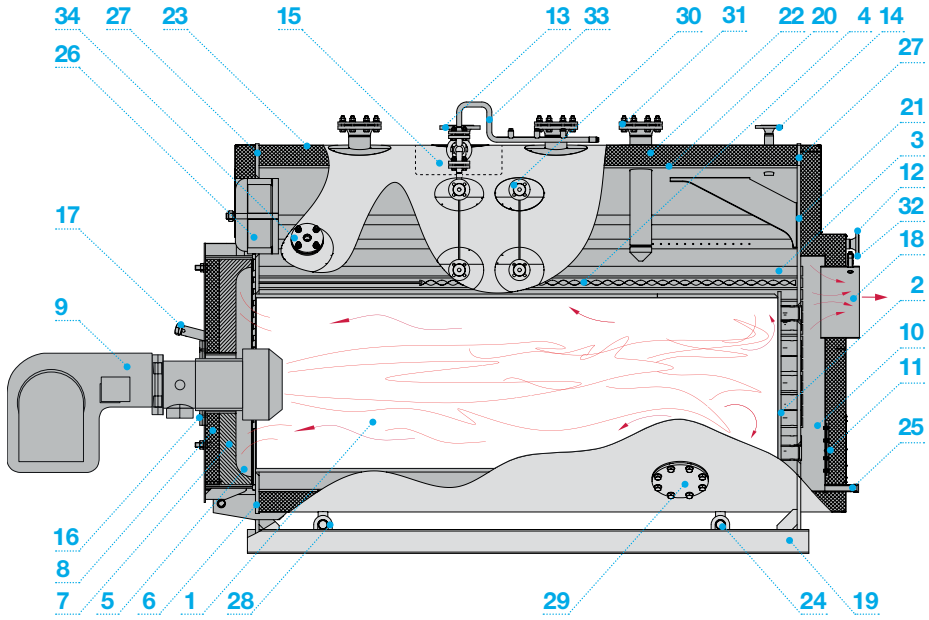
To provide uniform distribution of the weight load of the boiler when filled with water, steel load-bearing supports 19 are used in the design. On these supports, the boiler can be placed on an even sturdy floor without installing an additional foundation. Fixing the supports to the embedded floor elements is not required, except in cases where the boiler is installed in modular boiler houses to be transported in assembled form.

Lamella mineral mats with a low heat-conduction coefficient are used for boiler heat insulation 22, which makes it possible to significantly reduce the value of the q_5 coefficient (loss of heat into the environment through boiler lagging) below the standard value (0.5 % Q). On the outside, the boiler is faced with a chequered aluminum coating 23, which allows the boiler to maintain an attractive appearance throughout its service life.

The boiler drain nozzle 24 is located in the lower part of the boiler and allows for full or partial removal of water from the internal cavity. The flue gas collector drain nozzle 25 is located in the lower part and allows for removal of the condensate generated in the boiler when starting up from the cold state.

The boiler also has all necessary nozzles for mounting instrumentation and control sensors, such as level sensors, salt content sensors, etc. The boiler is equipped with nozzles for blowing (continuous and periodic).

Diagram of TT250 boiler



Schematic diagram of boiler TT250

1. Flue tube
2. Flat anchor head
3. Second pass fire tubes
4. Heat resistant intensifiers
5. Reversal chamber
6. Front face (tube plate)
7. Lining of boiler front door
8. Boiler front door
9. Burner device
10. Flue gas collector
11. Inspection hole of flue gas collector
12. Feed water inlet nozzle
13. Steam outlet nozzle
14. Emergency line nozzle
15. Droplet separator
16. Burner plate
17. Sight glass
18. Flue gas discharge nozzle
19. Steel load-bearing supports
20. Boiler outer casing shell
21. Rear face (tube plate)
22. Boiler heat insulation
23. Chequered aluminum coating
24. Boiler drain nozzle
25. Flue gas collector drain nozzle
26. Inspection hole of steam space
27. Lifting eyes
28. Periodic blowing tube
29. Inspection hole on the water side
30. Level indicator nozzles
31. Nozzles for mounting water level sensors
32. Continuous blowing pipe
33. Safety group pipe
34. Nozzle for mounting salt content sensor

