THERMOSTAHL SOLAR

HEATING AND SOLAR SYSTEMS

MULTIPLEX (MCL)

INSTRUCTION MANUAL

ver. 1.1

THERMOSTAHL SOLAR thanks you for the confidence you show in its products and assures you that you have made the right choice. The THERMOSTAHL boiler is a reliable product and is manufactured with materials of excellent quality by a great factory.

*The name THERMOSTAHL means **GUARANTEE** for the buyer.*

THERMOSTAHL provides heating solutions for more than 20 years on the market. The production experience and the expertise gives us the opportunity to assure you concerning the quality policy we follow and a large range of products who comply with ISO 9001 standards.

The last generation production technology and the seriousness made THERMOSTAHL a well known name in the European market.

CONTENT:

STANDARDS—DIRECTIVES—SPECIFICATIONS

THERMOSTAHL boilers are manufactured according to the European Specifications:

Directive „Low Voltage" 73/23/CEE
Directive „Electromagnetic Compatibility" 89/336/CEE
Directive „Gas Devices" 90/396/CEE
Directive „Level of performance" 92/42

Standard EN 303.1 Heating Boilers
Heating boilers with burners and forced draught
Part 1: Terminology –General requirements –Testing and tagging

Standard EN 303.2 Heating Boilers
Heating boilers with burners and forced draught
Part 2: Special requirements for oil burners boilers with mechanical atomisation of fuel.

Standard EN 303-05 Heating Boilers with solid fuels

Standard EN 304 Heating Boilers
Testing Code for heating boilers for individual atomic oil burners

Standard TRD 702 Technical rules for steam boilers

Standard TRD 305-306 Technical rules for steam boilers

Standard DIN 4791 Electrical conections between burner and boiler

Standard ΕΛΟΤ 763 Central heating boilers
Minimum dimensions of the combustion chamber

Standard ΕΛΟΤ 234 Central heating boilers - Terminology nominal power – technical requirements for heating - Tagging

Standard ΕΛΟΤ 235 Central heating boilers – Rules of testing

Standard ΕΛΟΤ 4702 Central heating boilers – Rules of construction

The Instalation and set in function must meet the following standards:

- DIN 4755 and 4787 concerning combustion of EL light oil
- DIN 4756 and 4788 concerning gas combustion
- DIN 4705 concerning the calculation of the chimney
- DIN 4751 concerning the safety equipment of the instalation
- DIN 51603 concerning liquid fuels for boilers
- DIN 37116 concerning the electric wiring for the burner
- VDE: Standards acording to EN 60730 concerning automatic systems
- DVGW-G600: regulations for gas instalations
- EN 267: Atomic oil burners of monoblock type
- EN 676: Gas burners with ventilator
- EN 226: Burner conections

- EN 60335-1: Home safety and the afferent electrical applications
- EN 60529: Electrical protection level (cod IP)

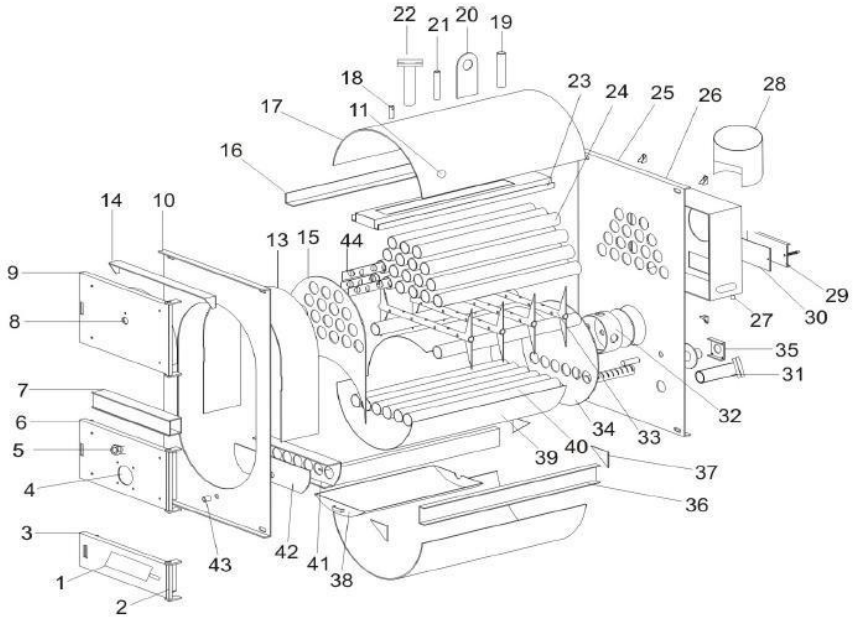
PREFACE

This booklet contains useful and important information about the correct operation and maintenance of the central heating boiler THERMOSTAHL. In addition, important instructions are given to avoid accidents and serious damage, in order that the installation and the operation of the boiler will be safe and no problems.

Read these instructions carefully, before you put the boiler into operation. Familiarize yourself with its operations and controls and follow strictly the instructions given!

If you have any questions or you need more information about particular points concerning the THERMOSTAHL boiler, please do not hesitate to contact us. The technical data contained in this booklet are based on the most recent information and are submitted to eventual reviews, since new design improvements require it.

Our company reserves the right to change the design or/and the disposition of our products in any time, without being obliged to adjust in a corresponding manner the previous products, too.



