

Oil and Gas Boilers

# Hot Water (low & high temperature) and Steam Boilers for Oil & Gaseous Fossil & Bio Fuels

Shell & Tube, Panel-wall and Water-tube Boilers up to 50 MW, 55 ton/h and 86 bar-g



 **Danstoker**

A Thermax Group Company

[www.danstoker.com](http://www.danstoker.com)



Over the last 75 years Danstoker has accumulated extensive knowledge of fire-tube and water-tube boilers in general.

The development and manufacture of these high-performance oil and gas boilers for the energy sector has resulted in Danstoker being one of Europe's leading boiler-makers, featuring a wide range of boilers for the generation of:

- Low temperature hot water (LTHW)
- High temperature hot water (HTHW)
- Steam

Capacities ranging from 800 to 50,000 kW or steam ratings from 200 to 55,000 kg/h at design pressure up to 40 barg and superheated until 450°C.

Special boilers may, if required, be combined with water-tube sections.

The Danstoker Group can deliver water-tube boilers until 100 MW and 100 t/h steam, 86 barg and superheated to 500°C.

The boilers are designed to burn fossil or biomass based gas and/or oil.







Danstoker's extensive range of boilers provides ample possibility of finding *the* Danstoker product best suited to solve the job.

The basis program comprises 3-pass boilers with water-cooled reversing chambers. High capacity boilers are proved in twin-furnace design, for high pressure steam possibly provided with water-tube reversing chambers.

The boiler program also includes smaller reverse-flame boilers for hot water, high temperature hot water and steam (low and high pressure).

The furnaces are dimensioned so as to keep furnace load and temperatures as low as possible, with a view to securing optimal combustion and a minimum of NOx emissions.

The already low radiation loss may be further reduced by providing the boilers with additional cover doors.

Danstoker also makes special boilers, designed to meet specific client needs, e.g. "Combi" or Composite boilers – i.e. directly fired boilers, combined with an indirectly fired section (e.g. from a gas engine) particularly useful if space is limited.

Our experts are able to provide advice and guidance with a view to adjusting and optimizing boilers and auxiliary equipment.

The Danstoker range of products and auxiliary equipment constitute a solid basis for accommodating the clients in terms of economizers, feed-water equipment, blow-down systems, automatic flue gas by-pass dampers, PI-diagrams, etc.



**Intensive innovation makes Danstoker a pioneer within development and manufacture of systems for energy generation**

# OPTI High Pressure Steam Boilers



5 t/h OPTI boiler ready for dispatch

## Capacity range : 1 To 55 t/hr

Designed using the latest thermal and technological principles, the OPTI boiler offers unique performance characteristics that comply with the most recent and stringent environmental requirements.

The OPTI fire-tube boilers are of the 3-pass wet-back design, suitable for back-pressure combustion of oil and/or gas or biogas. Available in four design pressure ratings up to 18 bar(g). However, design pressures up to 40 bar(g) are also possible.

The OPTI boiler is available in single and twin furnace designs. Compliant with the EN regulations, single furnace oil-fired boilers up to 18 t/h and gas-fired boilers up to 25 t/h are possible. Capacities above these boiler ratings are available in twin furnace version, up to 55 t/h.

The furnace is generously sized, thus featuring low furnace loads and temperatures in order to achieve optimal combustion characteristics and minimize NO<sub>x</sub> emissions.

The large steam chest ensures a steady and controlled steam generation, with a guaranteed steam dryness of over 99%.

The unique insulation principles applied minimize the overall heat loss from the boiler surface in order to achieve optimal gross thermal efficiency.

## The OPTI design features the following benefits

- High total efficiency and performance
- Outstanding insulation principles
- Low furnace load and temperatures
- Low flue gas resistance
- Large steam chest
- Easy access to smoke and water sides
- Sturdy construction
- Cladding and saddles without heat bridges
- Service platform insulated from boiler body