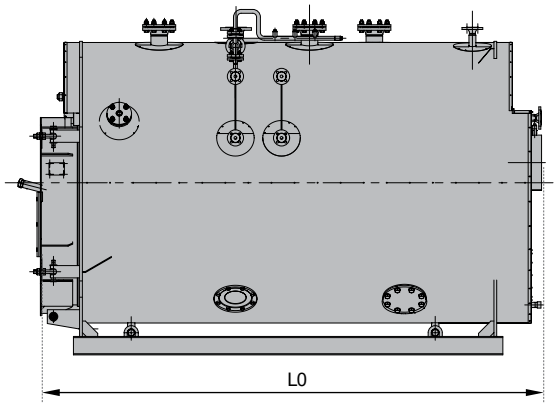
Technical specifications of TT250 boilers, 8 bar

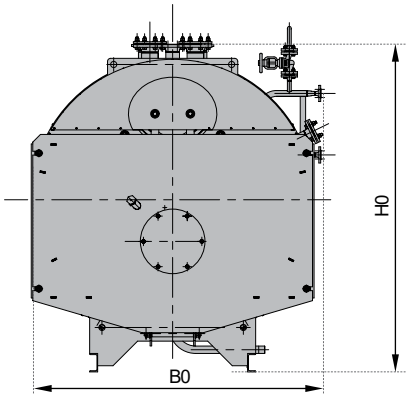
Rated steam capacity, t/h	0.5	1	1.5	2	2.5	3
Rated thermal power, kW	322	643	965	1287	1608	1930
Max. steam gauge pressure, MPa	0.8					
Max. water gauge pressure, MPa	0.8					
Max. steam temperature at the boiler outlet, °C	175					
Feed water temperature at the boiler inlet, °C	104					
Specified service life, years, min.	25					
Specified run, h, min.	200000					
Rated boiler water flow rate, m^3/h	0.55	1.1	1.65	2.2	2.75	3.3
Hydraulic resistance of path in terms of steam, kPa (m H_2O)	2.89 (0.294)	1.47 (0.15)	3.32 (0.338)	5.9 (0.602)	9.22 (0.94)	7.14 (0.728)
Volume of steam space, m^3	0.4	0.8	0.8	0.9	0.9	1.1
Boiler water volume, m^3	0.9	1.8	1.8	2.3	2.3	2.9
Dry boiler weight (weight tolerance 4.5 %), kg	2255	4007	4128	5168	5375	6900
Weight of boiler with water, kg	3111	5812	6044	7516	7816	9760
Without economizer						
Fuel type	Natural gas, propane-butane, diesel fuel, fuel oil					
Efficiency on nominal load, %	88.7	90.9	89.5	89.9	88.9	89.7
Flue gas temperature, °C	259	215	243	235	255	239
Hydraulic resistance of path in terms of water, kPa (m H_2O)	0.23 (0.023)	0.23 (0.023)	0.518 (0.053)	0.92 (0.094)	1.438 (0.147)	1.214 (0.124)
Flue gas flow rate, kg/s	0.15	0.28	0.43	0.57	0.73	0.86
Aerodynamic resistance of the gas path for maximum capacity, kPa (mbar)	0.11 (1.1)	0.166 (1.66)	0.376 (3.76)	0.425 (4.25)	0.674 (6.74)	0.691 (6.91)
With economizer						
Fuel type	Natural gas, propane-butane, diesel fuel					
Efficiency on nominal load, %	92.2	93.2	92.2	92.7	92.0	92.3
Flue gas temperature, °C	188	168	188	178	192	186
Hydraulic resistance of path in terms of water, kPa (m H_2O)	0.28 (0.029)	0.421 (0.043)	0.949 (0.097)	1.672 (0.17)	2.614 (0.267)	2.904 (0.296)
Flue gas flow rate, kg/s	0.14	0.28	0.42	0.56	0.70	0.84
Aerodynamic resistance of the gas path for maximum capacity, kPa (mbar)	0.279 (2.79)	0.394 (3.94)	0.736 (7.36)	0.689 (6.89)	1.016 (10.16)	1.133 (11.33)

Technical specifications of TT250 boilers, 12 bar

Rated steam capacity, t/h	0.5	1	1.5	2	2.5	3
Rated thermal power, kW	324	647	971	1294	1618	1941
Max. steam gauge pressure, MPa	1.2					
Max. water gauge pressure, MPa	1.2					
Max. steam temperature at the boiler outlet, °C	192					
Feed water temperature at the boiler inlet, °C	104					
Specified service life, years, min.	25					
Specified run, h, min.	200000					
Rated boiler water flow rate, m^3/h	0.55	1.1	1.65	2.2	2.75	3.3
Hydraulic resistance of path in terms of steam, kPa (m H_2O)	2.03 (0.207)	1.04 (0.106)	2.33 (0.238)	4.15 (0.423)	6.48 (0.661)	5.02 (0.512)
Volume of steam space, m^3	0.4	0.8	0.8	0.9	0.9	1.1
Boiler water volume, m^3	0.9	1.8	1.8	2.3	2.3	2.9
Dry boiler weight (weight tolerance 4.5 %), kg	2255	4007	4128	5168	5375	6900
Weight of boiler with water, kg	3111	5812	6044	7516	7816	9760
Without economizer						
Fuel type	Natural gas, propane-butane, diesel fuel					
Efficiency on nominal load, %	88.0	90.1	88.7	89.1	88.1	88.9
Flue gas temperature, °C	275	232	260	252	272	256
Hydraulic resistance of path in terms of water, kPa (m H_2O)	0.23 (0.023)	0.23 (0.023)	0.518 (0.053)	0.92 (0.094)	1.438 (0.147)	1.214 (0.124)
Flue gas flow rate, kg/s	0.15	0.29	0.44	0.58	0.74	0.88
Aerodynamic resistance of the gas path for maximum capacity, kPa (mbar)	0.115 (1.15)	0.174 (1.74)	0.395 (3.95)	0.446 (4.46)	0.708 (7.08)	0.726 (7.26)
With economizer						
Fuel type	Natural gas, propane-butane, diesel fuel					
Efficiency on nominal load, %	91.8	92.7	91.7	92.2	91.6	91.8
Flue gas temperature, °C	196	177	198	187	201	195
Hydraulic resistance of path in terms of water, kPa (m H_2O)	0.28 (0.029)	0.422 (0.043)	0.949 (0.097)	1.673 (0.171)	2.616 (0.267)	2.906 (0.296)
Flue gas flow rate, kg/s	0.14	0.28	0.42	0.56	0.71	0.85
Aerodynamic resistance of the gas path for maximum capacity, kPa (mbar)	0.286 (2.86)	0.408 (4.08)	0.764 (7.64)	0.715 (7.15)	1.054 (10.54)	1.18 (11.8)

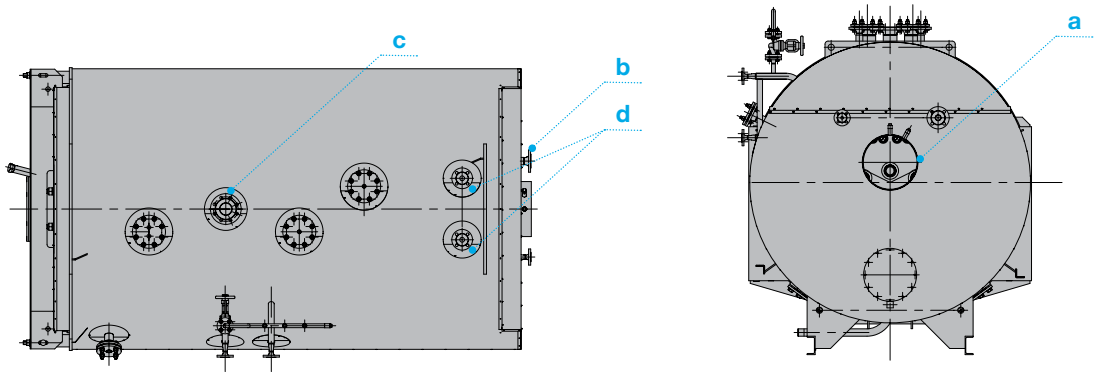
Overall and connecting dimensions of TT250 boilers





