

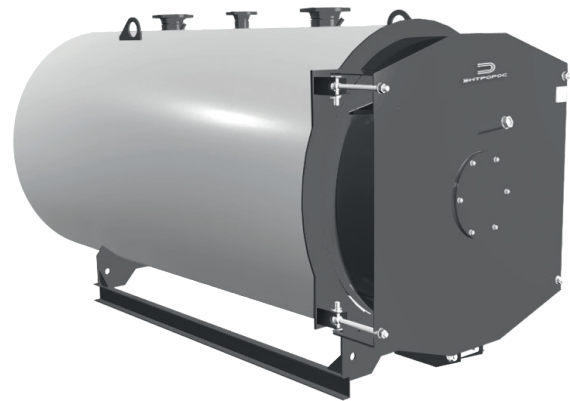
Field application of TT50 boilers

ENTROPIE boilers TT50 are two-pass hot water gas-fired boilers with a capacity ranging from 0.21 to 1.74 MW.

Fuel type: gas, light liquid fuel.

ENTROPIE boilers TT50 are designed for heating buildings and facilities, and providing engineering processes for various purposes.

The boilers can be transported by railway, road and water transport in accordance with the goods transportation regulations applicable for each kind of transportation. Boilers are delivered as a single transportable pre-assembled unit.



General view of the TT50 boiler

Principle operation of TT50 boilers

The ENTROPIE boiler TT50 is designed as a two-pass gas-fired boiler. The combustion chamber (first gas pass) is formed of a flue tube (1) and flat head (2). Convective heating surfaces, the fire tubes of the second pass (3), are located axisymmetrically around the combustion chamber.

The boilers with a capacity ranging from 560 kW to 1740 kW have a two-row arrangement of fire tubes. The two-row arrangement of fire tubes (as well as the use of heat-resistant intensifiers (4)) increases the rate of heat transfer, thus increasing the efficiency of the boiler.

The fully wetted reversal chamber (5) is formed by a tube plate (6) and boiler front door lining (7) made in a special design version.

The front door of the boiler (8) can be fully opened with the burner (9), which is installed in a convenient position for the customer. With the front door open, easy access to the combustion chamber and fire tubes is provided when undertaking maintenance and cleaning of the boiler. Inspection and cleaning of the reversal chamber are carried out via the combustion chamber.

The flue gas collector (10) is cleaned via the inspection hole (11) of the boiler flue gas collection chamber.

The water inlet and outlet (12, 13), as well as the emergency line (14) are located on the top of boiler. Nozzles for temperature sensors are fitted on the water inlet (12) and outlet (13).

A water guiding element (15) is mounted under the water inlet providing the most effective intra boiler distribution of the coolant.

A wide shell side and a large volume of water in the boiler provide the best operating conditions within the entire range of heat output. A burner plate (16) is provided for installation of the burner on the front door. Visual inspection of the flame in the combustion chamber is carried out using the sight glass (17). The flue gas outlet (18) is located at the top of the back wall of the boiler.

In order to distribute the weight load evenly, the boiler has steel bearing supports (19) welded to the bottom of the main body of the boiler. The boiler can be mounted

on an even, sturdy floor that withstands its weight, without needing to use an additional base.

The body of the boiler has a cylindrical shape. The outer casing consists of the boiler shell (20), and front-end and rear-end tube plates (6, 21).