1. draught door(air acces)	23. bridge
2. door hinge	24. exhaust pipes
3. ash door	25. back plate
4. burner flange	26. smoke box
5. eye slit (fire chamber)	27. condensation dumper
6. fire chamber door	28. smoke box pipe
7. collector 1	29. cleaning smoke box door
8. eye slit (smoke pipes)	30. asbestos plate
9. door acces (smoke pipes)	31. return water nozzle
10. front plate	32. anchor tie-rod, fire chamber- rear plate
11. thermo manometer bushing	33. anchor tie-rods water chamber
12. chain thermostat bushing	34. end plate fire chamber
13. crown	35. ventilator flange
14. mask	36. boiler base
15. tubular plate	37. angle bracket
16. angle iron	38. ash bin
17. water chamber	39. fire chamber
18. additional pipe (sensors)	40. fire grate
19. safety collector nozzle	41. water colector 2
20. lifting eye	42. colector 2 plate
21. dual safety nozzle	43. blow down discharge
22. hot water nozzle	44. turbulators

1. DESCRIPTION

The THERMOSTAHL – MULTIPLEX boiler is made of steel with exhaust pipes, with two ways for the burning gases

It is adequate for burning solid fuels (wood, coal, coke,lignite) and liquid fuel in case of adapting a burner (light oil - DIN 51603 and gases). The boiler MCL is a new product, designed to function economically providing a constant heating of houses or industrial areas. It can be connected to heating systems with central heating, air ovens with hot water.

The boiler is made of steel, the ideal material for thermal oscillations, resistant to dilatation and constriction. The construction in one piece, without elements and other welded structures, constitutes and advantage of Multiplex boiler. Moreover this boiler is protected against thermic shocks.

The MCL boiler is designed in such a way that all the surfaces that come in contact with the flame to be cooled by water, including the grid where the ash and the remains of burning are. The two ways of exhaust from the upper side, the great number of exhaust pipes, the great volume of the fire-box and the great volume of water in the boiler, as much as the simetric construction determines a high performance.

2. DELIVERY-TRANSPORT

The MULTIPLEX MCL boiler is delivered in a package and accompanied with the following parts:

- The boiler steel body
- The insulation fitted (it is of mineral fiber of 50 mm thickness and covered in aluminium film) and well fixed with some plastic strips on the water shell plate, assures a very good thermic insulation of the boiler.
- The cleaning brush for the smoke (from inside of the smoke pipes) and a little shovel for cleaning the walls of the burning remains.
- 1 ventilator
- 1 control panel
- 1 thermomanometer
- 1 temperature and presure relief valve
- 1 blow down valve

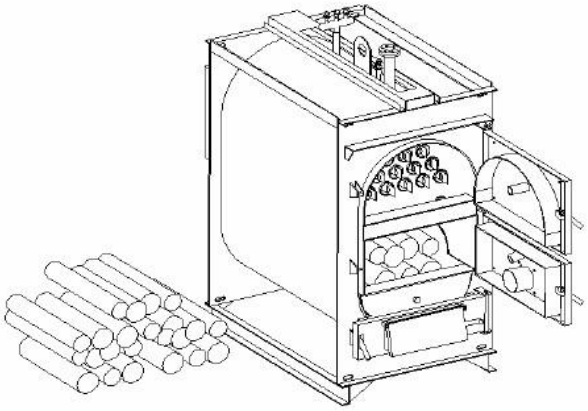
- 1 draught regulator
- 1 safety collector, which contains 2 safety valves of 3 bars and 1 automatic deaerator
- Inox -steel turbolators
- Metal covers

The loading of the boiler is made by a forklift, a palette-lift or a crane (the boiler is provided with a suspension hook). Secure the boiler during transport on the transport means, so as not to slip.

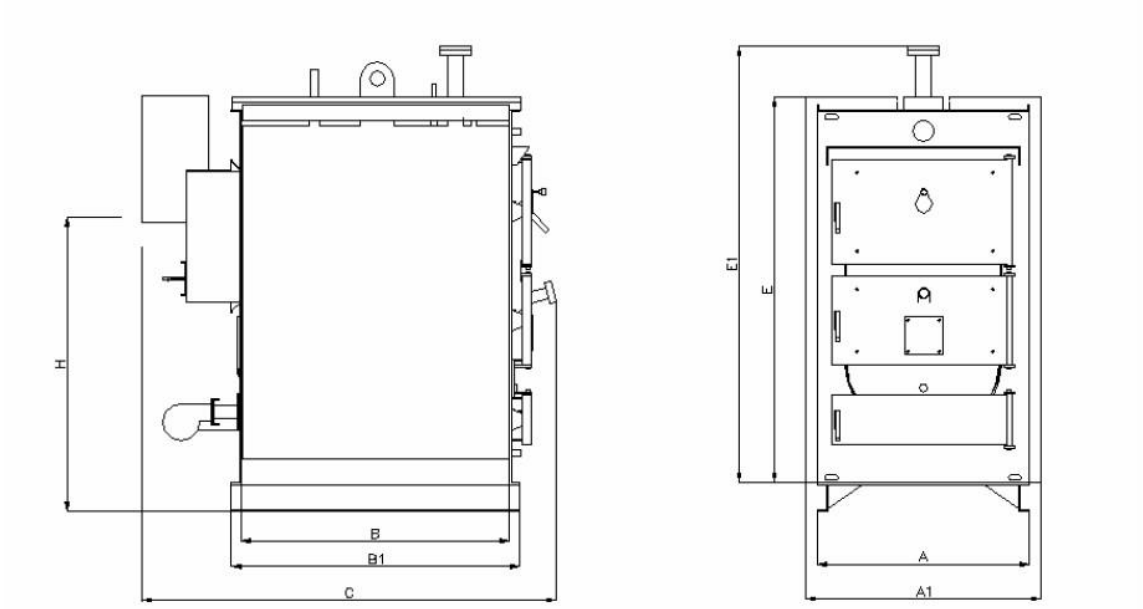
Consider seriously that the gravity centre is above the geometric centre. That means there is need of a special care during transport and unloading the boiler.

At delivery the boiler has a stamp plate made of aluminum on which it is marked the identification data and the function characteristics:

- Type and serial nr.
- Boiler power(Kcal/h or kW)
- Maximum work pressure
- Year of manufacture



Technical data



Type HL	Power		Oper. Pressure	Water content	Heating surface	Dimension of feeding door	Max wood length	Silo Volume	Motor	Ventilator
	kW	*Mcal/h*	*bar*	*lit*	*m^2*	*[mm] x*	*mm*	*lt*	*kW*	*m^3/h*
23	23	20	2	85	3	710 x 380	500	350	0.18	250
35	35	30	2	95	3.4	710 x 380	600	350	0.18	250
47	47	40	2	105	3.5	710 x 380	400	350	0.18	250
58	58	50	2	120	4	730 x 500	500	370	0.25	350
69	69	60	2	140	4.5	710 x 380	600	370	0.25	350
81	81	70	2	140	5	710 x 380	700	370	0.25	350
93	93	80	2	160	5.5	710 x 380	800	370	0.25	500
116	116	100	2	200	6	710 x 380	900	370	0.25	500
140	139	120	2	260	8	710 x 380	800	600	0.37	500
160	162	140	2	290	9	370 x 625	900	600	0.37	780
190	186	160	2	330	10	370 x 625	1000	600	0.37	780
210	209	180	2	360	11	370 x 625	1150	600	0.37	900
230	233	200	2	420	13.5	370 x 625	1400	600	0.37	900
260	256	220	2	450	14	370 x 625	1400	600	0.37	900
290	291	250	3	620	17	370 x 625	1100	950	0.37	1400
350	349	300	3	720	21	860 x 490	1400	950	0.37	1400
400	407	350	3	820	25	860 x 490	1600	950	0.37	1400
460	465	400	3	920	29	860 x 490	1850	950	0.37	1400
580	581	500	3	1020	33	860 x 490	2160	950	0.37	2600
700	698	600	3	890	31	860 x 490	1300	950	0.37	2600
750	756	650	3	1100	42	1230x520	1600	950	0.37	2600
800	814	700	3	1300	51	1230x520	1800	950	0.37	3800
870	872	750	3	1450	59	1230x520	2050	950	0.37	3800
930	930	800	3	1600	64	1230x520	2200	950	0.37	3800
1050	1046	900	3	1800	68	1230x520	2450	950	0.37	3800
1160	1162	1000	3	2000	72	1230x520	2650	950	0.37	3800
1400	1400	1200	3	3500	73	1730x740	2200	1900	0.37	3800
1600	1620	1400	3	3700	89	1730x740	2700	1900	0.37	3800

Dimensions

Type	A	B	B1	C	D	D1	E	F	G	H	I	K	Ø1	Ø2	T1	T2-T3
HL	[mm]														[inch]	
23	545	1200	1290	920	490	1150	550	110	1300	930	600	570	175	106	1 ¼	½
35	545	1200	1290	1020	490	1150	550	110	1300	930	700	670	175	106	1 ¼	½
47	545	1200	1290	1120	490	1150	550	110	1300	930	800	770	175	106	1 ¼	½
58	670	1280	1550	950	620	1400	630	120	1350	950	600	580	195	106	1 ½	½
69	670	1280	1550	1050	620	1400	630	120	1350	950	700	680	195	106	1 ½	½
81	670	1280	1550	1150	620	1400	630	120	1350	950	800	780	245	106	1 ½	½
93	670	1280	1550	1250	620	1400	630	120	1350	950	900	880	245	106	1 ½	½
116	670	1280	1550	1350	620	1400	630	120	1350	950	1000	980	245	106	2	½
140	910	1600	1850	1300	810	1730	610	100	1350	950	900	880	295	106	2	½
160	910	1600	1850	1400	810	1730	610	100	1570	930	1000	980	295	130	2	½
190	910	1600	1850	1500	810	1730	610	100	1570	930	1100	1080	295	130	2	½
210	910	1600	1850	1650	810	1730	610	100	1570	930	1250	1230	295	130	2 ½	½
230	910	1600	1850	1900	810	1730	610	100	1570	930	1500	1480	295	130	2 ½	½
260	910	1600	1850	1900	810	1730	610	100	1570	930	1500	1480	295	130	2 ½	½
290	1100	2000	2000	1840	1000	2250	830	150	1570	930	1250	1210	345	130	2 ½	½
350	1100	2000	2000	2090	1000	2250	830	150	2160	1085	1500	1460	345	185	3	1 ¼
400	1100	2000	2000	2340	1000	2250	830	150	2160	1085	1750	1710	395	185	3	1 ¼
460	1100	2000	2000	2590	1000	2250	830	150	2160	1085	2000	1960	395	185	4	1 ¼
580	1100	2000	2050	2840	1000	2250	830	150	2160	1085	1500	2150	395	185	4	1 ¼
700	1540	2400	2050	2330	1440	2590	980	210	2530	1785	1750	1420	490	265	4	1 ¼
750	1540	2400	2050	2580	1440	2590	980	210	2530	1785	1750	1650	490	265	5	1 ¼
800	1540	2400	2050	2830	1440	2590	980	210	2530	1785	2000	1900	490	265	5	1 ¼
870	1540	2400	2050	3080	1440	2590	980	210	2530	1785	2000	2150	490	265	5	1 ¼
930	1540	2400	2050	3330	1440	2590	980	210	2530	1785	2500	2400	490	265	6	1 ¼
1050	1540	2400	2050	3580	1440	2590	980	210	2530	1785	2500	2650	490	265	6	1 ¼
1160	1540	2400	2400	3830	1440	2590	980	210	2530	1785	2500	2850	490	265	6	1 ¼
1400	2100	2870	2150	3420	2000	4030	1180	335	3090	1950	2500	2390	590	345	6	1 ¼
1600	2100	2870	2150	3920	2000	4030	1180	335	3090	1950	3000	2890	590	345	6	1 ¼

