



Catalogue

**Waste heat medium pressure steam boilers
For installation behind cogeneration modules**

2024



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General information

VSKG type medium pressure steam boilers for waste heat recovery

Automatic medium pressure steam boiler using waste heat from internal combustion engines.

Boiler description

The design of the boilers depends on the parameters of the flue gas, in particular on its temperature and volume. The layout of the boilers can be single or double. Single layout boilers have two passes, double layout boilers – four passes.

The passes consist of one or two smoke tube bundles with inlet and outlet flue gas collectors.

The boiler can also be equipped with a separate independent burner path (combined boiler). These paths operate independently of each other, and their flue gas passes are separated. The boiler evaporator is shared.

The standard operating pressure in the range of boilers is 10 bar. VSKG boilers with operating pressure above 10 bar are available on request.



Boiler design description

Automatic two-pass, and in the case of a double layout or addition of an independent burner path, four-pass boilers of the VSKG series are designed to generate saturated or superheated medium pressure steam for industrial purposes. The steam temperature for standard boiler operating pressure is 185 °C.

The use of boilers is particularly advantageous where a continuous source of steam is required. Overpressure operation on the flue gas side with properly dimensioned heating surfaces ensures perfect use of the flue gas heat and thus achieves high efficiency.

The boiler body is supplied as standard with insulation covered with sheet metal coating, painted in RAL 3000 color.

The boiler body is equipped with flanges for connection of water level indicators, level sensors, a pressure gauge, a pressure sensor, an emergency pressure switch and blowdown valves. In addition, there are flanges for the steam output, boiler feed, safety valves, deaeration, and sludge removal. For the internal inspection of the boiler, the body is equipped with manholes and control openings. All heating surfaces are easily accessible for cleaning, which ensures a constant high efficiency even during long-term operation using liquid fuel.

The boilers can be equipped with all necessary shut-off and control valves, regulating and measuring devices, as well as equipment for work without the constant presence of operating personnel.

The materials used are boiler steel and seamless pipes according to EN 10028 and EN 10216.

The thermal efficiency of the boiler can be increased by connecting an economizer at the boiler flue gas outlet.



Boiler advantages

- High operational reliability and long service life of steam boilers are ensured by the design of the boiler, developed based on many years of our engineering experience in the field of construction and operation of steam boilers, and the use of high quality materials. The large steam volume of the boiler and the large evaporation surface, combined with the special design of the steam output nozzle, limit the presence of water droplets in the outgoing steam and thus increase its quality (dryness).
- Low radiant heat loss due to optimal insulation thickness, thermally insulated flue gas collector and rear return chamber.
- Boiler thermal efficiency is 92% for models without economizer. If an economizer is installed behind the boiler, the efficiency is 95% and more.
- Complies with the European instructions for pressure installations EN 12952 and EN 12953
- Convenient access to service and control areas, as well as cleaning areas
- A lacquered sheet metal insulation coating, supplied as standard, facilitates installation and maintenance and protects the boiler's thermal insulation from damage.
- Automatic control system based on an industrial PLC with a color touch screen is used to control all regulating and measuring devices of the boiler and provide online control of all work operations, etc. By installing additional components, it is possible to ensure fully automatic operation of the boiler without the constant presence of operating personnel.



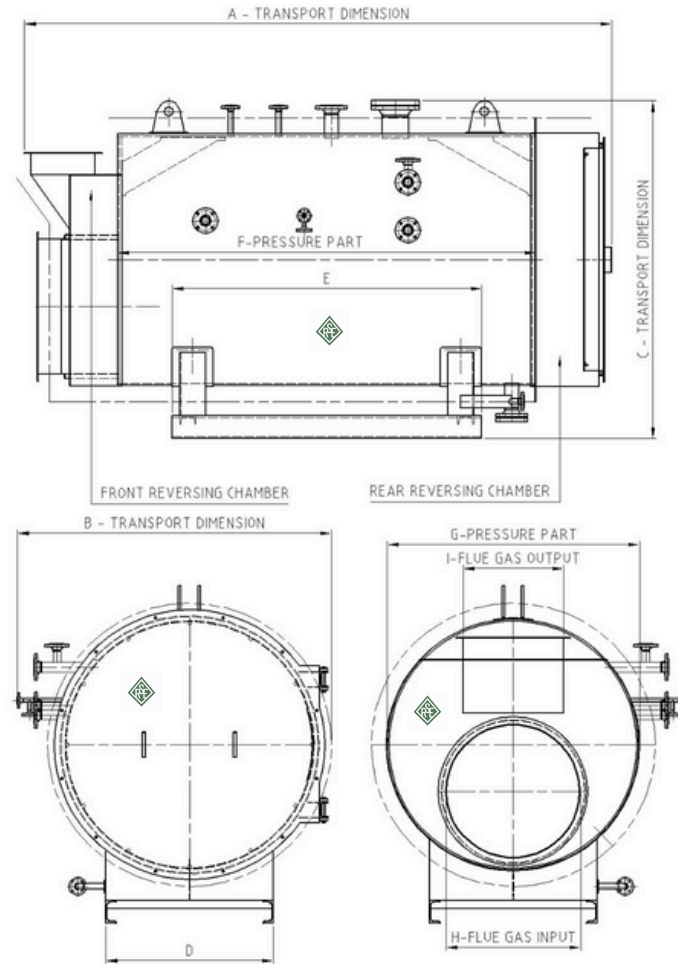
VSKG waste heat steam boilers technical data

Boiler type		VSKG1000H	VSKG1500H	VSKG2300H	VSKG4500H	
Steam output (at 105 °C feed water temperature)	t/h	0,6	0,7	0,9	1,8	
Rated heat output	kW	420	520	600	1250	
Boiler efficiency without economizer	%	90-92				
Flue gas temperature at the boiler inlet	°C	410	420	380	380	
Dry flue gas volume	Nm ³ .h ⁻¹	3804	5976	8310	16969	
Wet flue gas volume	Nm ³ .h ⁻¹	4260	6686	9320	18964	
Operating steam pressure	bar	8	8	8	8	
Maximum allowable steam pressure	bar	10	10	10	10	
Test pressure	bar	18	18	18	18	
Operating steam temperature	°C	175	175	175	175	
Maximum allowable steam temperature	°C	184	184	184	184	
Pressure loss on the flue gas side	mbar	15	15	15	15	
Shipping weight	kg	3600	4485	6400	11780	
Water volume at minimum level	l	2100	2320	6060	10480	
Steam volume from minimum water level	l	1100	1285	2660	4205	
Total volume of the boiler	l	3200	3605	8720	14685	
Boiler connections, nominal pressure PN40	Steam output	DN	80	80	100	150
	Safety valve		25	25	32	40
	Deaeration		25	25	25	25
	Boiler feed		25	40	40	50
	Blowdown		15	15	15	15
	Sludge removal		25	25	25	25
Flue gas inlet	ø mm	750	846	1024	1360	
Flue gas outlet	mm	630x400		900x480	1500x550	
Boiler inspection hatch	DN/mm	200		320x420	320x420	

We reserve the right to make technical alterations without prior notice



VSKG1000H – VSKG4500H boilers main dimensions



Boiler type	Steam power	A	B	C	D	E	F	G	H	I
	t/h	mm								
VSKG1000H	0,6	3679	1820	1960	900	1940	2620	1420	750	630x400
VSKG1500H	0,7	3679	1970	2120	1050	1940	2620	1580	846	630x400
VSKG2300H	0,9	4295	2227	2390	1350	1940	3000	1850	1024	900x480
VSKG4500H	1,8	4757	2894	3120	1700	2100	3350	2500	1360	1500x550

We reserve the right to make technical alterations without prior notice



VSKG waste heat steam boiler scope of supply

- The steam boiler is supplied with insulation covered with lacquered metal sheets. These sheets are attached to support structures with insulated thermal bridges. Metal sheets are covered with a polyethylene film to protect the boiler surface from damage during transportation and installation. This film is removed after installation is completed.
- Flanges are mounted on flue gas inlet and outlet pipes.
- All cleaning and inspection openings have doors and covers.
- Valves and equipment are shipped in suitable transportable non-returnable packaging.



