Field application TT200 boilers

ENTROPIE steam boilers TT200 are steel gas-fired, three-way flue gas boilers of horizontal type, fitted with a firebox for pressure-fired fuel combustion.

ENTROPIE boiler TT200 are mass produced within a rated steam capacity range from 1 to 25 t/h with a design pressure of 8, 12, 16 bar and are designed to produce saturated steam.

Fuel type: gas, liquid fuel. The rated steam capacity is specified for when using gaseous and light liquid fuel. When using special non-standard types of gaseous, light liquid as well as heavy liquid fuel, it is necessary to ask the manufacturer of the boiler about the steam capacity.

Steam gas-fired ENTROPIE boiler TT200 are manufactured with the following components according to the technical documentation:

- TT200 steam boiler with economizer,
- TT200 steam boiler with steam superheater,
- TT200 steam boiler with economizer and steam superheater.

Thanks to developed heat transfer surface and unique engineering solutions, and depending on the load and operating conditions of the boiler in combination with the wetted reversal chamber, a high energy efficiency level is achieved: without the economizer, the efficiency level reaches 92.7 %; when the economizer is used, the efficiency level will reach up to 95 %.

General view of TT200 boiler

The preferred areas of application for ENTROPIE steam boilers TT200 are industrial enterprises in all fields of industry where there is demand for saturated steam production for engineering processes, manufacturing processes and heating.

Priciple operation TT200 boiler

The ENTROPIE steam boiler TT200 is designed as a three-way gas-fired boiler; it has a cylindrical horizontal structure.

The combustion chamber with flue tube (1) and the boiler body have a cylindrical shape. Convective heating surfaces are formed by fire tubes of the second & third passes (2), (3) located axisymmetrically around the combustion chamber.

The multi-row layout of the second & third pass fire tubes provides a high rate of heat transfer.

The fully wetted first reversal chamber (4) is formed by a shell and two flat flanged heads. The second reversal chamber (5) is formed by the front head of the boiler, the frame and the front doors.

The boiler front doors (6) provide easy access to the fire tubes during maintenance and cleaning of the boiler.

Inspection and cleaning of the combustion chamber and the first reversal chamber should be carried out via the inspection hole (7) in the lower part of the rear head; there is a sight glass to visually monitor the flame.

Fire tubes can be inspected through the inspection hole on the side of the steam space, in the upper part of the boiler body. The inspection hole (8) in the lower part of the body allows the entire length of the water chamber to be visually monitored.

To control the operating parameters, pipes for level gauges (9) and continuous water level regulation (10) (11) are installed on the side, and a collector (12) is installed in the upper part with nozzles for connecting sensors and I&C devices.

The feed water inlet (13) and steam outlet (14), continuous blowing pipe (15) and emergency valve (16), as well as the steam supply pipe for own needs (17) are located on top of the boiler for easy operation.

A droplet separator is installed under the steam outlet (18) providing effective separation (cleaning) of the steam from moisture.

The pipes for the boiler blowdown system are arranged in a convenient way, making it easier to operate and maintain the boiler. Continuous blowing (15) serves to reduce the salt content of boiler feed water (salt content sensor (19)) and also decreases the possibility of effervescence and entrainment of water droplets with steam, which enhances the reliability of water loop circulation in the boiler and the quality of the steam. The periodic blowing (20) provides regular removal of sludge from the boiler, maintaining reliable operating conditions.

The drainage pipeline (21) in the lower part of the boiler allows the coolant to be fully removed, if necessary.

An installation plate (23) is provided in the front of the boiler to install the burner (22).

A flue gas collection chamber (flue box) with flue gas discharge outlet (24) and inspection holes is located in the upper part of the rear side of the boiler. The flue gas discharge outlet is fitted with a connecting flange.

For uniform distribution of the weight load, the boiler has a sturdy frame base (25) formed by two I-beams connected to the main body of the boiler. One support of the frame base is fixed rigidly, and the others are mobile, which allows for movement during heat expansion of the boiler.

The boiler's high quality solid insulation (26) made from laminated mineral fibre mats with a thickness of 120 mm and its aluminium coating contribute to extremely low radiation losses.

To move the boiler during installation and handling operations, lifting eyes (27) are provided on the boiler body located symmetrically with respect to the boiler center of mass.

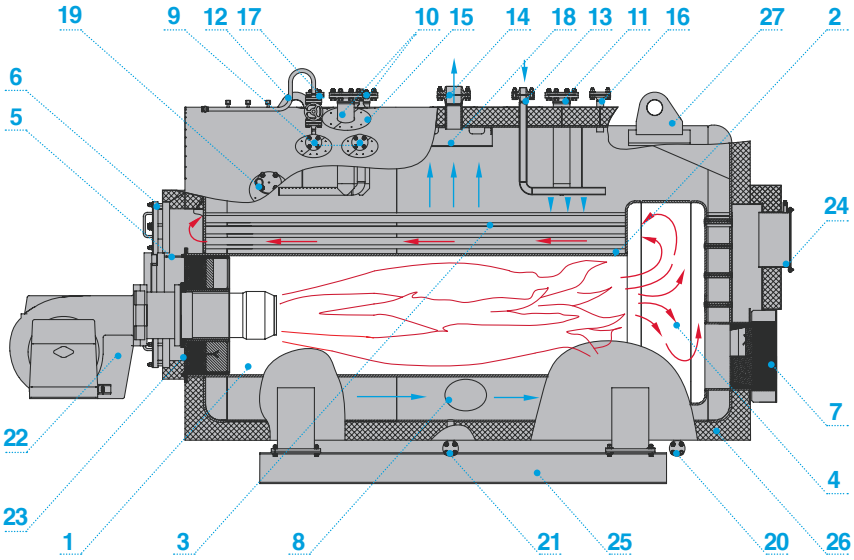
The three-way diagram of the boiler gas path with low heat density of the combustion chamber provides a convenient setup of the boiler's combustion modes and minimum release of hazardous combustion products.

The boiler's low aerodynamic resistance allows for optimal selection of the burner. A wide shell side and a large volume of water in the boiler provide the best boiler operating conditions within the entire range of heat output.

The multi-row layout of the second & third pass fire tubes and the design of the fire gas reversal chambers allow for a large combustion space and an increase of the heating surface area, which increases the rate of heat transfer and, consequently, the efficiency of the boiler.

In this way, the structure of the boiler, which incorporates best practices and reliable engineering solutions as well as a high quality manufacturing, provides exceptional characteristics for a steam boiler: high performance and steam quality, high efficiency ratio, operating safety and reliability, and a long service life.

Diagram TT200 boiler



1. Flue tube
2. Second pass fire tubes
3. Third pass fire tubes
4. First reversal chamber
5. Second reversal chamber
6. Front doors
7. Inspection hole
8. Inspection hole
9. Level gauge nozzles
10 11. Water level gauges
12. Header
13. Feed water inlet
14. Steam outlet
15. Continuous blowing pipe
16. Emergency valve
17. Steam supply for own needs
18. Droplet separator
19. Salt content sensor
20. Periodic blowing tube
21. Drainage pipeline
22. Burner
23. Installation plate
24. Flue gas discharge outlet
25. Sturdy frame base
26. Insulation
27. Lifting eyes

Technical characteristics TT200 8 bar boilers

Without economizer

Rated steam capacity, t/h	1	2	3	4	5	6	8	10	12	14	16	20	25
Rated heat output, kW	657	1315	1972	2630	3287	3945	5260	6574	7889	9204	10,519	13,140	16,420
Maximum excess steam pressure, bar, max	8												
Maximum excess water pressure, bar, max	8												
Maximum steam temperature at the boiler outlet, °C	175												
Minimum water temperature at the boiler inlet, °C	104												
Hydraulic resistance of steam-water path in terms of water, kPa	0.1	0.3	1.8	3.3	1.7	2.5	4.6	2.2	2.3	3.1	4.0	2.4	3.7
Hydraulic resistance of steam-water path in terms of steam, kPa	1.8	3.3	7.7	13.2	8.2	5.5	9.7	15.1	5.8	7.9	11.0	16.0	25.0
Flue gas flow rate*, kg/s	0.3	0.6	0.9	1.2	1.5	1.7	2.3	2.9	3.5	4.1	4.7	5.8	7.4
Aerodynamic drag of the gas path for maximum capacity*, kPa	0.35	0.73	0.86	0.82	0.93	1.10	1.50	1.20	0.95	1.00	1.10	1.58	1.60
Temperature of outgoing flue gas*, °C	214	214	219	225	230	213	210	234	228	226	219	217	249
Volume of steam space, m^3	1.23	1.32	2.50	2.20	3.40	3.64	4.54	5.20	6.80	7.50	9.50	10.10	7.80
Boiler water volume, m^3	3.7	5.6	7.2	8.0	11.6	11.7	15.4	18.9	22.6	24.3	26.6	29.0	29.3
Dry boiler weight (weight tolerance 4.5 %), kg	5200	5900	6400	9600	11,900	13,200	15,500	19,300	29,300	26,200	35,100	41,600	41,900

With economizer

Rated steam capacity, t/h	1	2	3	4	5	6	8	10	12	14	16	20	25
Rated heat output, kW	657	1315	1972	2630	3287	3945	5260	6574	7889	9204	10,519	13,140	16,420
Maximum excess steam pressure, bar, max	8												
Maximum excess water pressure, bar, max	8												
Maximum steam temperature at the boiler outlet, °C	175												
Minimum water temperature at the boiler inlet, °C	104												
Hydraulic resistance of steam-water path in terms of water, kPa	0.1	0.4	2.1	3.9	2.6	3.8	5.2	3.2	3.7	5.5	7.2	6.2	9.6
Hydraulic resistance of steam-water path in terms of steam, kPa	1.8	3.3	7.7	13.2	8.2	5.5	9.7	15.1	5.8	7.9	11.0	16.0	25.0
Flue gas flow rate*, kg/s	0.3	0.6	0.8	1.1	1.4	1.7	2.3	2.7	3.3	3.8	4.4	5.6	7.0
Aerodynamic drag of the gas path for maximum capacity*, kPa	0.40	0.79	1.00	1.00	1.20	1.40	1.70	1.60	1.60	1.40	1.70	1.65	1.80
Temperature of outgoing flue gas*, °C	164	166	173	181	176	178	152	165	165	161	160	151	167
Volume of steam space, m^3	1.23	1.32	2.50	2.20	3.40	3.64	4.54	5.20	6.80	7.50	9.50	10.10	7.80
Boiler water volume, m^3	3.7	5.6	7.2	8.0	11.6	11.7	15.4	18.9	22.6	24.3	26.6	29.0	29.3
Dry boiler weight (weight tolerance 4.5 %), kg	5200	5900	6400	9600	11,900	13,200	15,500	19,300	29,300	26,200	35,100	41,600	41,900

* Indicated for natural gas 8000 Kcal/m^3

Technical characteristics TT200 12 bar boilers

Without economizer

Rated steam capacity, t/h	1	2	3	4	5	6	8	10	12	14	16	20	25
Rated heat output, kW	657	1315	1972	2630	3287	3945	5260	6574	7889	9204	10,519	13,140	16,420
Maximum excess steam pressure, bar, max							12						
Maximum excess water pressure, bar, max							12						
Maximum steam temperature at the boiler outlet, °C							191						
Minimum water temperature at the boiler inlet, °C							104						
Hydraulic resistance of steam-water path in terms of water, kPa	0.1	0.3	1.8	3.3	1.7	2.5	4.6	2.2	2.3	3.1	4.0	2.3	3.6
Hydraulic resistance of steam-water path in terms of steam, kPa	1.3	2.3	5.4	9.3	5.8	8.3	6.8	10.6	4.3	5.8	7.6	11.2	17.6
Flue gas flow rate*, kg/s	0.3	0.6	0.7	1.2	1.5	1.8	2.4	3.0	3.6	4.2	4.7	5.9	7.5
Aerodynamic drag of the gas path for maximum capacity*, kPa	0.40	0.76	0.90	0.88	0.96	1.15	1.40	1.25	1.00	1.10	1.20	1.65	1.70
Temperature of outgoing flue gas*, °C	229	229	233	239	228	228	225	249	242	240	234	234	265
Volume of steam space, m^3	1.23	1.32	2.50	2.20	2.60	3.64	4.22	5.20	6.80	7.50	9.50	10.10	7.80
Boiler water volume, m^3	3.7	5.6	7.2	8.0	11.2	11.7	16.0	18.9	22.6	24.3	26.6	29.0	29.3
Dry boiler weight (weight tolerance 4.5 %), kg	5800	7600	10,500	10,600	15,800	17,900	17,500	23,500	29,300	32,000	35,100	41,600	41,900

With economizer

Rated steam capacity, t/h	1	2	3	4	5	6	8	10	12	14	16	20	25
Rated heat output, kW	657	1315	1972	2630	3287	3945	5260	6574	7889	9204	10,519	13,140	16,420
Maximum excess steam pressure, bar, max							12						
Maximum excess water pressure, bar, max							12						
Maximum steam temperature at the boiler outlet, °C							191						
Minimum water temperature at the boiler inlet, °C							104						
Hydraulic resistance of steam-water path in terms of water, kPa	0.1	0.4	1.9	3.5	2.4	3.5	4.7	2.9	3.4	5.0	6.5	6.2	9.7
Hydraulic resistance of steam-water path in terms of steam, kPa	1.3	2.3	5.4	9.3	5.8	8.3	6.8	10.6	4.3	5.8	7.6	11.2	17.6
Flue gas flow rate*, kg/s	0.3	0.6	0.9	1.1	1.4	1.7	2.2	2.8	3.3	3.9	4.4	5.6	5.6
Aerodynamic drag of the gas path for maximum capacity*, kPa	0.50	0.80	1.04	1.10	1.23	1.50	1.80	1.75	1.70	1.50	1.80	1.70	1.90
Temperature of outgoing flue gas*, °C	179	181	189	197	193	195	163	178	178	173	173	158	175
Volume of steam space, m^3	1.23	1.32	2.50	2.20	2.60	2.84	4.22	5.20	6.80	7.50	9.50	10.10	7.80
Boiler water volume, m^3	3.7	5.6	7.2	8.0	11.2	11.7	16.0	18.9	22.6	24.3	26.6	29.0	29.3
Dry boiler weight (weight tolerance 4.5 %), kg	5800	7600	10,500	10,600	15,800	17,900	17,500	23,500	29,300	32,000	35,100	41,600	41,900

* Indicated for natural gas 8000 Kcal/m^3

Technical characteristics TT200 16 bar boilers

Without economizer

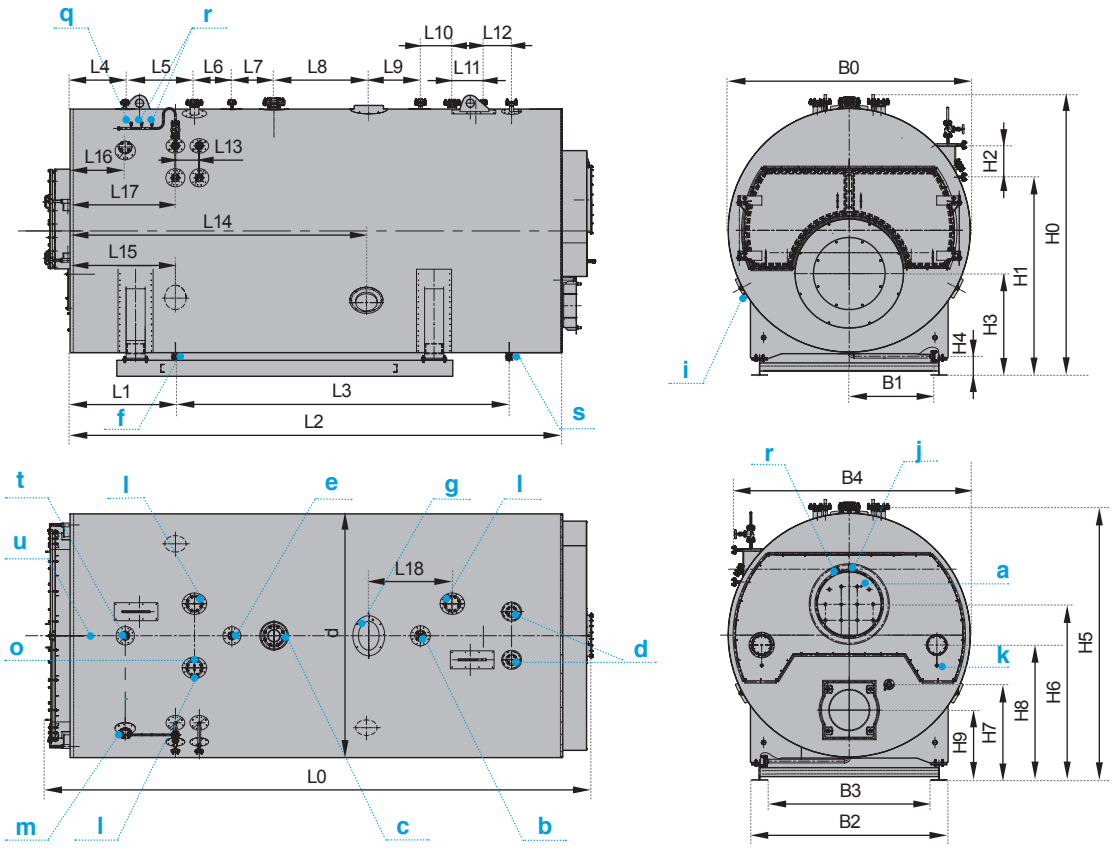
Rated steam capacity, t/h	1	2	3	4	5	6	8	10	12	14	16	20	25
Rated heat output, kW	657	1315	1972	2630	3287	3945	5260	6574	7889	9204	10,519	13,140	16,420
Maximum excess steam pressure, bar, max							16						
Maximum excess water pressure, bar, max							16						
Maximum steam temperature at the boiler outlet, °C							203						
Minimum water temperature at the boiler inlet, °C							104						
Hydraulic resistance of steam-water path in terms of water, kPa	0.1	0.3	1.6	3.0	1.6	2.3	4.2	3.0	2.0	2.7	3.7	2.3	3.5
Hydraulic resistance of steam-water path in terms of steam, kPa	1.0	1.8	4.2	7.2	4.4	6.4	5.3	8.9	12.7	4.3	5.6	8.8	13.6
Flue gas flow rate*, kg/s	0.3	0.6	1.0	1.2	1.5	1.8	2.4	3.0	3.6	4.2	4.8	6.0	7.6
Aerodynamic drag of the gas path for maximum capacity*, kPa	0.4	0.8	1.0	1.0	1.0	1.2	1.6	1.3	1.0	1.1	1.2	1.7	1.8
Temperature of outgoing flue gas*, °C	240	240	245	251	240	239	238	266	253	248	245	242	274
Volume of steam space, m^3	1.23	1.32	2.50	2.20	2.60	2.80	4.20	5.20	6.80	7.50	9.50	10.10	7.80
Boiler water volume, m^3	3.7	5.6	7.2	8.0	11.2	12.0	16.0	18.9	22.6	24.3	26.6	29.0	29.3
Dry boiler weight (weight tolerance 4.5 %), kg	5800	7600	10,500	11,600	15,800	17,900	19,900	23,500	29,300	32,000	35,100	41,600	41,900

With economizer

Rated steam capacity, t/h	1	2	3	4	5	6	8	10	12	14	16	20	25
Rated heat output, kW	657	1315	1972	2630	3287	3945	5260	6574	7889	9204	10,519	13,140	16,420
Maximum excess steam pressure, bar, max							16						
Maximum excess water pressure, bar, max							16						
Maximum steam temperature at the boiler outlet, °C							203						
Minimum water temperature at the boiler inlet, °C							104						
Hydraulic resistance of steam-water path in terms of water, kPa	0.1	0.4	1.9	3.5	2.4	3.5	4.7	3.0	3.4	5.0	6.5	5.6	8.8
Hydraulic resistance of steam-water path in terms of steam, kPa	1.0	1.8	4.2	7.2	4.4	6.4	5.3	8.8	12.7	4.3	5.6	8.8	13.6
Flue gas flow rate*, kg/s	0.3	0.6	0.9	1.1	1.4	1.7	2.2	2.8	3.3	3.9	4.4	5.7	7.1
Aerodynamic drag of the gas path for maximum capacity*, kPa	0.5	0.9	1.1	1.1	1.3	1.5	1.8	1.7	1.7	1.5	1.8	1.8	1.9
Temperature of outgoing flue gas*, °C	179	181	189	197	193	195	163	178	178	173	173	163	180
Volume of steam space, m^3	1.23	1.32	2.50	2.20	2.60	2.80	4.20	5.20	6.80	7.50	9.50	10.10	7.80
Boiler water volume, m^3	3.7	5.6	7.2	8.0	11.2	12.0	16.0	18.9	22.6	24.3	26.6	29.0	29.3
Dry boiler weight (weight tolerance 4.5 %), kg	5800	7600	10,500	11,600	15,800	17,900	19,900	23,500	29,300	32,000	35,100	41,600	41,900

* Indicated for natural gas 8000 Kcal/m^3

Overall and connecting dimensions of TT200 boilers



Connecting dimensions of ENTROPIE BOILER TT200

Description		PN, MPa	Nominal diameter, DN, mm												
Rated steam capacity, t/h			1	2	3	4	5	6	8	10	12	14	16	20	25
Flue gas outlet	a	0.01	300	350	400	450	500	650	650	800	800	800	800	1000	1000
Water inlet	b	1.6	40	40	40	40	40	40	40	50	65	65	65	80	80
8 bar steam outlet	c	1.6	65	80	100	100	125	150	150	150	200	200	200	200	250
12, 16 bar steam outlet		1.6	50	65	80	100	100	125	125	150	150	150	200	200	200
For safety valve	d	1.6	32	32	32	32	40	40	40	40	50	65	65	65	65
Continous blowing	e	1.6	20	20	20	20	20	20	20	20	20	20	20	20	20
Water drain	f	-	40	40	40	40	40	40	40	40	40	40	40	40	40
Upper inspection hole	g	-	420×320								270×370	420×320	370×470	430×330	
Lower inspection hole	i	-	320×220								370×470	320×220	270×370	330×230	
Draft and heat gauge	j	0	G 1/2-B												
Condensate drain	k	0	G 1-B												
Water level sensor	l	1.6	G 3/4-B												
Salt content sensor	m	1.6	G 1-B												
Overflow prevention sensor	o	1.6	G 3/4-B												
Flue gas temperature sensor	p	0	G 1/2-B												
Manometer	q	1.6	G 1/2-B												
Pressostat	r	1.6	G 1/2-B												
Periodic blowing	s	1.6	40	40	40	40	40	40	40	40	40	40	40	40	40
Steam for operation needs	t	-	25	25	25	25	25	25	25	25	40	40	40	65	65
Air vent	u	-	-	-	-	-	-	-	-	20	20	20	20	20	20

Overall dimensions of ENTROPIE BOILER TT200 8 bar boilers

Rated steam capacity, t/h	1	2	3	4	5	6	8	10	12	14	16	20	25
Total length, L0, mm	3793	4220	4672	4670	4925	5588	6387	6903	7167	7471	7740	8050	8699
Total width, B0, mm	2015	2255	2480	2526	3012	2860	2844	3043	3352	3442	3552	3655	3654
Total height, H0, mm	2487	2695	2816	2945	3318	3318	3294	3500	3870	3923	4124	4137	4138
L1, mm	1470	1725	1217	1217	1323	1355	1370	1299	1331	1621	1325	1371	1371
L2, mm	3242	3670	3975	3975	4235	4937	5738	6174	6291	6623	6880	7171	7173
L3, mm	1300	1470	2200	2200	2400	3018	3697	4195	4290	4382	4840	5200	5200
L4, mm	621	845	1137	1137	845	895	591	691	701	651	701	410	410
L5, mm	450/300	100/300	0	0	500/0	0/500	750	870	400	870	400	620	620
L6, mm	0/450	300	300	300	0/500	500/0	352	470	470	588	470	500	500
L7, mm	507	300	520	520	450	550	500	530	470	470	470	450	450
L8, mm	153	450	550	550	700	1100	1200	1190	570	610	615	475	475
L9, mm	222	0	330	330	700	800	600	650	1590	1782	1910	660	660
L10, mm	200	200	680	680	350	350	500	400	300	400	400	1750	1750
L11, mm	0	0	0	0	0	0	0	650	700	750	750	610	610
L12, mm	300	300	670	670	650	650	650	400	415	500	500	1100	1100
L13, mm	300	300	300	300	300	300	300	300	300	300	300	300	300
L14, mm	0	0	2570	2570	2823	3474	3671	3777	3831	4263	4431	5221	4960
L15, mm	1471	1823	1321	1321	1323	1356	1371	1321	1631	1621	1331	1371	1371
L16, mm	471	545	527	527	545	595	591	690	531	1071	531	1031	1013
L17, mm	771	845	1137	1137	1225	1276	1341	1319	1421	1491	1421	2321	2321
L18, mm	422	200	350	350	350	450	1100	1050	400	400	400	750	750
B1, mm	860	860	1060	1060	1060	1060	1060	1060	1062	1062	1062	1062	1307
B2, mm	1400	1490	1810	1810	1940	1940	1930	2453	2810	2790	2700	2863	2863
B3, mm	1200	1290	1610	1610	1740	1740	1730	2053	2330	2310	2460	2372	2372
B4, d, mm	1931	2161	2415	2515	2867	2864	2841	3043	3324	3397	3535	3655	4071
H1, mm	1609	1816	1938	2067	2292	2316	2309	2471	2783	2855	2855	2967	3096
H2, mm	400	400	400	400	400	400	400	400	400	400	400	400	400
H3, mm	1036	1096	1063	1113	1203	1203	1186	1268	1358	1384	1428	1463	1463
H4, mm	228	228	228	228	243	243	243	237	300	281	300	294	294
H5, mm	2290	2525	2775	2875	3318	3240	3216	3409	3773	3844	3970	4070	4070
H6, mm	1416	1581	1648	1761	1978	1888	1876	1646	2318	2323	2524	2539	2539
H7, mm	1095	1162	1303	1203	1198	1198	1186	1195	1308	1284	1332	1332	1422
H8, mm	976	1001	1284	1304	1593	1577	1566	1683	1706	1642	1856	1966	1656
H9, mm	896	826	843	849	963	963	956	875	998	969	1013	998	1058

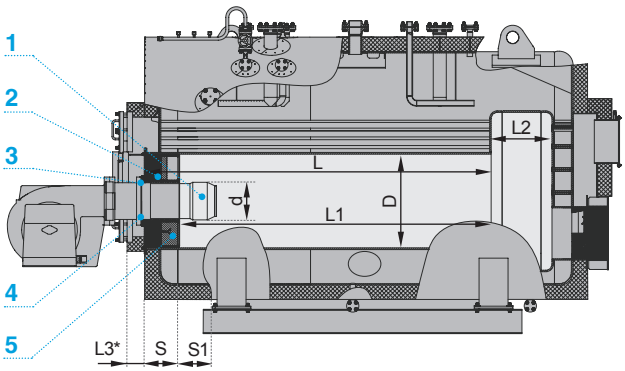
Overall dimensions of ENTROPIE BOILER TT200 12 bar boilers

Rated steam capacity, t/h	1–8	10	12	14	16	20	25
Total length, L0, mm	Data specified during ordering	6867	7167	7471	7760	8050	8699
Total width, B0, mm		3043	3352	3442	3552	4150	4070
Total height, H0, mm		3503	3870	3923	4124	4137	4138
L1, mm		1324	1331	1621	1325	1371	1371
L2, mm		6184	6291	6623	6892	7171	7173
L3, mm		4195	4290	4382	4840	5200	5200
L4, mm		694	701	651	70	410	410
L5, mm		870	400	870	400	620	620
L6, mm		470	470	588	470	500	500
L7, mm		530	470	470	470	450	450
L8, mm		1190	570	610	615	475	475
L9, mm		650	1590	1782	1910	660	660
L10, mm		400	300	400	400	1750	1750
L11, mm		390	700	750	750	710	610
L12, mm		355	415	500	500	1100	1100
L13, mm		300	300	300	300	0	0
L14, mm		3725	3831	4263	4431	5221	4960
L15, mm		1324	1631	1621	1331	1371	1371
L16, mm		694	531	1071	531	1031	1013
L17, mm		1322	1421	1491	1421	2321	2321
L18, mm		1050	400	400	400	1445	1360
B1, mm		1060	1060	1060	1060	1060	1060
B2, mm		2453	2810	2790	2750	2863	2863
B3, mm		2053	2330	2310	2250	2363	2363
B4, d, mm		3041	3324	3397	3552	3655	3655
H1, mm		2473	2783	2855	2841	2967	3096
H2, mm		400	400	400	400	400	400
H3, mm		952	1358	1384	1411	1463	1463
H4, mm		119	300	281	283	294	294
H5, mm		3412	3773	3844	3953	4070	4070
H6, mm		2198	2318	2323	2507	2539	2562
H7, mm		1195	1308	1284	1315	1332	1422
H8, mm		1687	1706	1642	1796	1966	1682
H9, mm		875	998	969	994	998	1058

Overall dimensions of ENTROPIE BOILER TT200 16 bar boilers

Rated steam capacity, t/h	1–8	10	12	14	16	20	25
Total length, L0, mm	Data specified during ordering	6867	7167	7471	7760	8050	8699
Total width, B0, mm		3043	3352	3442	3552	4150	4070
Total height, H0, mm		3503	3870	3923	4124	4137	4138
L1, mm		1324	1331	1621	1331	1371	1371
L2, mm		6184	6291	6623	6892	7171	7173
L3, mm		4195	4290	4382	4840	5200	5200
L4, mm		694	701	651	701	410	410
L5, mm		870	400/870	870/400	870/400	620	620
L6, mm		470	470	470/940	470/940	500/450	500/450
L7, mm		530	570	610	615	475	475
L8, mm		1190	1190	1382	1510	475	475
L9, mm		650	700	800	800	660	660
L10, mm		400	300	400	400	1750	1750
L11, mm		393	700	1150	1150	710	610
L12, mm		355	415	500	500	1100	1100
L13, mm		300	300	300	300	0	0
L14, mm		3725	3831	4263	4431	5221	4960
L15, mm		1324	1631	1621	1331	1371	1371
L16, mm		694	531	1071	531	1031	1013
L17, mm		1322	1721	1491	1421	2321	2321
L18, mm		1050	400	400	400	750	750
B1, mm		1060	1060	1060	1060	1060	1307
B2, mm		2453	2810	2790	2940	2863	2863
B3, mm		2053	2330	2310	2460	2372	2372
B4, d, mm		3041	3352	3441	3552	3655	4071
H1, mm		2473	2783	2855	2858	2967	3096
H2, mm		400	400	400	400	400	400
H3, mm		952	1358	1384	1428	1463	1463
H4, mm		241	300	281	283	294	294
H5, mm		3412	3773	3844	3970	4070	4070
H6, mm		2198	2318	2323	2524	2539	2539
H7, mm		1200	1308	1284	1332	1332	1422
H8, mm		1687	1706	1642	1813	1966	1656
H9, mm		875	998	969	1013	998	1058

Dimensions TT200 boiler firebox



Burner installation

1. Burner flame head
2. Elastic heat insulation material
3. Intermediate flange for burner installation
4. Installation burner plate
5. Air port

* value of length L3 within the range of 50/400 mm in increments of 50

Rated steam capacity t/h	1	2	3	4	5	6	8	10	12	14	16	20	25
d, mm	300	310	350	380	370	500	500	530	530	530	530	530	530
S, mm				300				295	291	291	290	430	430
S1, mm							20–60						
D, mm	622	772	872	968	1100	1068	1068/940 1068*	1330/1200 1244*	1428/1300	1530/1400	1530/1400	1628/1500	1628/1500
L, mm	2490	2895	3190	3190	3340	3940	4740	5245	5305	5645	5825	6135	6105
L1, mm	2175	2580	2875	2875	3025	3625	4425	4930	5035	5335	5535	5820	5695
L2, mm	500	504	500	500	600	600	600	600	600	600	700	700	700

* For 8 bar boilers

Selecting and installing of the burner

The design of the TT200 boiler provides the possibility to operate with modern high-efficiency automated fan burners designed for combustion of gaseous and liquid fuel. It is recommended to use multi-stage and modulated burners with forced air supply and with regulated air excess factor.

When ordering an ENTROPIE steam boiler TT200 complete with burner, the type of fuel being used must be specified. If gas is to be used as the main or reserve fuel, it is necessary to indicate the gas pressure.

If the burner is chosen independently during ordering, it is necessary to indicate the model. In this case, the bracket for the corresponding burner will be prepared along with the boiler.

When no information about the burner is available, the boiler will be fitted with a blind flange, and the boiler will be secured by the organisation that installed the burner.

When choosing the burner, make sure that its connecting dimensions and flame head dimensions comply with the technical requirements for the boiler and this technical description.

If the burner is fitted with a short or long flame head, it is necessary to order additional extension and/or intermediate flange. In selecting a boiler with gas burner, it is necessary to check that the burner gas line includes a compensator. The compensator will remove mechanical loads on the gas pipeline during boiler operation.

The space between the burner flame head and the rigid heat insulation of the boiler should be sealed with an elastic heat-insulating material attached to the boiler (this should be installed around the perimeter of the flange burner hole).

Quality of boiler water

Special attention should be paid to the quality of the boiler water, which in most cases is the main factor affecting the service life of the boiler and the boiler unit as a whole.

Water conditions should ensure that the boiler operates without damaging its parts due to lime-scale and sludge deposits, deviations from the regulatory quality indicators to a dangerous degree, or as a result of metal corrosion. For steam boilers, the quality of water must be constantly monitored.

Feed water quality indicators

Description of indicator	Value
Transparency of water by font (using the Snellen method), cm, min	40/20
Total hardness, mkg-equiv/kg	30/100
Content of dissolved oxygen, mkg/kg	50/100
pH value at the temperature of 25°C	8.3/10.5
Fe content, mg/l	Not rated
Cu content, mg/l	Not rated
Oil, fats, mg/l, max	3.0
Fe	0.3 mg/l
Cu	1.0 mg

NOTE

The values for boilers running on liquid fuel are indicated in the numerator, and for boilers running on other types of fuel, in the denominator.

Minimum scope of water analyses:

- feed water: pH value, total hardness, content of oxygen;
- boiler feed water: pH value, content (presence) of phosphates, electrical conductivity.

The water treatment log-book should always be available in the boiler room, in which information on the water-chemical conditions of the boiler should be recorded.

The boiler operation assumes the use of feed water and boiler water special treated (at least softened water). The method of water treatment must be selected by a specialized organisation. In doing so, the quality indicators of feed water and boiler water of the boiler TT200 shall conform to the values given in the tables presented in this section.

In order to avoid corrosion when the boiler is turned off (in case of long outage or delay in commissioning), qualified preservation of boilers and other installations should be carried out.

Boiler water quality indicators

Description of indicator	Value
pH	10.5–12
Electrical conductivity at 25°C, μS	30–6000
Phosphates, mg/l	5–20
When using oxygen-binding substances (sodium sulfite), mg/l	10–30

Boiler configuration

The unit is supplied in conditions ready for operation with complete delivery set and functional control. The complete delivery set of the boiler TT200 provided at the manufacturing plant allows for simplified set-up, quick installation, and ensures fully automatic, reliable and safe operation of the boiler. 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, a TT200 boiler can be delivered without accessories, or as a partial delivery set with equipment (by parts). In this case, the customer will independently equip the boilers with burners, safety and monitoring devices.

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

- boiler assembly,
- counter-flange for outgoing gas pipe,
- heat-insulating wool for sealing the burner embrasure,
- safety valves,
- safety group,
- sensors to monitor levels,
- visual monitoring of levels (sight glass),
- safety and I&C devices,
- upper blowing system,
- lower blowing system,
- steam supply system,
- feed water system,
- feed water pump module,
- installation and operation manual,
- manufacturer's registration documentation.

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,
- connecting element from flue gas pipe of the boiler to flue tube,
- diesel fuel storage tank.

NOTE

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

Boiler accessories

Depending on the customer's wish and on additional request, the manufacturer can deliver the following accessories for TT200 boilers:

- installation plate with holes for burner installation,
- boiler cleaning kit,
- intermediate flange for burner installation,
- boiler maintenance sites with handrails and ladders,
- sealing cord.

Boiler placement

The distance from the boiler front to the wall of the boiler room should leave enough space for boiler maintenance and repair, and no less than 3 m. For boilers with a capacity of up to 2 t/h, the distance can be reduced to 2 m. In case the boiler is installed near walls or columns, the insulation of the boilers should not be in close contact with the boiler room wall if there is no passageway, and there should be a minimum distance of 70mm between them.

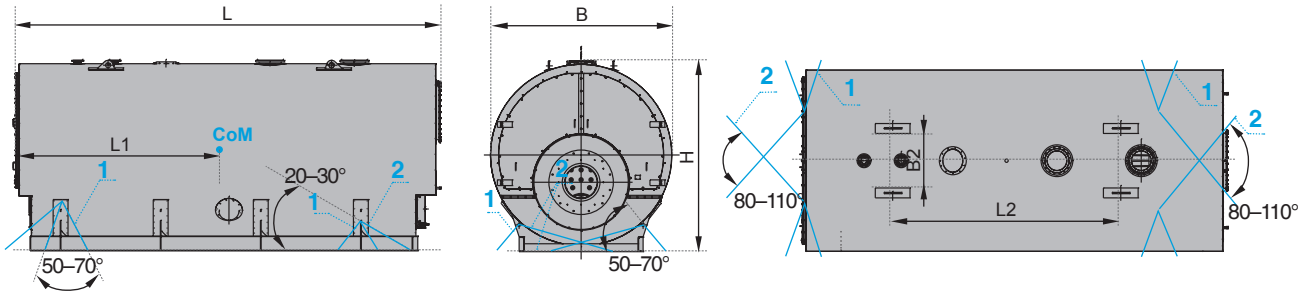
The side passageway should be wide enough for carrying out maintenance and repair and no less than:

- 1.5 m for boilers with steam capacity below 4 t/h,
- 2 m for boilers with steam capacity of 4 t/h and higher.

The width of the passageway between the boiler (economizer) and the rear wall of the boiler room should be at least 1 m.

Deviations from the recommended distances are allowed but only within the distances specified in the local regulatory documents.

Transportation



Boiler transportation diagram

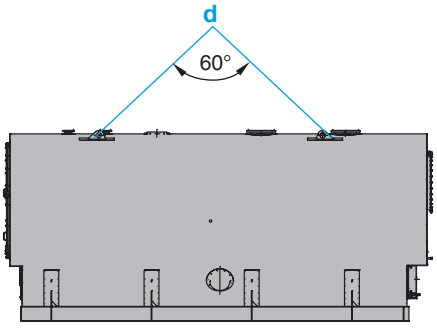


Diagram for boiler slinging

d – Bolt eye for slinging
• – Center of mass
—— – Means of fastening
1 – Tilt protection
2 – Diagonal fastening

Dimensions necessary for transportation of 8 bar boiler

Description	Rated steam capacity, t/h												
	1	2	3	4	5	6	8	10	12	14	16	20	25
Length, L, mm	3793	4220	4672	4670	4925	5588	6387	6903	7167	7471	7740	8050	8699
Width, B, mm	2015	2255	2480	2526	3012	2860	2844	3043	3352	3442	3552	3655	3654
Height, H, mm	2487	2695	2816	2945	3318	3318	3294	3500	3870	3923	4124	4137	4138
Distance, B2, mm	350	391	391	391	289	288	288	288	280	380	280	388	388
Center of mass, L1, mm	1805	1886	1920	1785	1906	2257	2976	2028	3141	3510	3645	3930	4354
Distance, L2, mm	2000	2328	2490	2490	2764	3300	3865	4150	3990	4400	4400	5000	5000
Dry boiler weight (weight tolerance 4.5 %), kg	5200	5900	6400	9600	11,900	13,200	15,500	19,300	29,300	26,200	35,100	41,600	41,900

