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Extended boiler system planning I

The periphery of the steam generator has a decisive influence on the energy, freshwater, system, chemical and maintenance costs.

Steam quantity: the quantity of steam required by the boiler for own use for feed water heating and deaeration must be taken into consideration when sizing the steam boiler in order to deliver sufficient steam to the system(s). However, in most cases the boilers are oversized – this results in unnecessary costs. In some cases, by using steam accumulators a significantly smaller (more favourably priced) boiler will suffice.

Maximum steam quantity required: _____ kg/hour

alternative: _____ BTU

Optional: steam quantity incl. own use: _____ kg/hour

Short-term peak loads that a steam accumulator can compensate for? ☐ Yes, Details: _____ ☐ No

Steam: steam is not simply steam. Depending on the application, the steam must comply with certain chemical requirements or have a defined residual moisture content.

Characteristics of steam: Average operating pressure: _____ bar

☐ Saturated steam — Residual moisture content: _____ %

☐ Demister required (from residual moisture content < 3 %)

☐ Superheated steam — Temperature: _____ °C

Steam comes into contact with e.g. food? ☐ Yes, Details: _____ ☐ No

Installation and operating conditions: local regulations in the country of installation and the ambient conditions when the boiler is in operation decisively influence the design of the boiler and combustion system. Do you know the details?

Country of installation: _____ Height above sea level: _____ m

Temperature min. (winter): _____ °C max. (summer): _____ °C

Outdoor installation? ☐ Yes ☐ No ☐ Installation in container

(water and weatherproof insulation required)

Voltage _____ Phases _____ Frequency _____ Hz

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Extended boiler system planning II

Lower procurement costs, higher efficiency and higher reliability are only a few of the benefits of a detailed design.

Flue gas: Permissible NO_x value: ____ mg/mn³ ☐ Value not known

Fuel:

Natural gas

☐ Natural gas H ☐ Natural gas L

☐ LPG, Gas number: ____

☐ Propane ☐ Butane

☐ Propane-Butane

Gas flow pressure ____ mbar

Net calorific value: ____ kWh/mn³

Gas price: ____ €/m³

Oil

☐ Fuel oil, extra light (EL)

☐ Fuel oil, low-sulphur (SA)

☐ Medium/heavy fuel oil

Sulphur ____ %

Net calorific value: ____ kWh/kg

☐ Oil preheating available

Viscosity of oil: ____ mm²/s

At temperature: ____ °C

Oil price: ____ €/kg

Others

☐ Animal fat

☐ Fish oil

☐ Ethanol

☐ Biogas

☐ Sewage gas

☐ Other

Multifuel combustion systems: additional fuel as admixture

☐ Biogas Hydrogen sulphide: ____ mg/mn³ Methane: ____ %

☐ Sewage gas

☐ Other combustion gases Properties: ____

☐ Other oils/greases/... Description: ____

☐ Continuously available Quantity: ____ ☐ Available all year round

Waste heat utilisation: from CHP module flue gases, gas turbines, process waste heat, etc.

☐ CHP module flue gases ☐ Gas turbine flue gases ☐ Other flue gases

Mass flow rate: ____ Kg/h Temperature: ____ °C

Permissible pressure loss: ____ mbar

Condensate utilisation at full load (rated output)

☐ Oxygen-free		☐ Oxygenic		☐ High-pressure condensate	
Quantity:	Kg/h	Quantity:	Kg/h	Quantity:	Kg/h
Pressure:	bar	Pressure:	bar	Pressure:	bar
Temperature:	°C	Temperature:	°C	Temperature:	°C

Extended boiler system planning III

The own use of the system can be drastically reduced by utilising waste heat.

Waste heat recovery: large quantities of heat can be recovered. The mass flows that give off heat are normally flue gas, hot waste water and exhaust vapour. The heat is absorbed by the feed water, make-up water, process water or combustion air.
The following measures are available for this:

- ☐ Economiser (flue gas heat exchanger)
- ☐ Condensing heat exchanger
- ☐ Feed water cooler (increases the efficiency of the economiser)
- ☐ Air preheater system (preheats combustion air)
- ☐ Surface blowdown water heat exchanger
- ☐ Exhaust vapour cooler
- ☐ Combustion control O_2/CO (reduces flue gas losses)

Reduce power costs: in older systems the burner fan and pumps are often operated continuously at full load, also when the boiler is operating in partial load. Up to 75 % of the power consumption can be avoided using speed controls.

Speed-controlled combustion air fan:
☐ Yes ☐ No

Speed-controlled pumps:
☐ Yes ☐ No

Property and condition of fresh water: the property and condition of the freshwater is decisive for the surface blowdown rate of a steam boiler. Reducing the surface blowdown rate to the required technical minimum can make a significant contribution to reducing energy costs.

Silicic acid:		mg/l
Conductivity:		µS/cm
Carbonate hardness:		°dH

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