VSKG steam recovery boilers equipment

The following valves and equipment can be supplied in accordance with the design pressure of the boiler and the sales contract.

Valves and fittings:

- Main steam outlet valve.
- Safety valves.
- Deaeration valves.
- Feed water valves.
- Feed water pipeline check valve.
- Boiler water level gauges.
- Sludge removal valves set.
- Blowdown valves set, including boiler water sampling.
- Valves and fittings are supplied with connecting and sealing material.

Boiler feed pump unit:

- Two-pump boiler feed unit, including necessary valves and fittings.

Boiler water level control:

- Continuous or discrete control of the boiler feed.
- The scope of supply for boiler unattended operation (BosB) is discussed during the ordering of the boiler.
- All equipment for boiler water level control is approved for operation in steam boilers with a working pressure of at least 16 bar.



VSKG waste heat steam boiler equipment

Other boiler equipment:

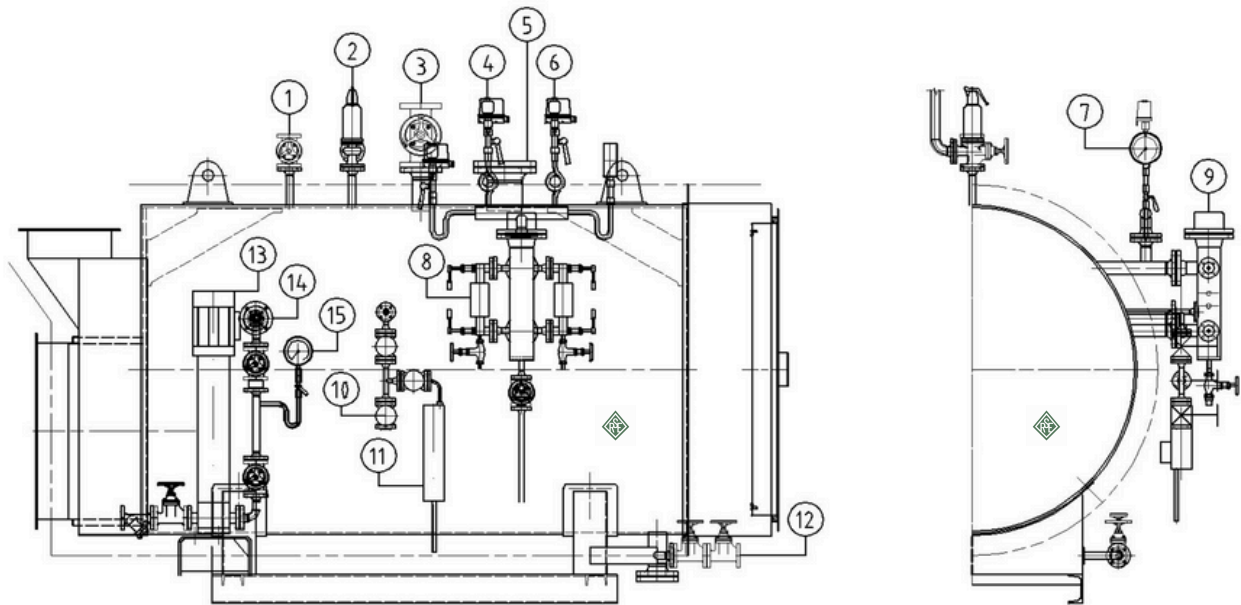
- Boiler water sample cooler.
- Boiler steam pressure sensor.
- Boiler steam pressure gauge including 3-way valve with test gauge connection.
- Feed water pressure gauge with straight valve.
- Emergency pressure switch with a reset button.
- Feed water temperature sensor.
- Feed water thermometer.
- Flue gas thermometer at the boiler outlet.
- Automatic boiler control system according to customer requirements.

