SCHNEIDER-KESSEL BERLIN®

STEAM BOILER and HOT WATER BOILER

HIGH PRESSURE STEAM GENERATOR - Series iNOOK

GENERAL

The **iNOOK** is a high pressure steam generator especially designed for closed steam-condensate circuits. The boiler supplies high pressure steam for process engineering plants where special safety regulations are enforced especially in productions where leakages shall not contaminate the product. This requirement can only be met with water of treated quality but not when using thermal oil for heat transfer.

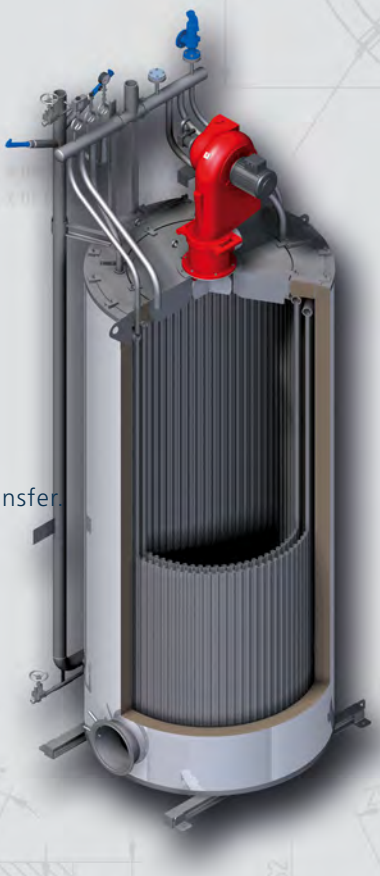
The main application of the **iNOOK** is the entire food industry especially focussed on

- deodoration of edible oil and fat.
- distillation, fractioning and esterification of various raw materials.

The **iNOOK** is installed directly below the steam consumer (the condenser), connected to it and not capable of being shut off. The generated high pressure steam transports the heat into the condenser where the heat energy is transferred into a product in a thermal process by condensing. The high pressure steam generator **iNOOK** and the condenser are operated in an absolute closed circuit driven by natural circulation.
The **iNOOK** installed in a closed circuit, allows an operation without the regular boiler equipment such as water level control and feed water pumps. To avoid water leakages, all connections of supply and return lines and connections with the equipment are welded. For safety valves the connetion is sealed by means of an rupture disc and the spaces in between the disc an the safety value is monitored by leakage control.

ADVANTAGES

- Safe and reliable operation due to **tube-wall-tube** design, no risk of surface overheating by obstruction of circulation due to tube reductions at collector inlets.
- High plant efficiency by optimized and efficient heat transfer avoiding flue gas leakages between the 3 passes.
- Minimized furnace volume load and heating surface load by thoroughly adjusted boiler design.
- High flexibility, of fuel range.
- 72 hrs supervision free operation by state-of-the-art electronic boiler control system.
- No hazardous substances such as thermal oils used for heat transfer.
- No risk of corrosion in the steam and condensate system due to welded connections instead of flanged.
- Possibility of further increasing the plant efficiency by utilizing the flue gas heat i.e. with waste heat recovery systems such as combustion air preheater.
- Preassembled boiler system including control box, electrical wiring etc. minimizing the installation time on site.

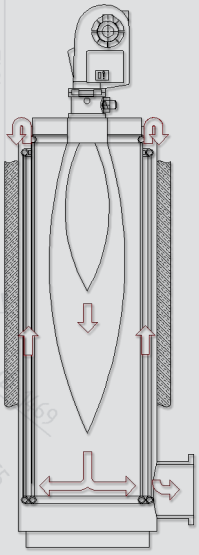


DESIGN

The **iNOOK** is a vertical high pressure steam generator without a steam drum with the burner installed as „roof burner" on top of the boiler.

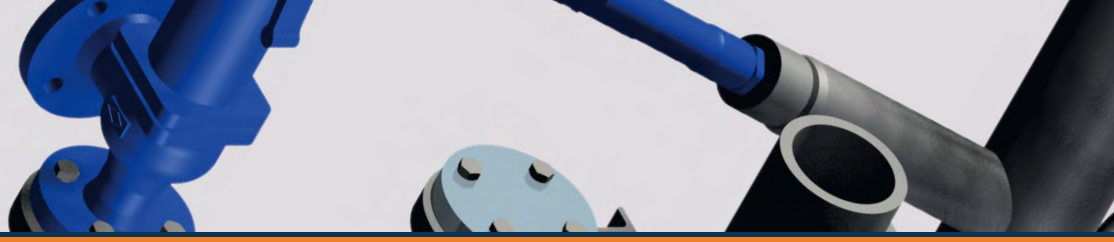
The flue gas system of the **iNOOK** is a three pass boiler type where the furnace is the 1st pass and the 2nd and 3rd pass are formed by the concentrically arranged tube cages of the convection part.

The superior advantage of the **iNOOK** is the execution of the tube cages in absolute flue gas tight **tube-wall-tube** design. This secures that the vertical evaporator tubes can be welded into the bottom and top ring collectors without reduction.
This design feature is the ultimate precondition to ensure unobstructed water steam flow and subsequently thermal overheating even during peak loads and/or sudden load fluctuation will be avoided. This design is adapted from our high-pressure water-tube boilers (ERK-HP) and has proven its technical superiority in compare with other designs.



Summarizing the advantages of **tube-wall-tube** design in brief:

- Unhindered water and steam flow since no reduction of tube cross section between upper and lower ring collectors
- No clogging and no overheating occurs
- Total gas tight tube-wall-tube design secures no leakages between the tube cages hence increasing the boiler efficiency



MANUFACTURING AND EQUIPMENT

Design and fabrication of the **iNOOK** is in accordance with the German Technical Regulation for Steam Boiler (TRD) respectively Euronorm **EN-12953** in connection with the Pressure Vessel Directive **DGRL 97/23/EG** as stationary boiler (land based boiler). The fabrication is supervised and monitored by TÜV, the German Steam Boiler Supervision Authority. In addition we are able to deliver in compliance with standards such as ASME, BS, Vincotte, Stoomwezen, APAVE, ISPESL, DOSH, Australia, New Zealand, Japan, etc.

Boiler equipment and control systems are certified by the respective classification authorities.

Depending on the specific requirements the **iNOOK** is equipped with the subsequent equipment. Decisive for the selection of the equipment are:

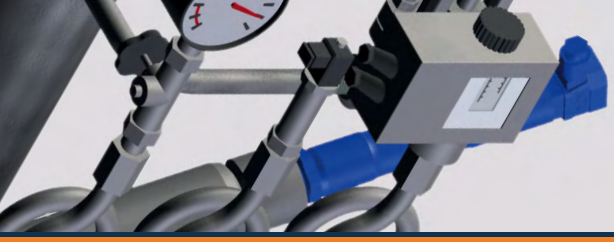
- required grade of plant efficiency
- required grade of plant safety and plant availability
- fuel availability

BASIC EQUIPMENT FOR THE iNOOK

- pressure body including boiler casing and insulation
- firing system in monobloc design for:
  - gaseous fuels such as natural gas L and H, bio gas, LPG
  - liquid fuels such as LFO, bio diesel
- control box including the control system such as:
  - pressure control
  - burner control
  - boiler safety chain with emergency push button
  - main power supply connection
- 1 safety valve with rupture disk and leakage control (pessure switch)
- 2 low water level limiters
- 1 pressure limiter
- 1 pressure transmitter
- 1 direct reading pressure gauge with gauge isolation valve
- 1 flame sensor
- 1 test valve for water level
- 1 feed and drain valve with check valve
- 1 exhaust gas temperature limiter