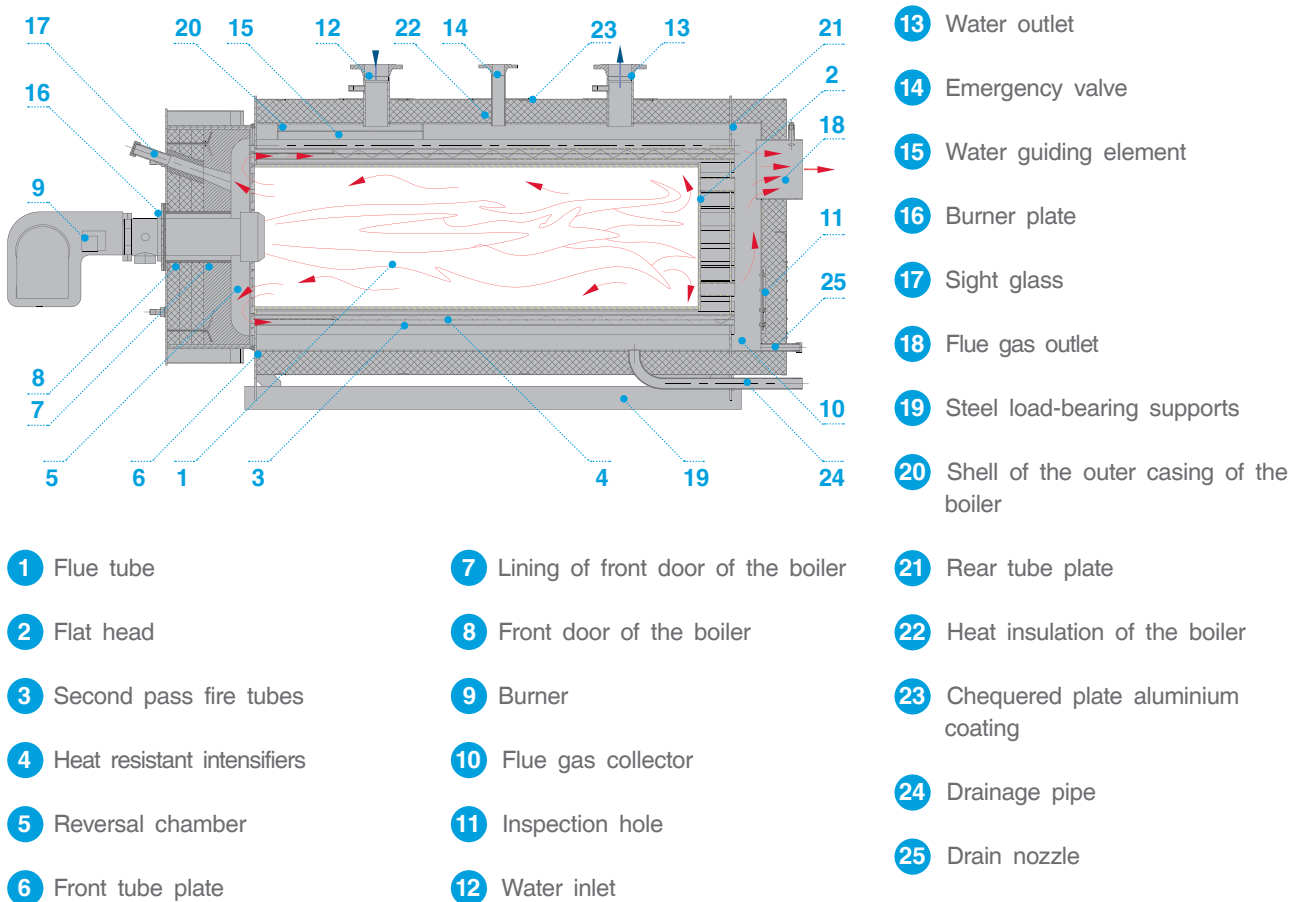
The boiler's high-efficiency solid heat insulation (22) consists of laminated mineral fiber mats 100 mm thick. The boiler surface is lined with a checkered aluminium coating providing an impressive appearance that lasts the entire service life of the boiler (23).

The drainage pipe (24) in the lower part of the boiler allows the coolant to be completely removed if necessary. A drain nozzle (25) is provided in the lower part to remove condensate.

To move the boiler during installation and handling, special holes are provided on the sides of the boiler, which are located symmetrically with respect to the boiler's center of mass.

The boiler's low aerodynamic resistance allows for optimal selection of the burner.

Diagram of TT50 boiler

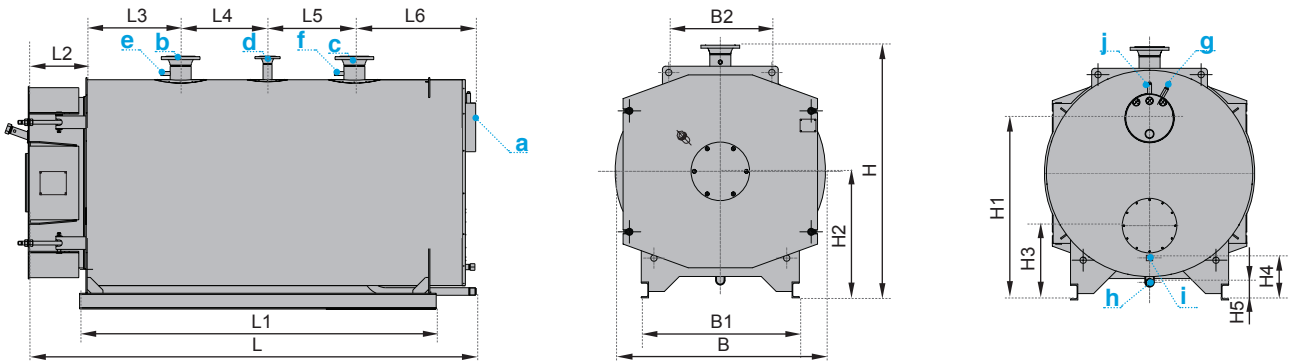


Technical specification of TT50 boilers

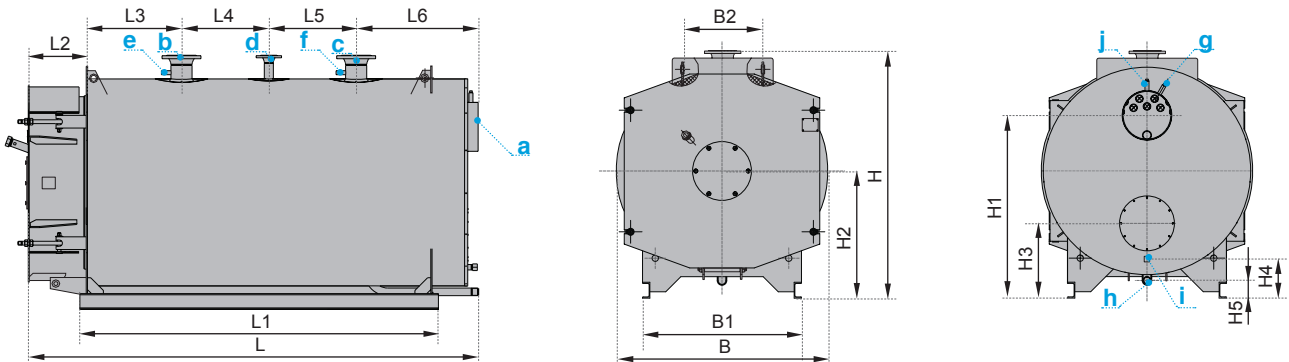
Boiler size	250		400		560		660		870		980		1360		1530		1740	
	210	250	310	400	420	560	561	660	661	870	871	980	1100	1360	1361	1530	1531	1740
Rated heat output, kW	210	250	310	400	420	560	561	660	661	870	871	980	1100	1360	1361	1530	1531	1740
Fuel type	Gas, light liquid fuel																	
Maximum operating pressure of water, bar	6																	
Maximum water temperature, °C	110																	
Minimum water temperature at boiler inlet, °C	60																	
Minimum water flow rate, m ³ /h	Not regulated																	
Efficiency*, %	95.2	94.5	93.3	91.7	94.2	92.9	92.9	91.8	94.6	93.2	93.2	92.4	94.2	93.1	93.1	92.3	94.2	93.5
Rated water flow rate for $\Delta t = 15^{\circ}\text{C}^*$, m ³ /h	12.3	14.6	18.4	23.8	25.0	33.3	33.4	39.3	39.3	51.8	51.8	58.3	65.5	80.9	81.0	91.1	91.1	103.6
Hydraulic resistance of water path at the coolant flow rate for $\Delta t = 15^{\circ}\text{C}^*$, kPa	0.30	0.40	0.60	1.00	1.10	1.90	1.90	2.60	1.75	3.05	3.05	3.85	3.10	4.73	4.73	6.00	4.35	5.62
Flue gas flow rate*, kg/s	0.090	0.108	0.136	0.178	0.183	0.248	0.247	0.293	0.287	0.383	0.383	0.433	0.480	0.600	0.600	0.680	0.660	0.760
Aerodynamic resistance of the gas path for maximum capacity*, Pa	135	200	310	530	200	360	360	520	260	460	460	600	425	670	670	865	500	655
Flue gas temperature*, °C	126	141	164	196	144	174	174	197	139	167	168	184	146	169	170	185	146	160
Firebox volume, m ³	0.35	0.35	0.35	0.35	0.51	0.51	0.51	0.51	0.78	0.78	0.78	0.78	1.32	1.32	1.32	1.32	1.84	1.84
Boiler water volume, m ³	0.35	0.35	0.35	0.35	0.74	0.74	0.74	0.74	0.96	0.96	0.96	0.96	1.29	1.29	1.29	1.29	1.70	1.70
Dry boiler weight (weight tolerance 4.5 %), kg	1130	1130	1130	1130	1568	1568	1568	1568	2019	2019	2019	2019	2891	2891	2891	2891	3653	3653