Boiler room additional equipment (optional)

- Equipment for chemical water treatment.
- Boiler maintenance platforms with guardrails and ladders.
- Return condensate management (condensate collection tank, condensate pumps).
- Feed water tank with thermal deaerator.
- Power and control cabinets for feed water tank with deaerator and return condensate management.
- Sludge removal and blowdown expander.
- Steam headers in accordance with the design drawings.



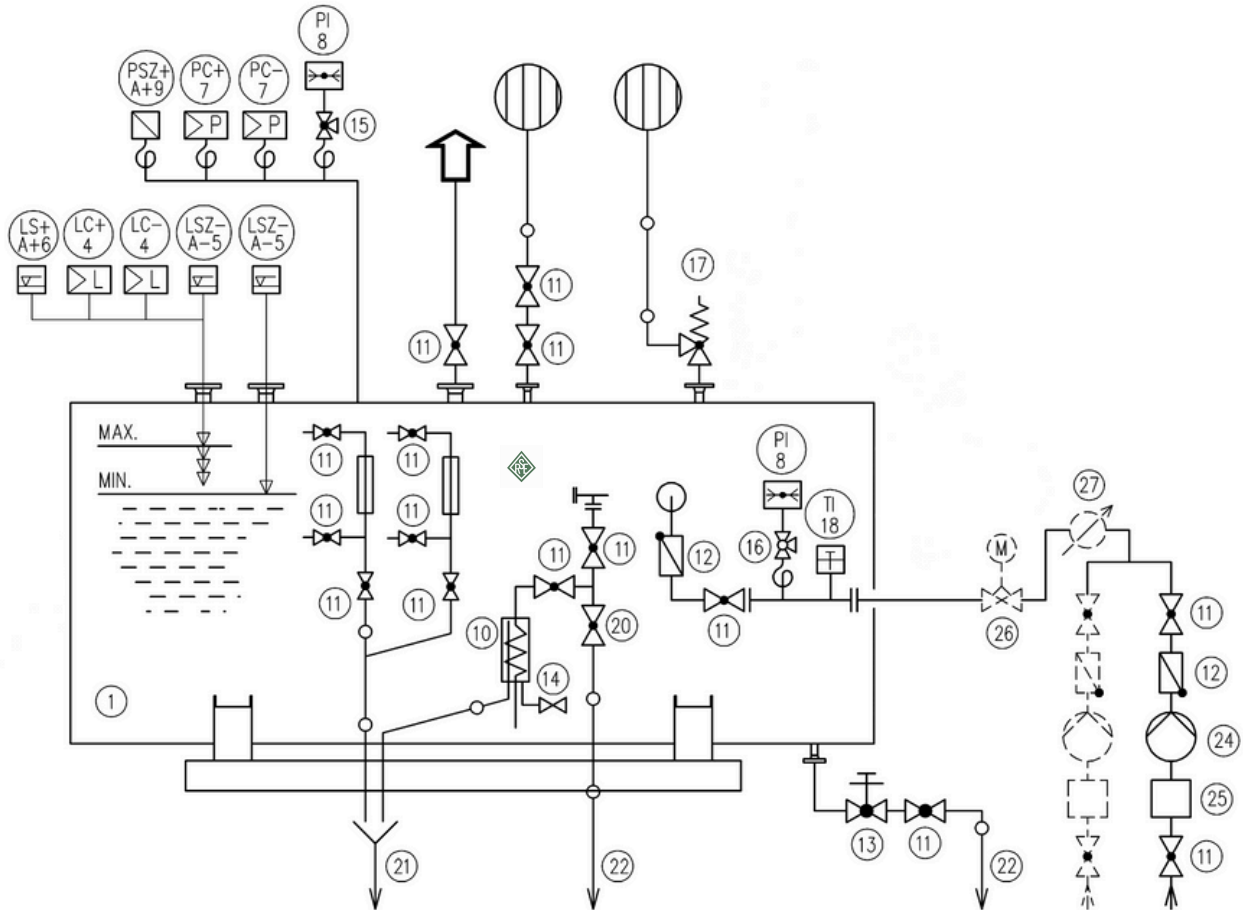
VSKG waste heat steam boiler main equipment layout



- | | |
|-----------------------------------|---------------------------------------|
| 1. Boiler deaeration | 9. Water level sensor |
| 2. Safety valve | 10. Manual (automatic) blowdown |
| 3. Steam outlet valve | 11. Boiler water sampling, cooler |
| 4. Steam pressure sensor | 12. Manual (automatic) sludge removal |
| 5. Inspection hatch | 13. Feed water pump |
| 6. Emergency pressure switch | 14. Feed water inlet |
| 7. Steam pressure gauge | 15. Feed water pressure gauge |
| 8. Water level indicator - 2 pcs. | |



VSKG waste heat steam boiler piping and instrumentation diagram



- | | |
|---------------------------------------------|-----------------------------------------------|
| 1. VSKG waste heat steam boiler | 15. Three-way valve |
| 4. Boiler water level control (LC) | 16. Three-way ball valve |
| 5. Minimum water level limiter (LSZ-A-) | 17. Boiler safety valve |
| 6. Maximum water level limiter (LS+A+) | 18. Feed water thermometer (TI) |
| 7. Steam pressure control (PC) | 20. Manual (automatic) blowdown valve |
| 8. Steam/feed water pressure gauge (PI) | 21. Gravity discharges to the collecting tank |
| 9. Maximum steam pressure limiter (PSZ+A+) | 22. Pressure discharges to the cooling tank |
| 10. Boiler water sample cooler | 24. Feed water pump |
| 11. Manual shut-off valve | 25. Feed water filter |
| 12. Wafer check valve | 26. Regulating valve – optional |
| 13. Manual (automatic) sludge removal valve | 27. Flow meter - optional |
| 14. Sample cooler ball valve | |



VSKG-K combined boiler.

Boiler design description

Combined medium-pressure fire-tube boiler for saturated steam generation.

The boiler body has a cylindrical shape. In one part of the boiler body there is a three-pass burner path using a gas or liquid fuel burner as a heat source, and in the other part there is a single-pass flue gas path using waste heat from internal combustion engines.

The burner path consists of a flame tube, a water-cooled rear return chamber, two bundles of smoke tubes, an uncooled front return chamber and a smoke collector. The flame tube has a hatch at the back and the front reverse chamber has doors for cleaning and inspection of the pressure part of the boiler from the flue gas side.

The flue gas path for waste heat utilization is single-pass, it consists of one bundle of smoke tubes, inlet and outlet flue gas collectors. Flue gases enter the front flue gas collector through a vertical inlet tube. Front flue gas collector is equipped with a hatch for inspection and cleaning. Flue gases exit from the rear flue gas collector through a vertical outlet pipe located at the rear of the boiler.

These paths operate independently of each other, and their flue gas passes are separated. Each path has its own separate flue gas outlet. The boiler evaporator is shared.

A flue gas heat exchanger (economizer) is installed in the rear flue gas collector of the boiler in the burner path. The economizer consists of two bundles of finned galvanized pipes interconnected in chambers. In the economizer, the heat from the flue gases is transferred to the boiler feed water. The energy obtained in this way increases the efficiency of the boiler and reduces fuel consumption.