3. FEATURES OF THE MULTIPLEX BOILER

3.1 MANUFACTURE MATERIALS

- Steel OLT-37.2, STAS 500/2-80~S235JR SR EN 10025/90+AI/93
- For fire plates and fire box : K 4120.2b STAS 2883/2-88~P265GH SR EN 10028-2/96
- Fire tubes OLT 35KII STAS 8184-87~P 245 GH EN 10216-2/2000
- Metal covers of 1 mm thickness (iron plate DKP) electrostatic painted at 200 ^{o}C.
- Insulation with glass fiber of 50 mm thickness with aluminium lining
- Insulation of the door with refractory cement of the best quality.

3.2 ADVANTAGES

- Steel offers numerous advantages, which are of a particular importance for the modern heating technique. Among these we mention the special mechanical quality, remarkable formation possibilities, smooth surfaces and low weight.

- a great advantage of THERMOSTAHL boilers is the great water capacity, which allows the precise adjustment of its temperature and no exceptional requirements concerning the water outflow. The interior energy of the boiler contributes considerably to the protection of the enviroment, because the great volume of water increases the storage capacity of energy, and reducing the number of ignition starts of the burner (in case of adapting of a burner)

- Reliability .
- Energy savings.
- Enviromental friendly.
- Modern Design.
- Solid Construcţion
- Easy maintenance
- Big fire box.
- Large heating surface.
- High performance ≥ 78 ÷ 82%.
- Uniformal thermal charge.
- Low outlet of burned gases (180 -220^{o}C).
- Long life without problems.
- Exceptional draught.
- High water volume.
- Possibility of working also with gas or liquid fuels

3.3 RUNING ORDER

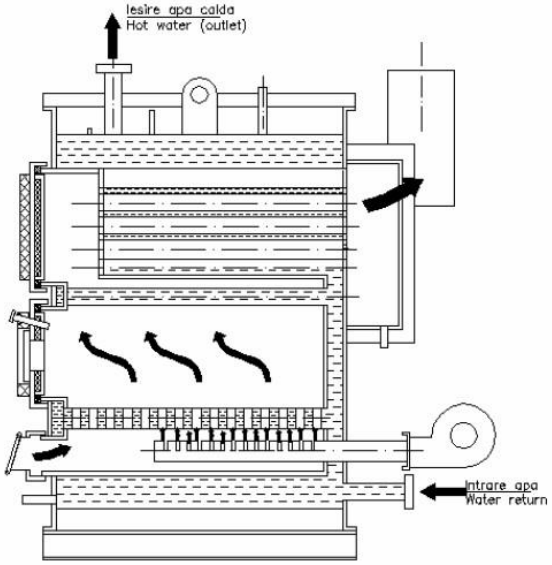
It is based on the radiation generated by the flame in the combustion chamber and the heat transmision by transfer and conductibility through the fire tubes (exhaust pipes).

The runing of the MULTIPLEX boilers is based on the most simple method of burning, with free evacuation of the exhausts through the chimney. The burning proces takes place in the combustion chamber, built in such a way that there may fit woods of long dimensions and in quantities capable to maintain the operation for several hours. During the burning process the flame develops twards all the points and heats the boiler walls who are cooled by water.

Later on, the exhausts are led through the smoke pipes from which they go to the smoke box. The remains of the burning fall in the lower section of the boiler where there is an ash tray specially designed for that.

The grate with water circulation is made of a number of pipes who holdup the ash heat. The space from the grate alows the ash to fall in the lower side of the boiler in the ash tray.

The burning control is made with the ventilator's help which is comanded by a control panel and a mechanism which works as a thermostat. When the water is still cold, it allows the air enter through the draught door. As the water heats up in the boiler, the sensor expands and closes the draught door. In this way the flame control is achieved by reducing the burning air.



The adjustment of the secondary burning air is made by the manual draught cupboard .

The MULTIPLEX boiler series can operarte also with liquid fuel (black oil, oil, residue oils) or gases as an alternative solution. For this purpose there is the posibility of mounting at the boiler's door of a special flange for adapting a burner.

In case that the boiler works mostly with liquid or gas fuels, a delay of the exhausts must be made by using of special turbiolators or by mounting a drop shutter at the chimney at the „closed" position.

For a better burning the boiler is provided with a rear ventilator, fastened under the smoke box. The ventilator's flange is conected with a slited pipe that crosses the rear plate and the combustion chamber and which has an optimal length to ensure a better air intake. The ventilator is controled by the control panel, and the conection of the ventilator is made by simply conecting the conecting wires. The ventilator is fed with 220 V and has powers between 60 and 200 W, ,blowing air between 450 and 1050 m^3/h, depending on the boiler's power.

For a good function of the Multiplex boilers and a longer life period, **it is strictly recomended the usage of dry wood with a humidity of maximum 20-25%**. The boiler powers prezented in this document are calculated based on this kind of wood. It is known that the wood caloric power decreases significantly with the increase of the humidity in conformity with the graph below.

Green wood has a low caloric power, it doesn't burn well, produecs a lot of smoke and reduces substantially the life period of the boiler and of the chimney. Also the power decreases with 50% and the wood consumption is doubled. **The fire wood must be chopped from the logs in even pieces ,stored in a covered hall and dried at least one year long before using it**. **In the boiler there will be used wood with the specific maximum length for every boiler type mentioned in the technical book**.

You may burn timber offal of great dimensions combined with fire wood. It is recommended that that these offal's should not exceed 15% from the combustion chamber volume.

It is forbidden to use scraps from rubber, plastic materials etc as they produce pollution and deteriorate the boiler.

There won't be used wood scraps that were chemically treated.

It can be used higher caloric power fuels than wood, eg. Coal (anthracite, brown coal, pit coal) or coke but Thermostahl Company must be announced before about this, because there must be made some adjustments to the combustion chamber.

Burning coal with low caloric power (brown coal, lignite, peat) results in decreasing of the thermal power of the boiler.

In the MCL boilers it is not recommended to burn powder coal or coal under the granulation of 20 mm.

FUEL		CALORIC POWER	
		Kwh/Kg	Kcal/Kg
OAK		4,2	3600
BEECH		4,0	3450
BIRCH		4,3	3700
POPLAR		4,1	3500
PINE		4,4	3800
FIRTREE		4,5	3900
BRIQUETS		4,9	4200
COAL	ANTHRACITE	5,6 – 6,5	4800 – 5600
	PIT COAL	4,5 – 6,4	3900 – 5500
	BROWN COAL	2,7 – 4,2	2300 – 3600
	LIGNITE	1,6 – 3,8	1400 – 3300

3.4 CONSTRUCTION

3.4.1 The boiler body

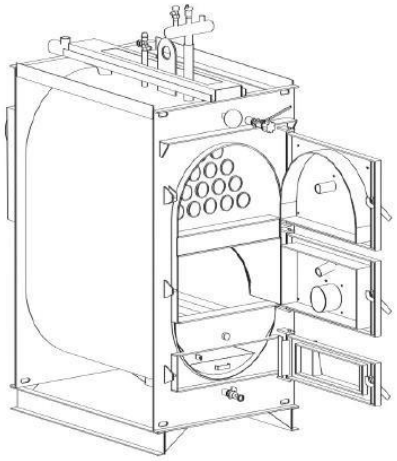
The MULTIPLEX boiler is horizontal, with smoke pipes.

The main body of the boiler is made of killed steel plates St 37.2 STAS 500/2-80~S235 JR SR EN 10025/90 hot rolled, conform DIN 17100. The cutting is made with a high technology LASER machine. The THERMOSTAHL boiler is designed in such a way that all its parts in touch with flames to be cooled by water. The profile, number and length of the smoke pipes are designed specially for a maximal exploitation of the exhausts.

The welding are made conform the standards 288-1 şi 288-3 şi DIN 50120, 50121-50145, SR EN 1011.1/2001, by using electric welding machines (MIG-MAG), for realizing a penetration of the steel plate on all its thickness. The welding quality is checked in conformity with DIN 8563. The welding process is conform 131-ISO 4063.

The smoke box is screwed and has a special door for cleaning, isolated with asbestos plate, who also works as a safety door (preventing explosion). The smoke box pipe is wide enough to ensure the smoke evacuation resulted after the burning process. If the drought is very strong, the evacuation speed of the smoke can be slowed down by adjusting a butterfly dumper who is fitted above the pipe of the chimney. The water circuit is opposed the exhausts.

Every boiler is separately tested at a hydraulic pressure of 4-5 bar (according to the type) for checking the resistance and waterproofing. A strong insulation covers all the water tank.



The access door towards the smoke pipes and the loading door are thermal-insulating lined. They are also fitted with glass fiber braid for a very good insulation aganist the noxious from the combustion chamber. Both doors have eye slits for an optical control of the burning process.

The access door of the combustion chamber has a flange adapted for fitting a burner, in case that is desired. Otherwise it is compulsory that the flange is well fitted to avoid the exit of burning gases from the combustion chamber.