Overall and connecting dimensions of TT250 boilers, 0.8 MPa

Rated steam capacity, t/h	0.5	1	1.5	2	2.5	3
Rated thermal power, kW	322	643	965	1287	1608	1930
Max. steam gauge pressure, MPa (bar)	0.8 (8)					
Efficiency on nominal load, %	88.7	90.9	89.5	89.9	88.9	89.7
Efficiency on nominal load with economizer, %	92.2	93.2	92.2	92.7	92.0	92.3
Height (H0), mm	1650	1989	1989	2132	2132	2232
Length (L0), mm	2393	2957	2957	3261	3261	3573
Width (B2), mm	1476	1796	1796	1885	1885	2006
Flue gas discharge (a)	211	300	300	350	350	350
Water inlet (b)	40	40	40	40	40	40
Steam outlet (c)	50	80	80	80	80	100
Safety valve (d)	20	25	25	32	32	32
Air flow required for combustion, m^3/h	380.2	742.1	1130.5	1500.7	1896.9	2256
Fire tube heat-exchange surface area, m^2	11.5	27	27	36	36	46.3
Flue tube heat-exchange surface area, m^2	3	5.4	5.4	7.5	7.5	9.5



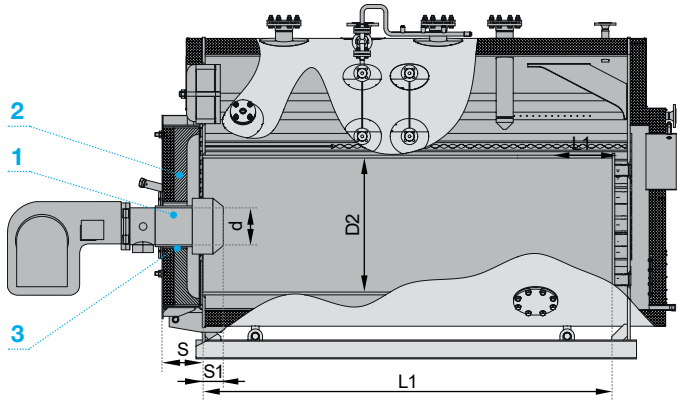
Overall and connecting dimensions of TT250 boilers, 1.2 MPa

Rated steam capacity, t/h	0.5	1	1.5	2	2.5	3
Rated thermal power, kW	324	647	971	1294	1618	1941
Max. steam gauge pressure, MPa (bar)	1.2 (12)					
Efficiency on nominal load, %	88	90.1	88.7	89.1	88.1	88.9
Efficiency on nominal load with economizer, %	91.8	92.7	91.7	92.2	91.6	91.8
Height (H0), mm	1650	1989	1989	2132	2132	2232
Length (L0), mm	2393	2957	2957	3261	3261	3573
Width (B2), mm	1476	1796	1796	1885	1885	2006
Flue gas discharge (a)	211	300	300	350	350	350
Water inlet (b)	40	40	40	40	40	40
Steam outlet (c)	50	80	80	80	80	100
Safety valve (d)	20	25	25	32	32	32
Air flow required for combustion, m^3/h	385.5	753.1	1147.4	1523	1925.4	2289.7
Fire tube heat-exchange surface area, m^2	11.5	27	27	36	36	46.3
Flue tube heat-exchange surface area, m^2	3	5.4	5.4	7.5	7.5	9.5

Dimensions of TT250 boiler firebox

Dimensions for burner installation

Boiler size	0.5	1	1.5	2	2.5	3
d, mm	200	300	300	300	300	300
S, mm	277	277	277	265	277	387
S1, mm	min. 20					
D2, mm	510	700	700	850	850	996
L1, mm	1722	2284	2284	2582	2582	2780
Aerodynamic resistance of the boiler under max. load (fuel — natural gas), Pa (mbar)	115 (1.15)	174 (1.74)	395 (3.95)	446 (4.46)	708 (7.08)	726 (7.26)



1. Burner flame head
2. Door lining
3. Elastic fireproof heat-insulating material
4. Burner plate / extension flange

Burner selection and installation

The burner devices shall provide reliable ignition and steady fuel burning without flame tear-off and blowback within the specified range of operating conditions, preventing any fuel from dripping onto the firebox surface.

The aerodynamic characteristics and placement of burners shall provide a uniform flame that fills the firebox without impinging on the walls, and prevent stagnation and poorly ventilated zones within the firebox space.

The customer may choose the burners independently, provided that they comply with the provisions set forth in the Boiler Operating Manual and the recommendations of the burner device manufacturer. In such case, when ordering the boiler, it is necessary to indicate the burner device type so that the manufacturer can adjust the lining to the particular burner type, if necessary.

The burners to be used with TT250 boilers shall have forced air supply. In order to ensure operation with high efficiency, it is recommended to install an automatic control system for the burner which allows for oxygen control.

Burner start-up, combustion chamber blowdown, and operation and shutdown shall be performed automatically.

When selecting the burners, it is necessary to take the following into account:

- firebox length and diameter;
- boiler aerodynamic resistance.

When using a boiler equipped with an economizer and steam superheater, it is also necessary to take into

account the aerodynamic resistance of this equipment. In TT250 boilers, it is allowed to use automatic multistage and modulating burners (gaseous, liquid fuel or combined).

The burner devices shall ensure that the boilers operate safely and efficiently.

Burner installation

The burner device shall be installed by employees from a specialized organization with permission to carry out the given kind of work in accordance with the burner manufacturer's requirements. The dimensions for burner installation are given in the tables.

The personnel carrying out the installation and subsequent adjustment of the burner device must be trained and provided with all necessary personal protective equipment. Before burner installation, it is necessary to remove the transportation packaging and make sure that the burner complies with the design requirements specified for the given boiler.

Before installing the burner flame head (1), it is necessary to check that there is a heat-insulating pad between the boiler and the burner installation plate / extension flange (4).

The space between the burner flame head (1) and the rigid heat insulation of the boiler shall be sealed with the elastic heat-insulating material (2) that is supplied together with the boiler (this should be placed along the perimeter of the flange burner hole (3)). The dimensions required for selecting and installing the burner device are given in Fig.

Quality of feed water

Special attention should be paid to the quality of boiler water, which in most cases is the decisive factor affecting the service life of the boiler and all boiler equipment.

The water conditions shall ensure boiler operation without damaging its elements due to deposits of scale and sludge, and without deviations from the regulatory quality indicators to a dangerous degree, or as a result of metal corrosion. For steam boilers, the quality of water shall be constantly monitored.

Feed water:

- pH value;
- total hardness;
- oxygen content.

Feed water

Fuel		Gaseous fuel	Liquid fuel
General requirements	—	Colorless, transparent, without insoluble inclusions and foaming agents	
pH value at 25 °C	—	10.5	8.3
Direct electrical conductivity at 25 °C	µS/cm	< 5 % of boiler water limit value	
Total hardness	mg-equ/L	< 0.1	< 0.03
Oxygen (O_2)	mg/l	< 0.1	< 0.05
Snellen transparency	mg/l	20	40
Total ferrum (Fe)	mg/l	< 0.3	
Total copper (Cu)	mg/l	< 1	
Silicic acid (SiO_2)	mg/l	< 5 % of boiler water limit value	
Oil, fats	mg/l	< 3	

* If no economizer is installed, the content of dissolved oxygen may be increased to the level < 0.1 mg/l.

Boiler water

Conductivity of feed water	µS/cm	> 30	< 30	< 10
General requirements	—	Colorless, transparent, without insoluble inclusions and foaming agents		
PH value at 25 °C	—	10.5–12	10.5–11.5	9.2–10.5
Direct electrical conductivity at 25 °C	µS/cm	< 6000	< 2000	< 150
Phosphate (PO_4)	mg/l	5–20	5–20	< 6
Oxygen-binding substance, sodium sulfite (Na_2SO_3)	mg/l	10–30	10–20	—
Silicic acid (SiO_2)	mg/l	< 150	< 40	< 4

The oxygen content in feed water shall be brought to the specified limit values using thermal deaeration.