OPTIONAL EQUIPMENT FOR THE iNOOK

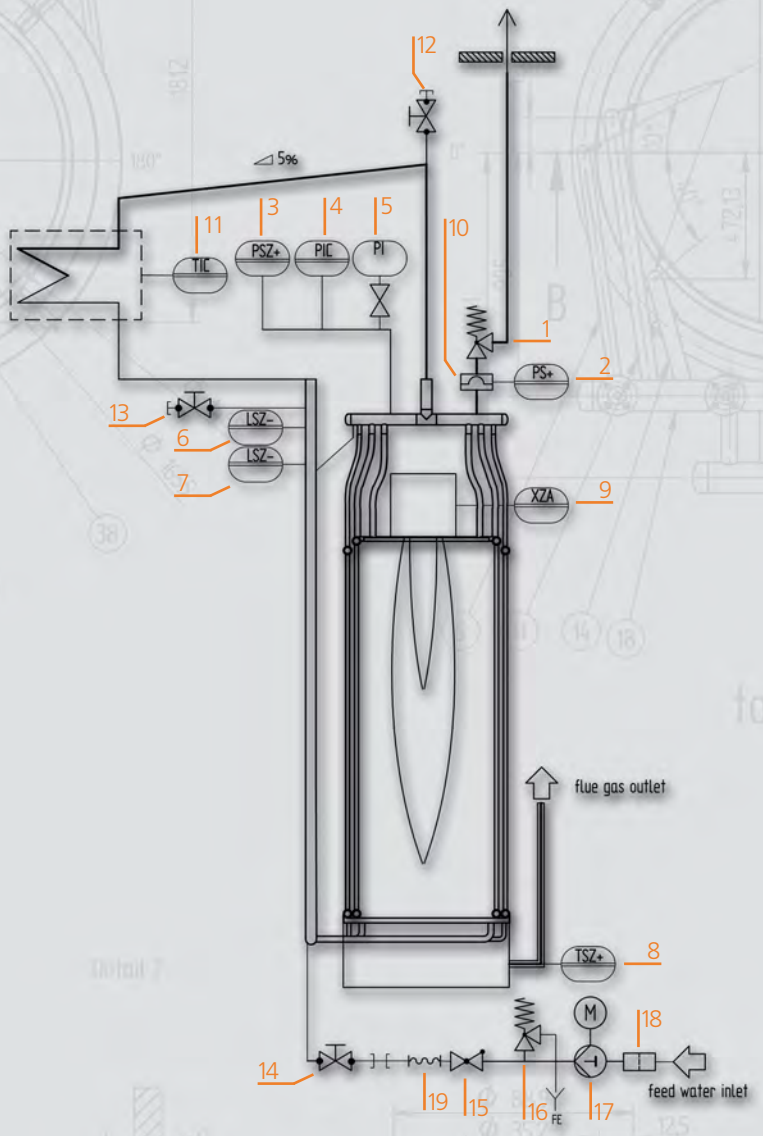
- firing system in monobloc design for additional 2 alternative fuels including control system
- cascade control
- 2nd safety valve including rupture disk and leakage control
- boiler water filling pump
- oxygen control
- air preheater



TECHNICAL DATA

We supply the **iNOOK** in the capacity range from **150 kW** up to **5000 kW**. Boilers for higher capacities are available upon request

PROCESS FLOW DIAGRAM



1	SV1	safety valve
2	PS+	pressure switch
3	PSZ+	pressure limiter
4	PIC	pressure transmitter / control
5	PI	pressure gauge with valve
6	LSZ-1	low water level limiter
7	LSZ-2	low water level limiter
8	TSZ+	temperature limiter
9	XZA	flame monitor
10	RD	rupture disc
11	TIC	temperature control
12	AV1	venting valve
13	AV2	test valve low water level
14	AV3	filling and drain valve
15	RV	check valve
16	SV3	safety valve
17	FP	filling pump
18	ST	strainer
19	FH	flexible hose

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