

# BAHR'12



## HIGH PRESSURE STEAM BOILER, THREE PASS REVERSE FLAME, 96% EFFICIENCY

RANGE	from 204 kW (300 kg/h) to 4089 kW (6000 kg/h)							
TYPE	STD		HPO			HP		
	smooth pipe		ESA pipe			ESALU pipe		
FUEL	gas, light & heavy oil		gas, light oil			gas		
DESIGN PRESSURE	12 bar (higher pressure on request)							
MODELS	300	400	500	600	800	1000	1250	1500
	1750	2000	2500	3000	3500	4000	5000	6000

## DESCRIPTION

High pressure steam boiler, three pass reverse flame, with efficiency from 90% up to 96%<sup>(1)</sup> according the installed smoke tube (STD, HPO, HP).

BAHR'12 is a family of packaged smoke tube steam boilers, three pass reverse flame, wet back. Standard safety pressure up to 12 bar (higher pressure available on request) and output from 300 to 6000 kg/h. It can be operated with liquid or gaseous fuels. Every model is complete with regulations and safety accessories for automatic operation and easy commissioning.

In compliance to the current laws, each steam boiler undergoes a conformity assessment, carried out by a Notified Body. The conformance to the essential safety requirements demanded by the European Pressure Equipment Directive 2014/68/UE (PED) is guaranteed by the CE mark.

### Design features:

By means of the reverse flame principle the smoke gases in the combustion chamber are diverted to the front, then reversed again to the smoke tube sections and discharged through the chimney connection. The appliance is designed to ensure low heating loads in the combustion chamber and low superficial loads.

- **Boiler body:** is made up of a cylindrical shell and a wet back furnace, made of high quality steel. All the materials have certificates attesting their chemical and mechanical characteristics, the controls are carried out during each production stage, and, their suitability for use as well. The welding seams are carried out by qualified personnel in compliance to certified procedures and are subjected to Non Destructive Tests, in accordance to an internal "Manufacturing and Control" program. Once the boilers have been manufactured they are subjected to hydraulic testing in accordance to the requirement 7.4 – Annex I, laid down in the Directive 2014/68/UE (PED).
- **Smoke tubes:** made of high quality steel, are welded to tube plates. Pipes are equipped with steel turbulators or fitted with aluminum and/or steel inserts according the installed smoke tube.
- **Front door:** is built in welded steel plate, completely clad internally with a layer of insulation material and with a layer of high density refractory material. The door is fitted with hinges which enable it to be easily adjusted and quickly opened. Moreover, the door is fitted with a self-cleaning sight glass for combustion control during boiler operation.
- **Rear smoke-box:** is built in welded steel plate and fixed on to the tube plate by nuts for an easy access to it. It is fitted with a small door for cleaning purposes and an horizontal flue connection (vertical on request), with a diameter sized to the boiler's output. The rear smoke-box is pre-arranged for the installation of an integral economizer.
- **The base:** is built with a steel frame, welded to the tube plates and closed with steel plates.
- **Walkway:** positioned on the top part of the boiler, is made of steel, covered with chequered plate and completed; on request with handrail and access ladder.
- **Insulation:** the shell is thermally insulated with a 100 mm rock wool cladding binded with high density, thick thermosetting resins, suitably supported and covered externally in 10/10 thick enamelled aluminum. The frontal parts of the boiler are also insulated with rock wool and covered externally with a metallic box.

### Standard equipment: <sup>(2)</sup>

- Steam main globe valve.
- n. 2 spring loaded safety valves.
- n. 2 reflecting level indicators, with flanged connections, purging and cut-off cocks.
- n. 1 large manometer with 3 way cock for manometer calibration.
- n. 1 safety pressure switch with manual reset onto the board panel, CE PED certified.
- n. 1 limit working pressure switch.
- n. 1 regulation pressure switch for two stages burners or probe for modulating burners.
- n. 2 safety minimum level switches, with manual reset CE certified.
- n. 2 water level probes for ON-OFF pump regulation.
- Feeding group complete with 2 vertical multistage centrifugal pumps.
- Valve assembly for feeding circuit, with relevant pipes already fitted.
- Automatic group for level control.
- n. 1 manual bottom blowdown valve.
- Man-hole on top and hand-hole on water side.
- Integral steam drier for high steam quality.
- Blind burner plate.
- Turbulators (STD version) or special high efficiency pipes fitted with inserts (HPO, HP versions).
- Lifting lugs.
- Control board panel IP55 400V - 3+N - 50Hz
- Document folder enclosing:
  - Manufacturer's Declaration of Conformity in compliance with the Annex VII of the European Directive 2014/68/UE (PED)
  - Installation, operation and service manuals.
  - Certificates of safety components.
  - Control board's electric schemes and related Declaration of Conformity.
  - Water characteristics: requirements concerning the quality of water supply, the water in the boiler, frequency and type of sample tests to do.

### Options:

- Kit of "Second boiler water feeding pump"
- Kit of "maximum safety level"
- Kit TDS (Total Dissolved Salts)
- Kit of "Automatic de-sludging" (Blow down)
- Kit "72 hr" Supplied with electronic board panel Unical, model IML (Industrial Multi Logic) or IMC
- Kit EC (gas) / Kit EC (oil)
- Pre-drilled burner plate according to request
- Oil or gas fired burner
- Emergency boiler water feeding group (steam injector)

### Special versions

#### BAHR'12 72 hr

- equipped with either "IML" or "IMC board panel" and "Kit 72 hr" to obtain the certification for operation "without continuous surveillance" up to a maximum of 72 hr.

#### EC / HPOEC / HPEC versions

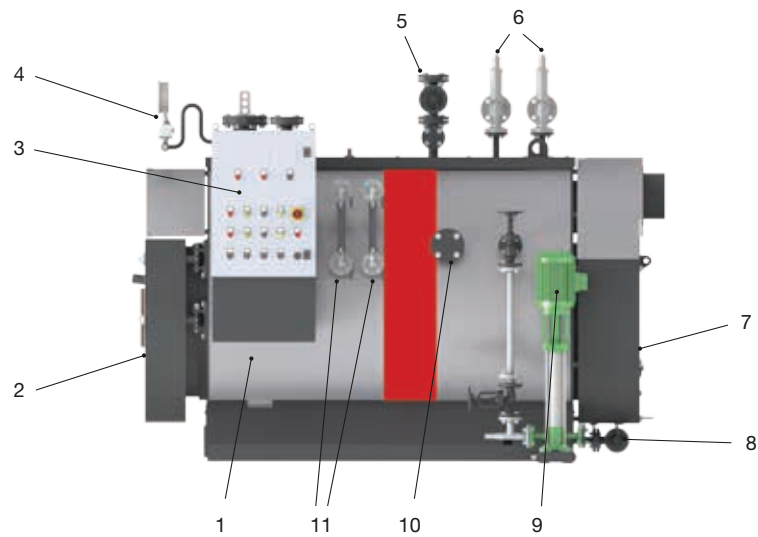
- To increase more the already high steam boiler efficiency, without influencing the dimensions the boilers are already preset to fit, on request (in the factory or later, on the field), the economizer Kit EC, which is specific for each model and is available for both, gas and oil versions.

(1) This value is intended with economizer and may change according working pressure and load conditions.

(2) The quantity and the model may vary according to the configuration.

## MAIN COMPONENTS

1. Boiler body
2. Front door
3. Board panel
4. Instruments assembly
5. Steam valve
6. Safety valve
7. Rear smoke chamber
8. Drain
9. Pump feeding group
10. TDS connection
11. Level gauge