As a rule, the continuous blowing volume shall be at least 0.5 % of the capacity, at least 10 % for boilers with an operating pressure of up to 12 bar, and 5 % for boilers with an operating pressure of 16 bar.

The continuous blowing flow rate shall be regulated based on the electrical conductivity values.

The electrical conductivity setpoint of the continuous blowing system shall ensure that the electrical conductivity level is such that none of the parameters specified in the table reaches its maximum value.

The values specified in the table are the maximum permissible values. As a rule, the maximum electrical conductivity signal is included in the safety circuit. When the maximum value of electrical conductivity is reached, the burner is shut down and interlocked. It is therefore recommended to set the controlled conductivity with the margin of 30 % of its limit value.

For burners equipped with a steam superheater with feed water electrical conductivity at a temperature of 25 °C > 30 µS/cm, the following limit values for the boiler water should be halved:

- direct electrical conductivity at 25 °C;
- silicic acid (SiO_2).

Condensate

In case of the possibility that foreign material enters the feed water with the return of the condensate, it is necessary to provide measures to prevent the intrusion of such foreign material (for example, the "Policeman'' filter, monitoring of alkaline-earth elements, turbidity, conductivity with bypass device control).

Sprayed water

Only fresh water or condensate free of salt and solid chemical additives are allowed to be used as sprayed water for cooling the superheated steam, for example, sodium hydroxide, potassium hydroxide, etc., as well as trisodium phosphate and tripotassium phosphate. Fresh water or condensate are considered to be demineralized when they have a conductivity of < 0.2 µS/cm and a concentration of Silicic acid of < 0.02 mg/l.

Shutdown

To prevent corrosion during shutdown (in case of sustained periods of downtime or delay in commissioning), the steam boilers and equipment components should be properly preserved.

Water analysis

The quality of the boiler feed water should be checked every shift. For this purpose, a sample is taken during

normal operation of the boiler. The sample shall be cooled down to 25 °C.

Water analysis volume

Feed water:

- pH;
- total hardness;
- oxygen;
- electrical conductivity;
- transparency.

All results shall be recorded in the work log-book.
The absence of chemical control log-books, and thus the absence of chemical control itself, leads to the loss of rights to warranty claims.

Only specialized companies shall be involved in delivery and servicing equipment for water treatment.

Boiler configuration

The unit is supplied in conditions ready for operation. The complete delivery set of the TT250 boiler provided at the manufacturing plant allows to simplify the design process, speed up installation, and ensure safe, reliable and fully automatic operation of the boiler. The individual parts and components of the boiler are selected by size and technical characteristics, matched to each other, and assembled in a module, ready for connection.

At the customer's request, the TT250 boiler can be delivered without accessories, or as a partial delivery set with equipment (by parts). In this case, the customer will independently perform configuration to fit the boiler with burners, safety devices and automation control devices.

The complete delivery set (full configuration) includes the following:

- boiler assembly;
- burner plate or extension flange if necessary;
- heat-insulating wool for sealing the burner embrasure;
- safety valves;
- safety group;
- level control sensors;
- visual level gauges;
- safety and automatic control devices;
- upper blowing system;
- lower blowing system;
- steam supply system;
- feed water system;
- feed water pump module;
- installation and operation manual;
- datasheet.

In addition, the following systems can be included in the complete delivery set:

- automatic control devices for boiler cascade and auxiliary equipment;
- deaerator*;
- continuous purging separator*;
- bubbler-cooler*;
- condensate collection tank*;
- pump module for condensate transfer;
- flue tubes;
- horizontal flue gas ducts with built-in condensate traps and revision holes to transport the exhaust gas from the boilers to the flue tube;
- underground or aboveground diesel fuel storage tank.