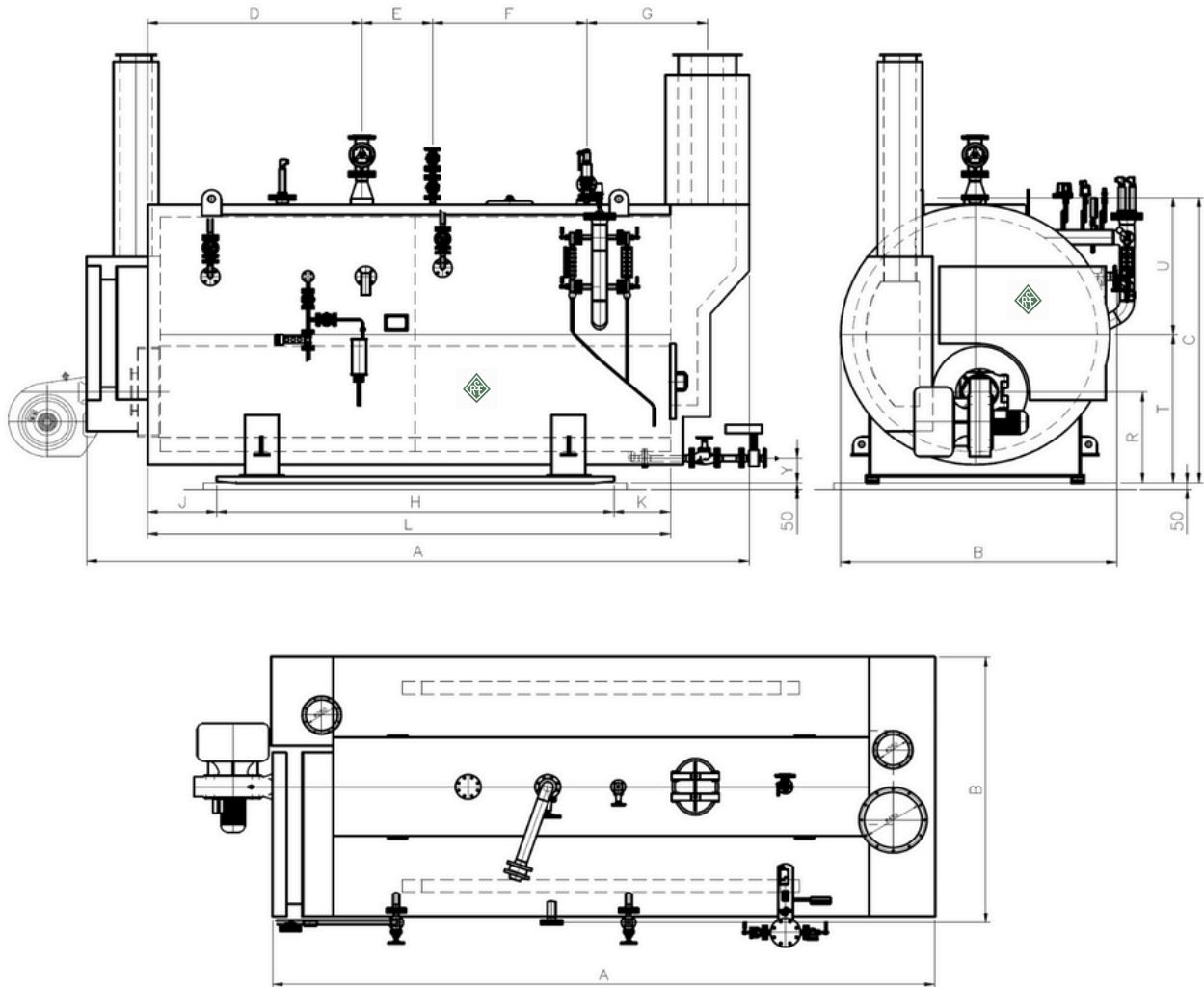
There is a 420x320 mm hatch in the upper part of the boiler for cleaning and inspection of the pressure part from the side of water and steam.

The standard operating pressure of combined boilers is 8, 10, or 13 bar. VSKG-K combined boilers are manufactured upon request according to customer requirements.



VSKG-K combined boiler.

Boiler drawing





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