



TERMOFARC

SOLID FUEL THERMAL POWER PLANT

FI-GS
WITH GASIFICATION



Combustion chamber and boiler's convective ways



Gasification chamber coated with refractory concrete on the lower side



Thermostat controlled air fan



Control panel



Thermomanometer



Safety valve



Wood gas combustion



Valve system for flue gas exhaust



Fire iron, brush and scraper for ash and tar removal



Mineral wool insulation



Doors isolated with thermo-insulated concrete and ceramic material belt



Doors equipped with thermo-insulated handle and position adjustment and sealing system



Galvanized coils for:
- preparation of household hot water
- boiler overheating protection



Safety heating valve



Open expansion tank



Packing:
- euro pallet (entirely assembled)
- with the outer cover disassembled and packed in LPDE foil and carton



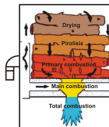
GENERAL

- FI-GS are steel boilers, operating on wood fuel based on gasification principle, equipped with air fan providing the supply with combustion air of the combustion chambers. The air provided by the fan is directed on two air channels - primary air (upper channel) allows the upstream combustion (in mass) of the wood and the passing of wood gas through the refractory nozzle, and the secondary air (lower channel) helps the combustion of the wood gas.
- the wood combustion through pyrolysis obtains 89% efficiency and an ecological combustion that results in a minimum amount of ash; the fuel employed will be dry wood (maximum moisture of 20%), logs of max. 200 mm diameter and wood debris of 20%.
- the boilers consist in two compartments separated by a refractory concrete plate provided with combustion nozzles; the upper compartment plays the role of fuel storage and gasification chamber, while the lower one is combustion chamber where the wood gas is actually combusted; the main combustion chamber is designed so that the combustion gas goes through the two convective passages for a better transfer of heat to the water, then exhausted to the stack.
- the boilers are standard equipped with two heat exchangers: coil for production of household hot water (range 18-40 kW) and cooling coil for protection against the boiler overheating (for the whole range of powers).
- the standard package contains also air fan provided with one-way adjustment valve, thermomanometer, thermostat regulating the boiler's temperature (by the start and stop of the fan), safety thermostat for manual connection, minimum thermostat (that stops the fan after the minimum temperature of the boiler is reached), general switch button, safety valve, fire iron, scraper, wire brush.

ADVANTAGES

- increased efficiency with values of up to 89%;
- ecological combustion and large fuel storage providing increased operating time (low power even up to 24 hours);
- large combustion chamber, allows the loading and combustion of large size logs, without the need to split them;
- large savings by using solid fuels;
- as opposed to other boilers available on the market and thanks to the position of the loading door which is lower than the upper side of the furnace, when loading logs the smoke is not released in the boiler's room even if the stack does not have sufficient draught;
- low fuel consumption thanks to the gasification process;
- thanks to the almost perfect combustion it produces a minimum amount of ash and debris, which is removed once a week only;
- the easy removal of the rear of the boiler allows fast access for easy cleaning of the chimney;
- the control panel regulates the combustion and the external temperature;
- a coil inside the main tank provides hot water for boiler between 18-40 kW. The supply of household hot water is instantaneous and continuous, in proportion to the boilers power (simultaneously covers the needs of a kitchen and bathroom). For a larger consumption of household hot water and for the boilers between 50-150 kW a hot water tank can be used;
- operating safety regardless the conditions:
 - an expansion tank, cooling coil, heating valve and safety valve will be fitted in the case of mains pressure systems;
 - in the case of a non mains pressure system an open expansion tank and safety valve will be fitted;
- elements contained in the control panel allow the boiler's operation without the need to supervise it, by stopping the fan and thereby the combustion (by the adjustment thermostat) when the temperature is reached. The safety thermostat stops the boiler when the temperature of 95 degrees is reached, in case the adjustment thermostat failed to operate;
- protection against overheating, consisting of a cooling exchanger (coil) entirely submerged in the primary heating agent and heat valve, that allows the cooling of the boiler, using cold water with network supply. This system is started when the temperature of 95-98 degrees is reached, by means of the heating valve with thermostatic control. It is remarkable that this system protects the boiler and in case of accidental power failures.
- it can be assembled in gravitational operating equipment (thermo siphoning) or with forced circulation with circulation pump.

Principle of operation of the gasification boiler



The wood (18-20% moisture) is loaded in the fuel storage, where in contact with the embers on the refractory surface gives birth to the wood gas through the process referred to as "wood distillation", which combined with the primary air (combustion) form a mixture of gaseous fuel.

This fuel is blown through the refractory nozzle into the combustion chamber where "reversed flame" combustion is taking place.

The stages of the gasification process and combustion of wood gas:

1. Wood drying - eliminate the water vapors from the wood, containing among others, natural resins.

2. Carbonization (pyrolysis) - wood gas is formed from the dry wood and it is transformed into coal through the process called "distillation".

3. Primary combustion - the combustion of the fuel and transfer of heat to the previous and to the next level.

4. Main combustion - the mixture of fuels is transferred through the refractory nozzle where it is self-ignited at 560 degrees C in contact with secondary air.

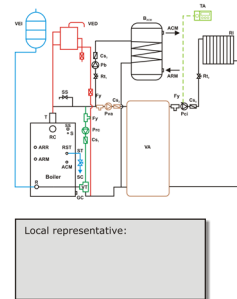
5. Total (final) combustion - the wood gas is made in the combustion chamber in contact with the secondary air at 1200 degrees C temperatures.