* Indicated for natural gas 8000 Kcal/m³

Overall and connecting dimensions of TT50 boilers



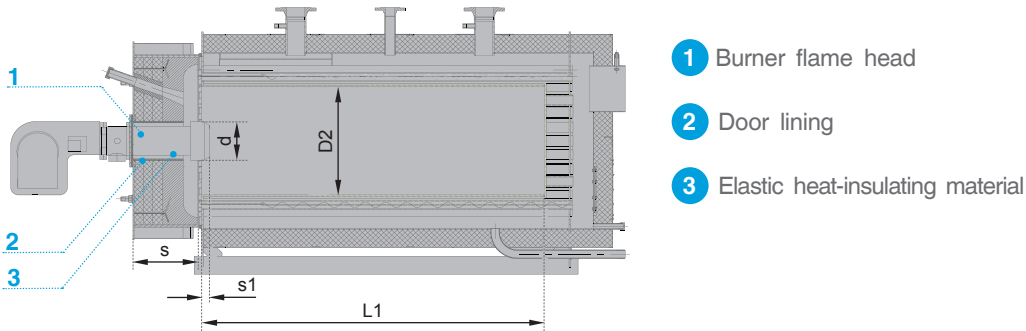
Overall and connecting dimensions of boilers with a heat output of 210–980 kW



Overall and connecting dimensions of boilers with a heat output of 1100–1740 kW

Boiler size		250	400	560	660	870	980	1360	1530	1740
Output range, kW		210–250	310–400	420–560	561–660	661–870	871–980	1100–1360	1361–1530	1531–1740
Flue gas outlet, DN	a	200	200	250	250	300	300	350	350	350
Water inlet, DN	b	100	100	100	100	125	125	125	125	150
Water outlet, DN	c	100	100	100	100	125	125	125	125	150
Safety valve, DN	d	40	40	50	50	50	50	65	65	80
Water temperature sensor at inlet	e	G 1/2-B								
Water temperature sensor at outlet	f	G 1/2-B								
Flue gas temperature sensor	g	G 1/2-B								
Boiler water drainage	h	G 1 1/2-B								
Condensate removal	i	G 1-B								
Draft and head gauge	j	G 1/2-B								
Length, mm	L	2389	2389	2511	2511	2731	2731	3137	3137	3345
Width, mm	B	1040	1040	1210	1210	1330	1330	1490	1490	1640
Height, mm	H	1313	1313	1483	1483	1603	1603	1751	1751	1901
Length of supporting frame, mm	L1	1916	1916	2038	2038	2258	2258	2550	2550	2758
Door width, mm	L2	253	253	253	253	255	255	375	375	375
Distance, mm	L3	587	587	492	492	592	592	590	590	640
Distance, mm	L4	500	500	500	500	550	550	700	700	700
Distance, mm	L5	400	400	500	500	550	550	700	700	700
Distance, mm	L6	631	631	748	748	768	768	762	762	920
Width of supporting frame, mm	B1	800	800	1000	1000	1000	1000	1080	1080	1179
Distance, mm	B2	577	577	622	622	652	652	598	598	598
Distance, mm	H1	885	885	1030	1030	1150	1150	1290	1290	1435
Distance, mm	H2	655	655	740	740	800	800	870	870	945
Distance, mm	H3	465	465	470	470	470	470	470	470	545
Distance, mm	H4	266	266	266	266	266	266	258	258	258
Distance, mm	H5	111	111	111	111	111	111	101	101	101

Dimensions of TT50 boiler firebox



Burner installation

Boiler size	250	400	560	660	870	980	1360	1530	1740
Output range, kW	210–250	310–400	420–560	561–660	661–870	871–980	1100–1360	1361–1530	1531–1740
Outer diameter of installation hole, d, mm	200	200	220	220	300	300	300	300	300
Thickness of cover, taking into account the adapter plate, s, mm	275	275	275	275	275	275	397	397	397
Burner installation size, s1, mm	20–60								
Firebox diameter, D2, mm	510	510	600	600	700	700	850	850	960
Length of flue tube (firebox), L1, mm	1738	1738	1858	1858	2078	2078	2368	2368	2576

Selecting and Installing of the burner

On ENTROPIE boilers TT50, the use of automatic multistage and modulated burners (gas, liquid fuel or combined burners) is permitted.

To order a hot water ENTROPIE boiler TT50 complete with burner, it is necessary to indicate the gas pressure in case it is used with gas as the main or reserve fuel.

Preparation of the burner plate must be carried out by the organisation that installed the burner. When ordering a burner, check that its connecting dimensions and flame head dimensions comply with the technical requirements for the boiler and with this technical data sheet. If the burner is fitted with a short or long flame head, an additional extension and/or intermediate flange must be ordered.

The burner gas line must contain a compensator. This will relieve mechanical loads on the gas pipeline, both during boiler operation and in case of accidental changes in the position of the boiler front door after opening/closing during maintenance and cleaning of the boiler. Equipping the burner is subject to the manufacturer's requirements. The burner flame head must be completely inserted in the firebox.

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

Quality of boiler water

Operating the boiler without pre-boiler or intra-boiler water treatment is prohibited.

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.

The water regime must ensure the boiler operates without its parts being damaged by lime-scale or sludge deposits, or as a result of metal corrosion, mostly caused by deviating from the standard quality indicators given in the table.

The water composition at the boiler inlet should comply with the specified indicator values. The method of water treatment must be selected by a specialized organisation.

The water treatment log-book shall be permanently kept in the boiler room, in which all data on the boiler water-chemical conditions should be recorded on a regular basis.

Description of indicator	Value
Transparency of water by font (using the Snellen method), cm, min	30
Carbonate hardness, mkg-equiv./kg, max	700
Content of dissolved oxygen, µg/kg, max	100
Content of iron compounds (in terms of Fe), µg/kg, max	500
pH value at 25°C	9.5–8.3
Free carbonic acid, mg/kg	None
Content of oil products, mg/kg, max	1.0

The use of non-freezing fluids as coolants is permitted as agreed with the manufacturer.

Boiler configuration

Several options of boiler delivery sets are available depending on the equipment: full delivery set, partial delivery set, or delivery without parts.

The full delivery set includes a boiler with burner equipment, set of parts and components installed according to the information specified in the questionnaire.

Manufacturer fits boilers with a control unit, necessary safety devices (for ensuring mode adjustment, parameter monitoring, boiler shutdown, reliable operation and safe maintenance), valves, pumps, actuators with necessary piping as well as a burner device (burners). Due to factory installation, the optimal and reliable operation of all boiler units is guaranteed.



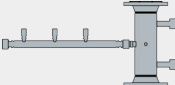

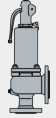



Sealing wool is supplied as part of the boiler delivery set for sealing the annular gap between the burner flame head and rigid thermal insulation of the front door.

At the customer's request, the boiler can be supplied with the partial delivery set equipment (boiler fitted with a burner and relief valves as well as operating documentation) or without parts (only the boiler and operating documentation). In the latter case, the customer will independently equip the boiler with burners, safety devices and automatic controls.

When ordering a boiler, it is necessary to select the type of delivery set and if necessary, agree on the scope of delivery.

Boiler accessories

At the customer's request, ENTROPIE can additionally supply the following boiler accessories:

	Plate for burner
	Flange for burner
	Collecting channel of the safety group for connecting sensors and monitoring devices
	Pressure limiters for minimum and maximum pressure
	Safety valves
	Temperature sensors
	Three-way valve
	SYR Water level limiter
Other accessories for boiler installation and maintenance	

Boiler placement

The distance from the boiler front to the boiler room wall must leave enough space for boiler maintenance and repair, but no less than 3 m. In this case, for boilers running on gaseous or liquid fuel, the distance from the protruding parts of the burner devices to the boiler room wall should be at least 1 m. The width of passageways between the boiler and the boiler room wall should be at least 1 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 70 mm between them.

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

Transportation

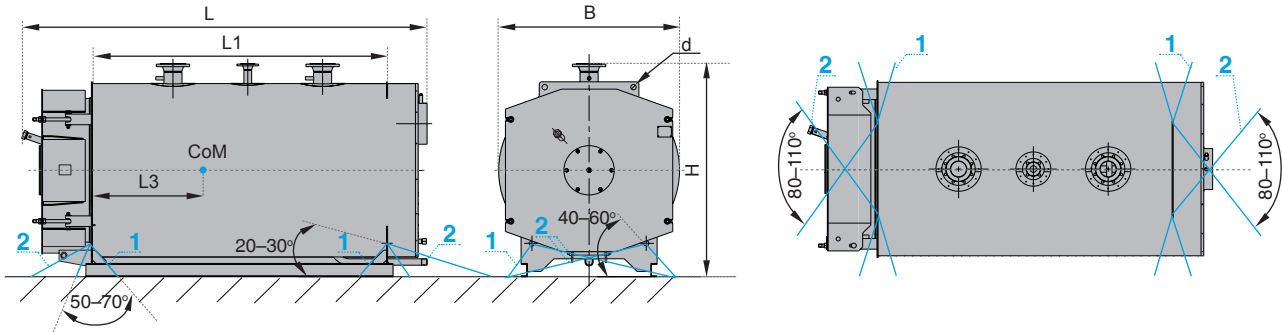


Diagram of transportation of boilers with a heat output of 210–980 kW

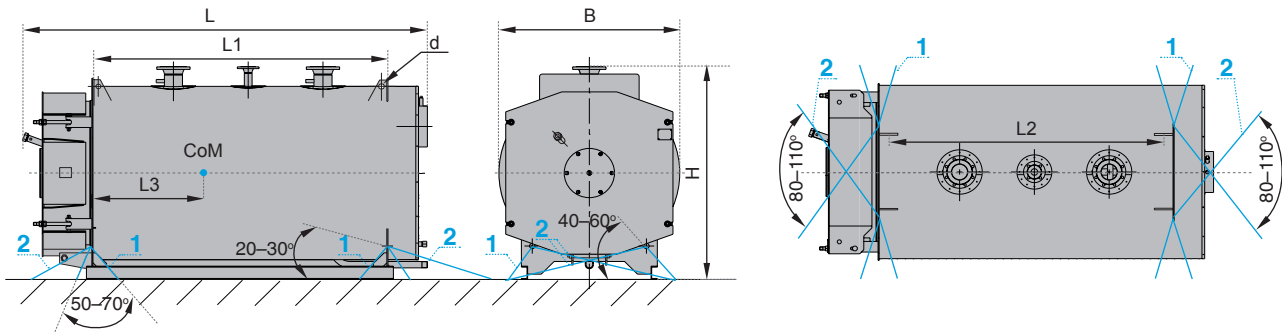


Diagram of transportation of boilers with a heat output of 1100–1740 kW

- – Center of mass
- – Means of fastening
- 1 – Tilt protection
- 2 – Diagonal fastening

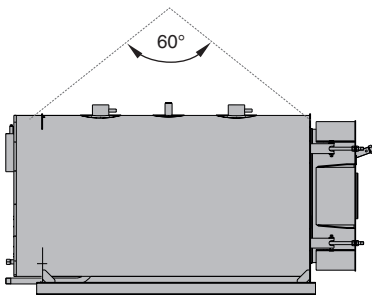


Diagram for slinging boilers with capacity of 210–980 kW

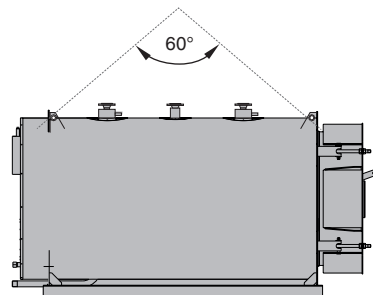


Diagram for slinging boilers with capacity of 1100–1740 kW

Boiler size		250	400	560	660	870	980	1360	1530	1740
Output range, kW		210–250	310–400	420–560	561–660	661–870	871–980	1100–1360	1361–1530	1531–1740
Length	L mm	2529	2529	2651	2651	2871	2871	3285	3285	3493
Height	H mm	1313	1313	1483	1483	1603	1603	1751	1751	1901
Width	B mm	1040	1040	1210	1210	1330	1330	1490	1490	1640
Diameter of hole for sling	d mm	40	40	40	40	40	40	40	40	40
Distance between front and back	L1 mm	1820	1820	1942	1942	2162	2162	2450	2450	2658
Distance between eye bolt holes	L2 -	-	-	-	-	-	-	2362	2362	2570
Center of mass	L3 mm	765	765	823	823	937	937	1017	1017	1115
Weight	m kg	1130	1130	1568	1568	2019	2019	2891	2891	3653