Boiler accessories

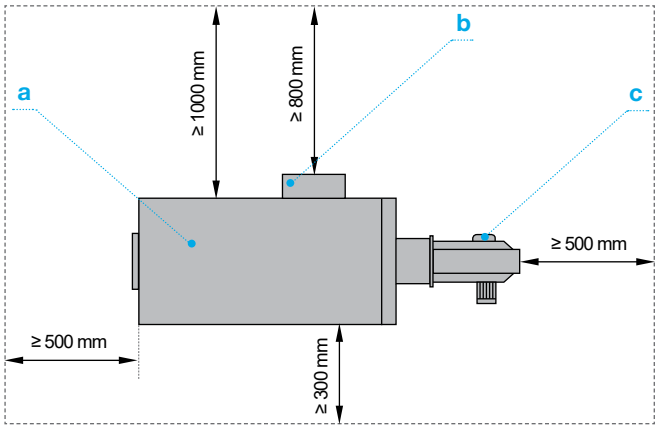
Depending on the customer's wish and on additional request, ENTROPIE can deliver the following accessories for TT250 boilers:

- burner plate or extension flange for installing the selected burner device in the boiler;
- boiler cleaning kit;
- boiler maintenance platforms with handrails and ladders;
- spare parts and tool kit, including the necessary sealing cords and gaskets to be replaced during maintenance work.

* Delivery with necessary piping valves and fittings included is possible.

Boiler placement

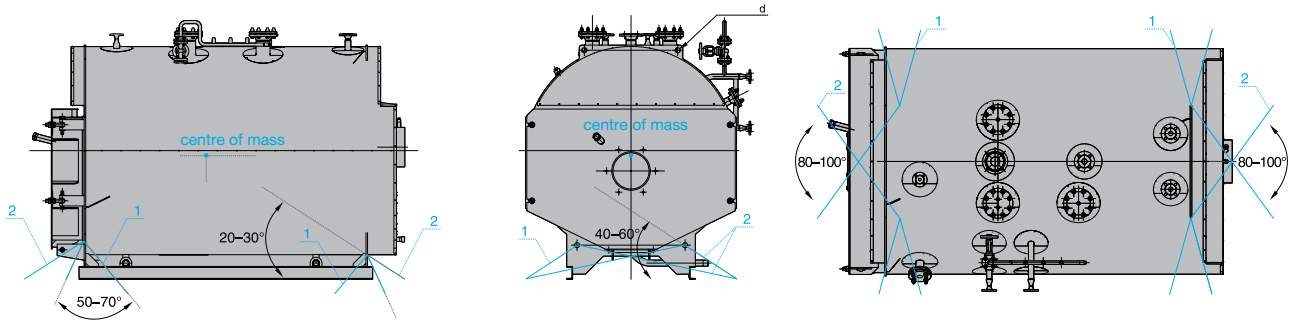
The space planning and structural solutions for boiler placement shall comply with the applicable territorial codes and regulations.



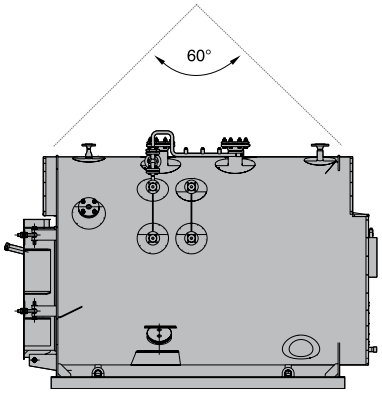
Recommended distances

- a — Boiler
- b — Boiler automation devices
- c — Burner device

Transportation



Boiler transportation diagram



Schematic diagram of boiler slinging

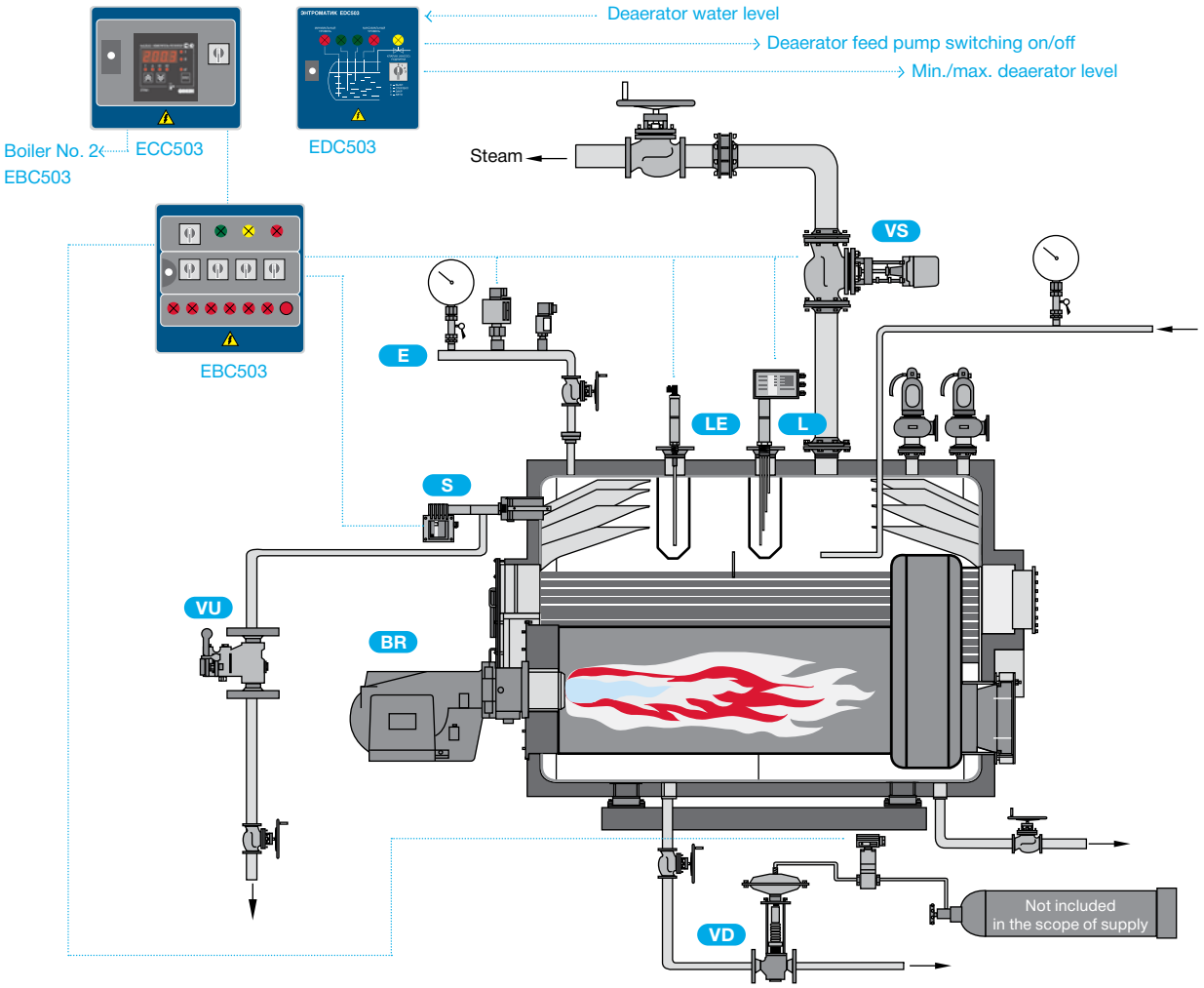
Legend

- • — Center of mass
- —— — Fastening means
- 1 — Protection from roll-over
- 2 — Diagonal fastening

Dimensions required for transportation of the boiler up to 12 bar

Description	Rated steam capacity, t/h					
	0.5	1	1.5	2	2.5	3
Length, L, mm	2538	3102	3102	3406	3406	3718
Width, W, mm	1476	1796	1796	1885	1885	2006
Height, H, mm	1650	1989	1989	2132	2132	2232
Dry boiler weight, kg	2255	4007	4128	5168	5375	6900

TT250 steam boiler with piping and control station



BR Burner

S Salt content sensor

VS Steam valve

L Level sensor

VU Upper blowing valve

LE Min./max. level sensors

E Safety group

VD Lower blowing valve

NOTE

The schematic image serves to explain the functional processes and does not purport to have complete information with respect to structural details.

Scan me

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