## Options and accessories

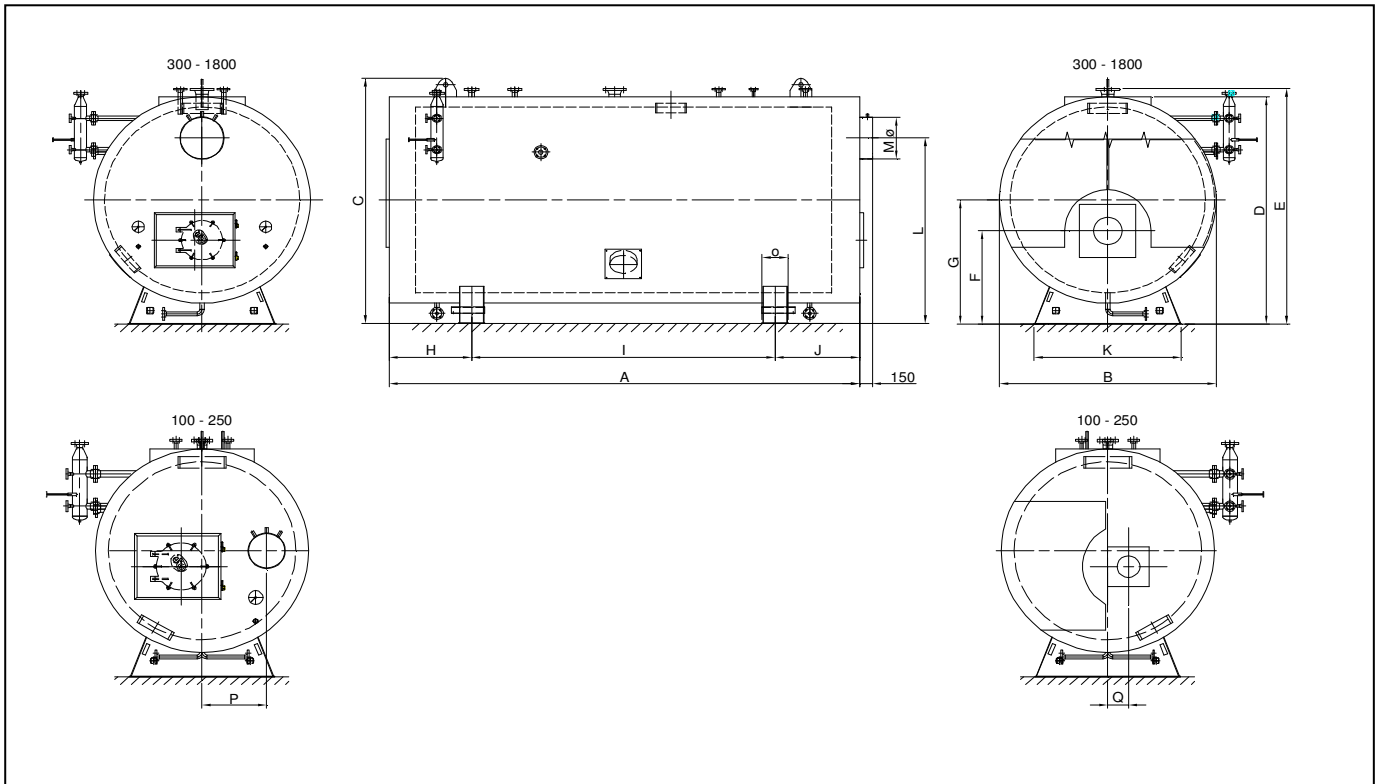
- Extra cover doors
- Extra insulated hatches and man hole covers
- Extended width of platforms
- Ladders, galleries, etc.
- Valves and controls, automatic blow-down
- Burners, economisers, pumps, tanks
- Deaerators, water treatment
- Superheaters
- The OPTI boiler can also be configured in a "Combination" version, with the addition of a separate flue gas waste heat section



Feature	Danstoker	Comment
Boiler type	OPTI	CE marked and designed according to PED 97/23/EC or designed according to the GOST standards.
Combustion chamber load	1,0 to 1,4 MW/ m <sup>3</sup> without rev. chamber	NO <sub>x</sub> emission are, in part, dependent on high combustion chamber load, due to high combustion temperatures. Due to the Danstoker inherent design and low combustion chamber load, the OPTI boiler can easily meet low NO <sub>x</sub> demands. Low combustion chamber load, results in lower temperatures when the flue gases are entering the 1 <sup>st</sup> . pipe-pass section, thereby lower stress in the boiler, and impacts on potentially longer lifetime.
Flue gas connection	Flexible	OPTI-boiler may be delivered with vertical connection to the chimney flue, - thereby less requirements for space available at the room behind the boiler
Flexibility		Flexibility in design and low thermal stress. Rich steam-chest, longer lifetime.
Steam re-release rate.	Approx. 0,04 m/s	Result: very high quality and dry steam, avoiding water hammer in Steam pipeline.
Steam chest volume		Well sized steam volume results in higher steam-quality
Working pressure	Up to 34 bar	Depends on boiler size
Furnaces	Corrugated or smooth	Generous furnace dimensions. Corrugated furnace provides durable boiler and longer life. The furnace is adjusted to dimensions which allows for the flame shape of the burner to live up to the required extra low NO <sub>x</sub> emissions The furnace corrugation is high shaped waves with a difference from trough to crest of 150 mm. Result: high flexibility of construction, and a less thermal stress on the furnace due to bigger effective radiation surface. Less total stress on the boiler too and thereby prolonged lifetime.
Design	3-pass wet back	Wetback design <b>avoids refractory</b> and maintenance. Low thermally stressed boiler.
Flue gas temp- Excl. eco	Max. 240 °C	At 10 bar working pressure and 105 °C feed-water temp. firing Natural Gas at full load. With a good burner, enabling for a max. excess combustion air to allow perfect mix. of air and fuel this will result in an efficiency of 90,3% Net.
Pressure drop	4,5 to 12 mbar	Low pressure drop. Low flue gas pressure drop results in smaller combustion air fan motor electrical consumption, and less expensive motor.
Thermal efficiency	90.3 % NET	Net efficiency expected at base load. Very high efficiency to reduce operating costs and reduction of fuel consumption.
Insulation	1 x 120 mm 1 x 100 mm	Insulating overlapping: results in low heat loss and stand-by heat loss. No "cold-bridges".
Inspection	excellent	Easy access to water AND flue gas side
Extra Cover Doors	Yes	Cover-doors secure low surface temp. and radiation-loss. <b>Surface temp. on front doors reduced to approx. 40 degr. C</b> ,Insulated cover doors over man- and hand holes to protect and reduce loss
R&D	Excellent	The Danstoker product development is based upon 75 years and worldwide know-how, and co-operations with the leading technical universities in the world.



# OPTI High Pressure Steam Boiler



OPTI	No.	100	150	200	250	300	400	500	600	700	800	1000	1200	1400	1600	1800
Steam rating	kg/h	1000	1500	2000	2500	3000	4000	5000	6000	7000	8000	10000	12000	14000	16000	18000
A	mm	3300	3550	3600	3975	4225	4725	5425	5550	5600	5750	6315	6750	7050	7950	8050
B	mm	1800	1950	2050	2150	2200	2375	2500	2600	2725	2775	3000	3050	3375	3425	3575
C	mm	2300	2450	2550	2650	2700	2875	3000	3100	3225	3275	3500	3550	3875	3925	4075
D	mm	2050	2200	2300	2400	2450	2625	2750	2850	2975	3025	3250	3300	3625	3675	3825
E	mm	2150	2300	2400	2500	2550	2725	2850	2950	3075	3125	3350	3400	3725	3775	3925
F	mm	1010	1085	1115	1160	1030	1080	1125	1140	1145	1155	1235	1240	1340	1370	1430
G	mm	1150	1225	1275	1325	1350	1440	1500	1550	1615	1640	1750	1775	1940	1965	2040
H	mm	785	785	785	785	950	950	950	975	975	975	1050	1050	1200	1200	1200
I	mm	1780	2030	2080	2380	2300	2800	3500	3600	3600	3750	4180	4580	4600	5500	5600
J	mm	735	735	735	810	975	975	975	975	1025	1025	1085	1110	1250	1250	1250
K	mm	1325	1425	1475	1525	1475	1600	1700	1800	1875	1925	2100	2150	2300	2300	2500
L	mm	1150	1225	1275	1325	1720	1845	1950	1985	2040	2040	2220	2200	2450	2360	2575
M ø	mm	250	300	325	350	400	450	500	550	600	650	725	800	850	900	950
Tube withdrawal length	mm	2450	2700	2750	3050	3300	3800	4500	4550	4550	4700	5100	5500	5700	6550	6600
O	mm	250	250	250	250	300	300	300	300	300	300	400	400	400	450	450
P	mm	525	550	620	675											
Q	mm	170	175	200	213											
Water capacity L.W.	m <sup>3</sup>	3,17	4,12	4,61	5,6	5,9	7,9	10,8	11,6	12,8	13,5	17,2	18,9	23,2	27,0	32,8
Steam chest at L.W.	m <sup>3</sup>	0,55	0,7	0,9	1,1	1,4	1,8	2,1	2,5	3,1	3,4	4	4,7	5,8	6,5	7,2
Furnace diameter	mm	600	700	700	750	800	900	975	1000	1025	1050	1200	1200	1375	1425	1550
Furnace length	mm	2000	2250	2300	2600	2800	3300	4000	4100	4100	4250	4700	5100	5300	6150	6250
Flue gas volume	m <sup>3</sup>	1,3	1,9	2,0	2,6	2,9	4,3	5,3	6,5	7,0	7,6	11,0	12,0	16,0	19,5	22,5
Flue gas temp. *	C°	245	245	245	245	240	240	240	240	240	240	240	240	240	245	245
Flue gas resist. *	mbar	5,0	8,5	7,5	7,5	9,5	10,0	10,5	10,5	10,5	12,0	11,0	13,0	12,0	10,5	10,5
Weight - 8.0 bar	kg	3500	4300	5100	6000	7100	8500	10000	11600	13500	15000	17500	21000	24000	27000	30000
Weight - 10.0 bar	kg	3700	4600	5500	6500	7700	9200	11000	12800	14700	16800	19200	22600	26500	29600	33000
Weight - 13.0 bar	kg	4000	5000	6000	7100	8500	10500	12000	14500	16500	18500	21500	25500	24500	27500	31000
Weight - 18.0 bar	kg	4500	5800	6800	8000	9500	11600	13600	16000	18300	20500	24000	24000	30000	35000	39000

\* combustion of natural gas, O<sub>2</sub> dry: 2.1%, 10 bar

Subject to manufacturer's right to make alterations 06-09-10





## References

Danstoker boilers operate worldwide ,Some of the references would be:

- Coca Cola
- Siemens
- Volvo Aero Corp.
- Heathrow Airport, UK
- Danish Oil & Gas
- Danish Shell
- UNILEVER, Switzerland
- CARLSBERG International
- Rolls Royce, Norway
- Americana
- EGC (ICE Man)
- Green Land
- Domty
- Nestla
- First Paper
- Sprea Misr
- orchidia Pharm
- Jedco Pharm

## Boiler Design Certificates, QA/QC

All Danstoker boilers are approved and stamped by the relevant pressure vessel authorities in the respective countries of installation, or by institutes duly accredited by these authorities, with a view to securing the compliance with norms and standards applicable in the country of installation.

According to a.o.:



EN ISO 3834-2



AD 2000 HP



(S)+(H)+(U)



Lloyd's



(EN 729-2)



TRD 201



(R)+(NB)



GOST R





The Danstoker horizontal and vertical bio-fuel boilers are fire-tube boilers, and if required combined with water-tube sections. Capacities ranging from 200 kW to 24,000 kW or 40 t/h steam up to 86 barg.

Typical fuels would be:

Forest residue, bark, sawmill/construction waste, saw dust, wood pellets, fruit stones, straw, agrifibres or traditional solid fuels.

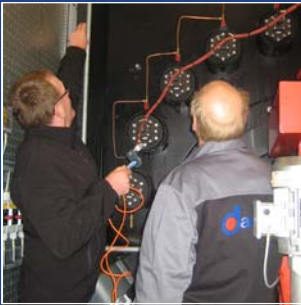
All boiler are adapted to suit the special characteristics of the fuel to be used, and designed in a close co-operation with the supplier of the combustion and fuel-handling equipment.



During the last decades Danstoker has delivered more than 2500 exhaust gas boiler on a world-wide scale. The boilers are mounted after gas or diesel engines.

Design and development of special boilers and economisers for heat recovery of hot flue gases originating from chemical and industrial processes.

The waste heat is recovered in single, double or triple pass boilers, provided with low-temperature economisers or with integrated superheaters in the steam boilers. Capacities until 35 MW, 55 ton/h Steam. Design pressure up to 32 barg.



The service staff in the Danstoker after-sales division has many years of experience within a broad variety of jobs regarding energy-technical plants, thereby enabling them to provide quick and efficient service on Danstoker boilers as well as on boilers of other makes.

As we are often already acquainted with the plants, we are able to quickly conduct the necessary adjustments and/or repairs.

*Contact: [service@danstoker.com](mailto:service@danstoker.com)*



One of the greatest challenges that the World is facing within this decade will be to encourage market players to act in a way so as to protect and improve the environment.

At Danstoker we are of the firm belief that there are no conflicting interests between economic development and environment-protection – we must have a common goal now and for the future generations.

Danstoker has elaborated upon their own Environment Charter, based on the Environment Charter of the ICC: "The Business Charter for Sustainable Development - 16 principles".



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