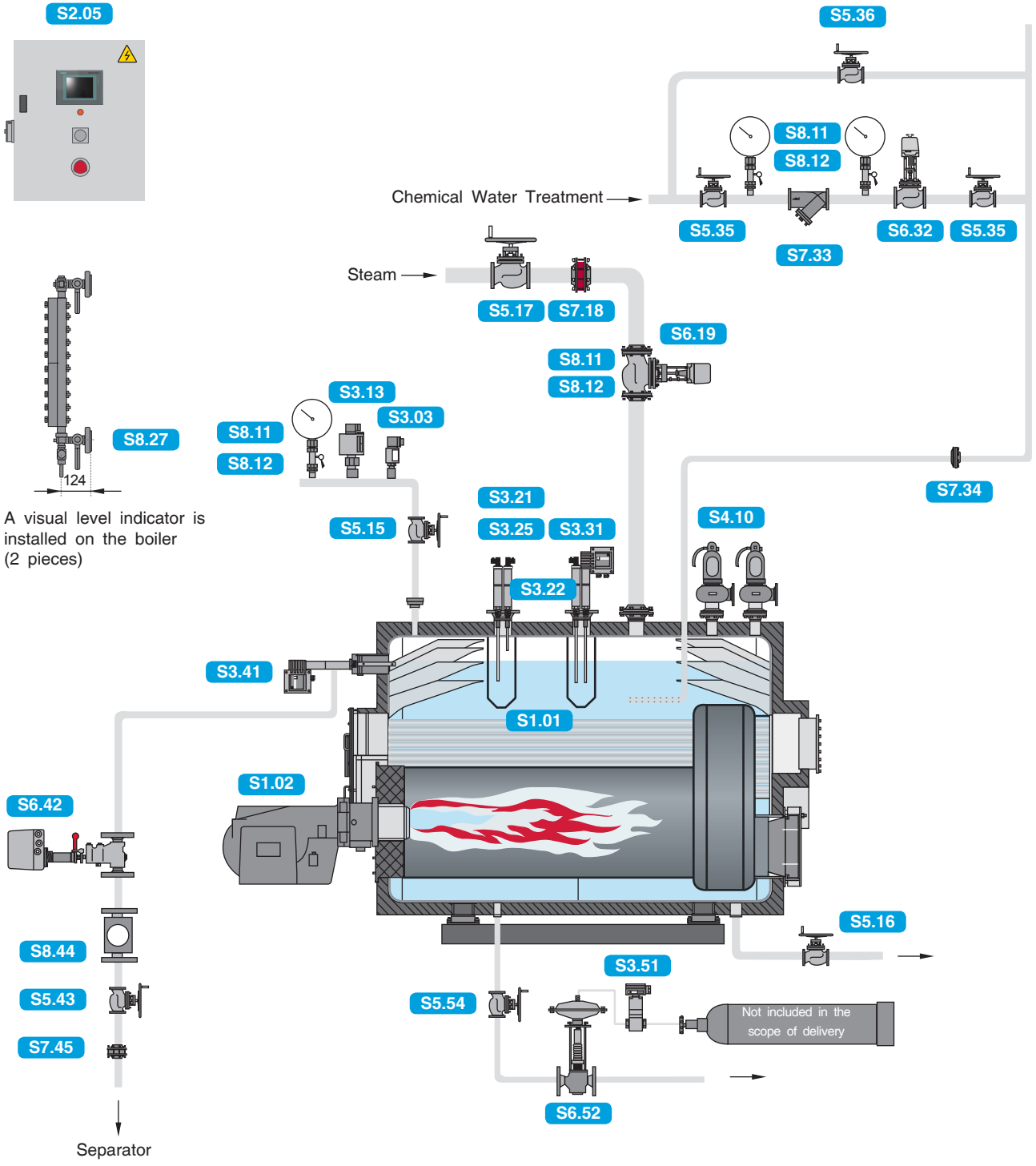
Dimensions necessary for transportation of 12 bar boiler

Description	Rated steam capacity, t/h												
	1	2	3	4	5	6	8	10	12	14	16	20	25
Length, L, mm	3793	4193	4719	4670	5590	5984	6424	6867	7167	7471	7760	8050	8699
Width, B, mm	2015	2269	2466	2526	2704	2704	2846	3043	3352	3442	3552	4150	4070
Height, H, mm	2487	2564	2819	2945	3090	3093	3294	3503	3870	3923	4124	4137	4138
Distance, B2, mm	350	391	391	391	318	318	288	288	280	380	280	388	388
Center of mass, L1, mm	1805	1732	2028	1785	2517	2916	2804	3042	3141	3510	3645	3930	4354
Distance, L2, mm	2000	2437	2490	2490	3186	3586	3865	4155	3990	4400	4400	5000	5000
Dry boiler weight (weight tolerance 4.5 %), kg	5800	7600	10,500	10,600	15,800	17,900	17,500	23,500	29,300	32,000	35,100	41,600	41,900

Dimensions necessary for transportation of 16 bar boiler

Description	Rated steam capacity, t/h												
	1	2	3	4	5	6	8	10	12	14	16	20	25
Length, L, mm	3793	4193	4719	4711	5584	5984	6313	6867	7167	7471	7760	8050	8699
Width, B, mm	2030	2269	2466	2526	2704	2704	2857	3043	3352	3442	3552	4150	4070
Height, H, mm	2560	2564	2819	2934	3093	3093	3275	3503	3870	3923	4124	4137	4138
Distance, B2, mm	350	391	391	391	318	318	600	288	280	380	280	388	388
Center of mass, L1, mm	1805	1732	2028	2013	2517	2311	2804	3042	3141	3510	3645	3930	4354
Distance, L2, mm	2000	2437	2490	2490	3186	3586	3865	4155	3990	4400	4400	5000	5000
Dry boiler weight (weight tolerance 4.5 %), kg	5800	7600	10,500	11,600	15,800	17,900	19,900	23,500	29,300	32,000	35,100	41,600	41,900

Steam boilers TT200 with piping



S1	Main equipment	S4	Safety valves	S7	Filters, check valves
S2	Control system	S5	Shut-off valves	S8	Visual inspection glass
S3	Electronic components	S6	Control valves	S9	Other

NOTE

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

Control system for boiler and auxiliary equipment