4. BOILER INSTALLATION

4.1 Boiler installation:

Boilers can be installed in their own rooms located in the basement, ground floor or uper floors of the industrial buildings of category C, D and E of fire danger, buildings for storage of nonflamable materials and civil buildings, conform the valid legislation.

ATENTION! It is not admitted to locate the boiler room having a common wall or just under rooms filled with people who cannot evacuate by themselves (hospitals, shops, schools, kindergartens or similar) or under the ways of evacuation of these .

The boiler room has to be separated by the adjacent rooms with walls or ceilings with suitable mechanical resistance, fireproof doors and without woods for windows.

The boilers having the caloric flow of 0,1 Gcal/h can be located in rooms having other destinations, in which it will be arranged an appropriate space for locating that boilers. The boiler location has to be made only based on a project checked by an authorized inspector, or by an economic agent authorized in this aspect by ISCIR INSPECT or a similar authority.

For the heating centrals equipped with one or more boilers whose power exceeds 300 kW, the installation project will be aproved from the point of view of the thermomechanic sketch by an economic agent authorized by ISCIR INSPECT or a similar authority.

4.2 Room dimensions:

It is recommended that the installation of the boiler in the room should be made in such a way that there is enough space for caring on of maintenance and cleaning works.

The boiler should be placed on horizontal plan and easily accessible from all sides.

The distance between the boiler and the front wall:

For boilers up to 100 KW – at least 1,5 m.

For boilers bigger than 100 KW – at least 2 m.

The distance between the boiler and the rear wall:

The adeqvate distance is the one that allows an easy acces for checking and maintenance.

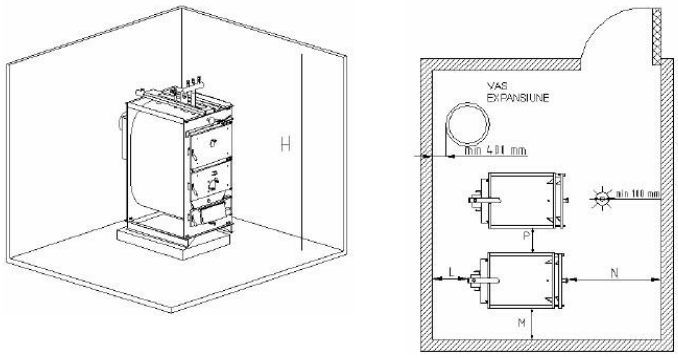
The distance between the boiler and the side walls:

For boilers up to 300 KW – at least 0,6 m.

For boilers bigger than 300KW – at least 1 m.

Boiler's room height

For boilers up to 70 KW – at least 2 m
For boilers bigger than 70 KW – at least 2,4 m
For boilers bigger than 230 KW – at least 3 m
For boilers bigger than 400 KW – at least 3,5 m.



Conform PT C 9-2003 the access in the boiler room of persons other than the authorised personal in boiler exploitation and of the auxilliar equipment is prohibited.

The inspectors from ISCIR-INSPECT IT or likewise authorities, as much as the authorised personal for technical surveilance may enter anytime in the boiler room on the basis of acces card or special control documents.

!It is prohibited to give another destination to the boiler room, except the one established in the project.

The acces and service spaces of various places in the boiler room, as much as the exits ways to the doors should be always free.

In the boilers room of a greater nominal power than 300 KW, it should be a telephone or other means of comunication with the exterior, which will avoid the useless walking of the boiler operators.

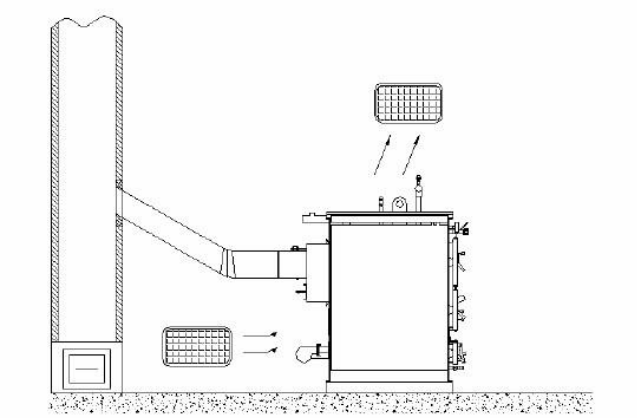
In a vizible place of the boilers room, there would be listed the work instructions that will consider the speciffic of the boilers in the room. There will be also listed internal instructions concerning the operators task and the way of operating the boiler.

Observations:

In the boiler's room :

a. must be clean;
b. the flamable objects should be removed;
c. must have a sewerage system;
d. must be enough ventilation;
e. the fuel reservoirs will be placed in separate spaces outside the boiler's room and be well ventilated. If they are placed in the boiler's room they should be separated by this one by a separating wall, in conformity with the valid safety rules;
f. there, must exist a powder fire estinguisher next to the burner and a hand fire estinguisher next to the door;
g. the chimney must be safe and with an adeqvate section;
h. it is advisable that the fuel tank (if it's the case) to be installed in a place away from sun rays, rain or fire sources ;
i. in case there is an alarm system, a smoke detector must be installed on the ceiling of the boiler room;
j. the door must be metalic, without louvers or glass and it must open twards the outside;

! It is forbiden to install the boiler in spaces with a lot of dust, dangerous gases or in places with great humidity like the bathrooms.



5. THE CHIMNEY

The following will be respected:

Conform DIN 4705 and DIN 18160, the evacuation of exhausts in the atmosphere as much as the reducing of the temperature of those on the way must be made in such a way that the condensation and its consequences be avoided.

The correct running of the chimney is very important for the boiler running.

• **Chimney tightness:** no cool air is allowed to enter by cracks or openings, because in this case the burning gases are cooled and produce condensation. There is the danger that the condensed gases may enter the boiler and produce corosion. Likewise it must be avoided the entering of rain water in the chimney .

• **The evacuation of the exhausts should be smooth,** with no obstacles – foreign parts (bricks, bird nests, woods, grass, etc).

• **The cleaning of the chimney** esspecially in the exit points from the boiler and the elbows, where the exhaust gases change their course. A clean chimney means a correct draught.

• **The insulation of the chimney is compulsory.**

• **An uptight chimney can make many problems to the boiler,** for example filling, a lot of smoke, noises, bad running of the burner, etc. Another big problem is the forming of an air current and vortexes that do not allow the easy evacuation of exhaust gases .

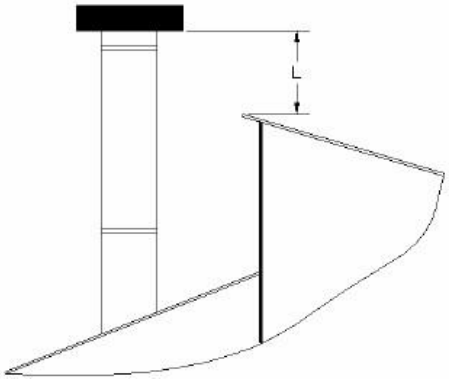
• The chimney must have **an increased height** twards the building.

• The material from which the chimney is built doesn't have to be influenced by the exhaust gases.

For all the above reasons it is required a periodic inspection of the chimney especially at the beginning of the winter time.

ATTENTION:

A very little chimney gets clogged quickly. A very big chimney cools to much the exhaust gases and produces condensation. So the chimney doesn't have to be too big or too small.



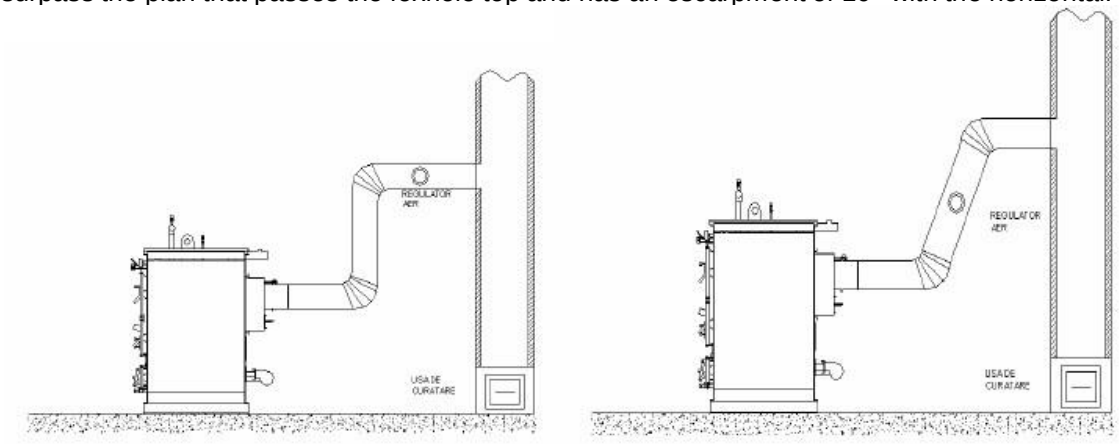
At the roofs with escarpment of up to 20%, the height of the chimney end twards the roof top, has to be of minimum 1000 mm.

If there are elements with increased height towards the roof (attics, antifire walls), the chimney must surpass their height with at least 1000 mm, exception is made fot the chimneys situated at a smaller distance than 3000 mm of these elements, in which case the surpass can be reduced to 500 mm.

At the roofs with escarpment >20%, the height of the chimney depends on the nature of the casing and the position of the chimneys towards the foxhole top, as it follows:

-The chimneys placed up to 1500 mm of the top must surpass the top of the roof with 500 mm for inflammable casings and with 1000 mm for flammable casings.

-The chimneys placed at greater distances have to have the evacuating opening at the height of at least 1000 mm towards the casing (measured on the slope normal line) and to surpass the plan that passes the foxhole top and has an escarpment of 10^0 with the horizontal.



The reasons for malfunction of solid fuels boilers:

1) Small active height of the chimney.
2) Untight masonry of the chimney.
3) Too narow masonry of the chimney.
4) The existence of foreign parts or narowing of the chimney section.
5) Untight drop shutter.
6) Draught regulator wrongly adjusted.
7) The foxhole is in the chimney.
8) Untight joints to the foxhole .
9) Untight cleaning bay .
10) Most of the foxhole is without insulation, too little escarpment .
11) Untight joints(flanges), deteriorated insulations.
12) Reduced draught because of carbon clogged on the flame tubes.
13) Carbon settlement.
14) Untight cleaning lid .
15) Untight doors and body.
16) Draught regulator wrongly adjusted or broken.
17) The auxilliary air bay for burning.
18) The ash tray full.
19) The water cooled grid obturated with ash.
20) Reduced ventilation or closed in the heating space.
21) The cleaning door of the chimney is untight.
22) Very high temperature of the burning gases (very strong draught of the chimney or boiler heated at the limits for covering the needs of heating).
23) Very low temperature of the burning gases (obvious function under the parameters of the boiler, the boiler is too big for the heating needs).
24) Burning of wet fuel with low caloric power.

6. BOILER ASSEMBLING

Metal covers assembling:

Metal covers assembling on the boiler's body is done fast and easy paying respect to the following instructions.

The assembling order is:

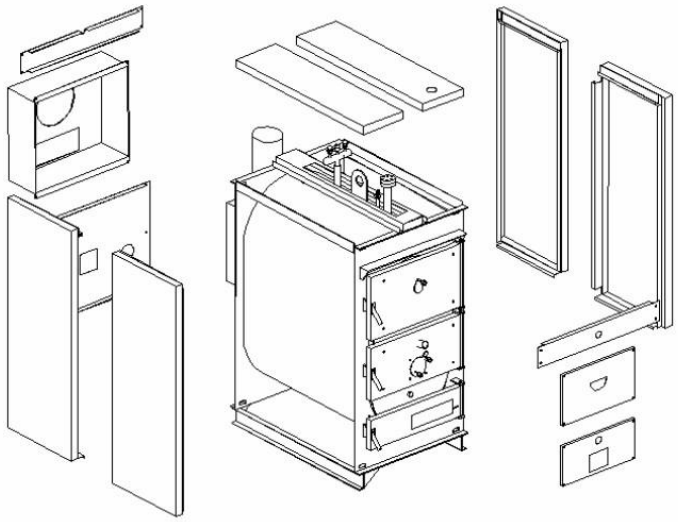
a. The side covers are assembled first.

b. The upper covers are assembled second.

c. Screw in the upper side of the side covers the front and rear covers with 2 screws each.

d. The door covers are assembled by screwing first the double ended bolts for conecting the covers with the doors in the threaded bushings that are welded inside the boiler's doors.

Note: For the MCL 40 - MCL 70 boilers we have only one cover for the sides. For the other boiler series we have two or three covers for the sides.



7. THE CONTROL PANEL

Digital Electronic Controller PWC-1000

<u>Operating instructions</u>

Button A1 – A2 : They are used to increase and decrease the desired maximum water temperature.

Button A3 : It is used for entering and exiting from the menu. For entering into the menu short pressing is required, and for exiting long pressing.

Button A4 : It is used to turn on and off the controller (long pressing). It is also used for starting and stopping the ignition process (short pressing).

After entering the menu buttons A1 and A2 are used to change the value of the selected parameter, and buttons A3 and A4 are used to change the parameter we want to alter.

Settings

01	**TEMP.WATER**	Maximum water temperature.
02	**TEMP.EXHAUST**	Maximum exhaust temperature.
03	**TEMP.CIRCULATOR**	Water temperature that the circulator pump starts to operate.
04	**TEMP.Bypass**	Water temperature that the bypass valve starts to operate.
05	**FAN AIR MAX**	Maximum power amount of the fan (%) in the full burning process.
06	**DT WATER**	Temperature difference below the maximum water temperature that the fan power starts to decrease.
07	**DT EXHAUST**	Temperature difference below the maximum exhaust temperature that the fan power starts to decrease.
08	**IGNITION TIME**	Maximum time of the process “ignition”. Fan power is determined only by the “ignition air” setting at this process.
09	**IGNITION AIR**	Power amount of the fan (%) in the ignition process.
10	**Off TIME**	Time that exhaust temperature must be below the “11-Off exhaust” so that the controller is set into “end of fuel” process.
11	**Off EXHAUST**	Exhaust temperature value that determines when the fuel has ended.
12	**CONS.PERIOD**	Repeating time of the process “flame conservation”. In this process the fan power works at “09-ignition air” so that the flame is conserved.
13	**CONS.DURATION**	Duration of the process “flame conservation”.

8. GENERAL MAINTENANCE INSTRUCTIONS

In conformity with DIN 4575 and 4756 regulations the periodic cleaning (even daily if it's necessary) of the boiler, must be performed by a qualified personnel to ensure an economic and ecologic running.

The boiler needs a maintenance operation to be done at the end of the winter season. Special care should be given to cleaning of the smoke tubes, to avoid the laying of carbon which can damage them.

If a correct maintenance is not performed, then problems will arise such as:

- Performance dropping
- Increased fuel consumption
- Increasing temperature of exhausts
- Carbon layers
- Reduced draught

Maintenance instructions

- Disassemble the burner (if necessary).
- Open the doors.
- Disassemble the turbulators from the fire tubes and clean them with a special brush.
- Clean the walls of the combustion chamber with a special crowbar.
- Empty the ash tray.
- Check the insulation bands and the glass fiber braids and replace them in case of deterioration.
- Check the refractory material on the door.
- The safety valves and the temperature/pressure relief valve must be checked and replaced in case of malfunction.
- Check the water connections.
- Check the draught regulator .
- Check the filter from the water supply.
- Check the eye slit thermoresistant glass.