## TECHNICAL DATA

Model	Steam production kg/h	Nominal output * kW	Nominal input STD ** kW	Nominal input HPO ** kW	Nominal input HP ** kW	Max. working pressure bar	Water content at level l	Total volume l	$\Delta P$ smoke side mbar	Burner head min. length mm	Burner head max. dia. mm
300	300	204	226.7	221.7	214.7	12	540	730	2.2	340	210
400	400	273	303.3	296.7	287.4	12	540	730	2.6	340	210
500	500	341	378.9	370.7	358.9	12	820	1030	2.8	340	240
600	600	409	454.4	444.6	430.5	12	820	1030	3.5	340	240
800	800	560	622.2	608.7	589.5	12	1080	1500	3.8	380	240
1000	1000	700	777.8	760.9	736.8	12	1080	1500	4.2	380	240
1250	1250	852	946.7	926.1	896.8	12	1555	2195	4.5	400	280
1500	1500	1022	1135.6	1110.9	1075.8	12	1555	2195	5.1	400	280
1750	1750	1193	1325.6	1296.7	1255.8	12	2005	2810	5.5	420	280
2000	2000	1363	1514.4	1481.5	1434.7	12	2005	2810	6.0	420	280
2500	2500	1704	1893.3	1852.2	1793.7	12	2890	3950	6.8	420	360
3000	3000	2045	2272.2	2222.8	2152.6	12	2890	3950	7.0	420	360
3500	3500	2386	2651.1	2593.5	2511.6	12	3370	4600	7.3	450	360
4000	4000	2726	3028.9	2963.0	2869.5	12	4155	5780	8.0	450	400
5000	5000	3408	3786.7	3704.3	3587.4	12	5800	7730	8.8	450	400
6000	6000	4089	4543.3	4444.6	4304.2	12	6760	8600	8.8	450	420

\*with feeding water temperature = 80°C and pressure = 12 bar

\*\* According working pressure and load conditions

## PRODUCT PLUS VALUES

- **EXCELLENT WATER EFFICIENCY**  
up to 96% with special ESALU and economiser
- **SMOKE CHAMBER PREARRANGEMENT**  
for possible economiser integration, also with the boiler already installed
- **EFFICIENT THERMAL INSULATION**  
given by:
  - high total thickness, made by joining two rock wool layers with aluminium foil
  - insulation between the casing and the hot parts of the boiler body for thermal bridges elimination
- **REVERSIBLE DOOR OPENING**  
hinges and closing bolts adjustment in all directions
- **PLATFORM**  
in checker plate, placed in the upper part
- **SIMPLIFIED ELECTRICAL CONNECTION**  
via fast coupling connectors (optional)
- **BOARD PANEL**  
electromechanical or electronic, expandable (optional)
- **POSSIBLE COMBINATION**  
with one, two, three stage or modulating burners
- **IMPLEMENTABLE FUNCTIONS:**  
boiler and board panel designed for the integration of optional kits, also with boiler already installed.

TYPE OF PIPES

SMOOTH PIPES

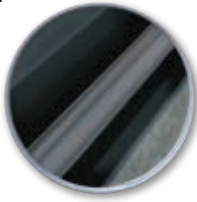
The smooth smoke pipes, suitable for gas, light and heavy oil operation, constituting the tube bundle, increase the thermal exchange and allow the removal of the residual combustion products.

They are formed by pipes with, inside, helical turbulators.

They are standard supplied for gas, light and heavy oil operation.

**Efficiency up to 90%.**

In function of working pressure of the boiler.



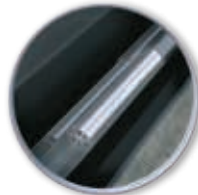
ESA PIPES

The ESA smoke pipes (UNICAL patent), suitable for gas and light oil operation, constituting the tube bundle, increase the thermal exchange and allow the removal of the residual combustion products.

They are formed by pipes with, inside, six 60° sectorial pipes. The adoption of the ESA pipes allowed to reach high performances in terms of efficiency, with important reduction in terms of running costs, fuel consumption and polluting emissions. They are standard supplied for gas and light oil operation.

**Efficiency up to 92%.**

In function of working pressure of the boiler.



ESALU PIPES

The ESALU smoke pipes (UNICAL patent), suitable for gas, constituting the tube bundle, allow to reach a very high thermal exchange. They are formed by pipes with, inside, special inserts of different types and shapes. The adoption of the ESALU pipes allowed to reach high performances in terms of efficiency, with important reduction in terms of running costs, fuel consumption and polluting emissions.

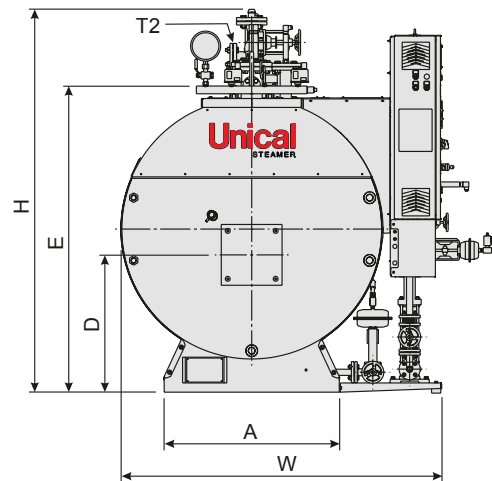
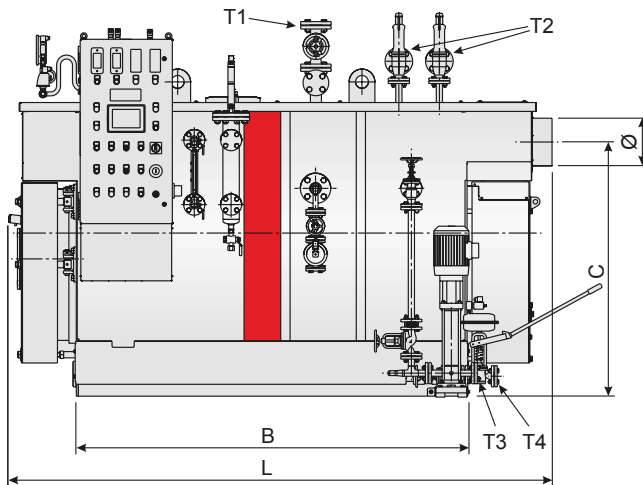
They are standard supplied for gas operation.

**Efficiency up to 94%.**

In function of working pressure of the boiler.



DIMENSIONS



Model	W	L	H	A	B	C	D	E	Ø	T1	T2	T3	T4	Empty weight	Total weight
	mm	mm	mm	mm	mm	mm	mm	mm	mm					kg	kg
300	1474	2340	1820	780	1550	1167	635	1333	219	DN32	DN40	DN25	DN25	1650	2175
400	1474	2340	1820	780	1550	1167	635	1333	219	DN32	DN40	DN25	DN25	1650	2175
500	1861	2565	1940	860	1750	1266	685	1453	219	DN40	DN40	DN25	DN25	2040	2800
600	1861	2565	1940	860	1750	1266	685	1453	219	DN40	DN40	DN25	DN25	2040	2800
800	1996	2950	2077	950	2120	1349	745	1593	258	DN50	DN40	DN25	DN25	2860	3940
1000	1996	2950	2077	950	2120	1379	745	1593	258	DN50	DN40	DN25	DN25	2860	3940
1250	2126	3414	2294	1090	2526	1555	860	1783	308	DN65	DN40	DN25	DN25	3750	5305
1500	2126	3414	2294	1090	2526	1555	860	1783	308	DN65	DN40	DN25	DN25	3750	5305
1750	2246	3543	2422	1200	2750	1685	905	1918	358	DN65	DN40	DN25	DN40	4650	6655
2000	2246	3543	2422	1200	2750	1685	905	1918	358	DN65	DN40	DN25	DN40	4650	6655
2500	2296	3860	2774	1470	2830	2004	1080	2243	408	DN80	DN40	DN32	DN40	6600	9490
3000	2296	3860	2774	1470	2830	2004	1080	2243	408	DN80	DN40	DN32	DN40	6600	9490
3500	2196	4360	2774	1470	3330	2004	1080	2243	408	DN80	DN40	DN32	DN40	7700	11070
4000	2756	4360	3031	1700	3300	2187	1170	2473	458	DN100	DN40	DN32	DN40	9030	13185
5000	2856	4943	3173	1800	3800	2261	1195	2548	488	DN125	DN50	DN32	DN40	10590	16390
6000	3026	5236	3315	1850	4003	2326	1210	2618	488	DN150	DN50	DN40	DN40	11800	18560