The heat transfer is achieved by the main heating agent through the boiler exchanger, and then flue gases are exhausted through the stack.

TECHNICAL CHARACTERISTICS

BOILER	TYPE	FT 18 GS	FT 25 GS	FT 30 GS	FT 40 GS	FT 50 GS	FT 60 GS	FT 80 GS	FT 105 GS	FT 130 GS	FT 150 GS
Rated heat power	Kcal/h kW	15.500 18	22.000 25,6	26.900 30,1	35.000 40,6	45.000 52,2	60.000 69,3	80.000 93,0	95.000 110,0	112.000 130,0	130.000 151
Efficiency	%	87-89	87-89	87-89	87-89	87-89	87-89	87-89	87-89	87-89	87-89
Height	mm	1535	1535	1535	1535	1635	1635	1735	1735	1735	1735
Width	mm	605	605	605	605	700	700	820	820	820	890
Length	mm	1030	1150	1210	1320	1360	1550	1610	1850	1850	2000
Volume of the fuel storage	dm ³	100	135	150	175	230	280	400	510	570	655
Water content in the boiler	L	118	139	149	164	209	243	326	386	405	449
Diameter stack inlet	mm	Ø 170	Ø 170	Ø 170	Ø 170	Ø 200	Ø 200	Ø 220	Ø 220	Ø 240	Ø 240
Height stack inlet	mm	1345	1345	1345	1345	1430	1430	1520	1520	1520	1520
Necessary draught	mbar	0,15-0,2	0,15-0,2	0,15-0,2	0,15-0,2	0,2-0,25	0,2-0,25	0,2-0,25	0,2-0,25	0,2-0,25	0,25-0,25
Consumed power	W	80	80	80	80	135	135	240	240	400	400
Supply voltage/frequency	V/Hz	220/50	220/50	220/50	220/50	220/50	220/50	220/50	220/50	220/50	220/50
Maximum operating pressure	bar	2	2	2	2	2	2	2	2	2	2
Test pressure	bar	4	4	4	4	4	4	4	4	4	4
Turn/return inlet	inch	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"
ACM coil inlet	inch	1/2"	1/2"	1/2"	1/2"	-	-	-	-	-	-
Cooling coil inlet	inch	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"
Boiler discharge inlet	inch	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"
Weight	Kg	413	480	530	565	680	785	945	1115	1222	1300
Temperature of flue gas	°C	130-140	130-140	130-140	130-140	130-140	130-140	130-140	130-140	130-140	130-140
Recommended operating temperature	°C	65-85	65-85	65-85	65-85	65-85	65-85	65-85	65-85	65-85	65-85
Maximum temperature of the water in the boiler	°C	95	95	95	95	95	95	95	95	95	95
Household hot water flow	L/min	12	12	12	12	-	-	-	-	-	-
Maximum amount of fuel on charge (material)	kg	27	38	43	48	73	89	115	140	155	180
Fuel consumption at rate power (dry wood with 18% humidity - H _u = 3500kcal/kg)	kg/h	4,98	7,06	8,35	11,23	14,45	16,7	22,15	28,9	36	42
Maximum length/diameter of the wood	mm	350/200	450/200	500/200	600/200	650/200	800/200	900/200	1100/200	1100/200	1250/200
Autonomy according to wood moisture and forest species	hours	8 - 12									

POSSIBLE CONNECTION DIAGRAMS



In cases where there is no mains water (even a house water supply plant is used), the assembly version will be mandatory with open expansion tank. The open expansion tank is provided at the height of minimum 1.5 m above the test radiator.

The expansion tank is of open type according to ISCR standards, the solid fuel boilers not having a prompt control over the combustion.

The open expansion tank version is recommended to be used in case the system operates on thermodynamic principle as well.

In the case of permanent water source and if the assembly of an open expansion tank is difficult/impossible to achieve, the choice is the membrane (closed) pressure expansion tank and cooling system (boiler overhauling coil and safety heating valve) connected to the water network.

In order to extend the life service of the boiler by avoiding condensing and for a more efficient operation, it is recommended to assemble between turn and return a recirculation pump controlled by thermostat and of a mixing thermostat valve.

For operation at the optimal parameters and obtaining of increased autonomy it is recommended to assemble in the heating circuit an accumulation tank.

In order to obtain household hot water (at powers exceeding 40 kW) an ACM boiler manufactured by Termoflex is connected.

It is also recommended to use a 3-way mixing valve between turn and return in the place of the thermostat valve for powers exceeding 80kW.

In order to obtain the intended heat comfort and control of the environment temperature, it is recommended that the heating circuit is controlled by an environment thermostat.

VEI - closed expansion tank
VED - open expansion tank
T - four connection
R - return connection
ARR - network cold water
ARM - household cold water
ACM - household hot water
SS - safety valve
S - heating valve marker
RST - heating valve inlet
ST - safety heating valve
RL, RL - straight way valves
Prc - anti-condensate recirculation pump
Pva - pump for accumulation tank
Fy - impurities filter

Pb - ACM boiler pump
VED - heating circuit pump
Cs, Cs, Cs, Cs - direction valves
B_h - household hot water boiler
Ri - radiator
VA - accumulation tank
ACM - stack inlet
Gc - discharge of the boiler
VT - thermostat mixture valve
TA - environment thermostat

Local representative: