



A.D. METALNA INDUSTRIJA VRANJE  
Radnička 1

**SOLID FUEL FOR FLOOR HEATING  
ALFA TERM -20**



*This product meets the requirements of the Ecodesign Directive in terms of efficiency and air pollution level, in order to contribute to the reduction of energy consumption and negative environmental impact.*

**INSTRUCTIONS FOR INSTALLATION, ADJUSTMENT AND USE**

ENG\_V.3.0

## 0. TECHNICAL DATA

HEATING POWER WITH GRATE IN LOWER POSITION:	
Rated heating power (wood)	22,9 kW
Heating power of solid fuel emission (wood)	8,7 kW
Thermal power of delivered water (wood)	14,2 kW
HEATING POWER WITH GRATE IN UPPER POSITION:	
Rated heating power (wood)	16 kW
Heating power of solid fuel emission (wood)	6 kW
Thermal power of delivered water (wood)	10 kW
REQUIRED FLUE DRAFT	15,5 Pa
DIAMETER OF FLUE EXTENSION	150 mm
HEIGHT FROM FLOOR TO AXIS OF FLUE EXTENSION	690 mm
SOLID FUEL DIMENSIONS:	
Width	900 mm
Height	850 mm
Depth	600 mm
OVEN DIMENSIONS:	
Width	460 mm
Height	260 mm
Depth	440 mm
FIREBOX DIMENSIONS:	
Width	265 mm
Height (min./max.)	264/452 mm
Depth	414 mm
OPENING OF FIREBOX DOOR (width/height)	175/200 mm
CONNECTIONS OF DISCHARGE AND RETURN LINE	R1" RS
CONNECTIONS OF THERMO VALVE AND SAFETY VALVE	R1/2" RU
CONNECTIONS OF COOLING PIPES	R1/2" RS
BOILER VOLUME	14 (l)
HEATING VOLUME WITH GRATE IN LOWER POSITION:	
Heating volume of solid fuel emission	280-380m <sup>3</sup> (total)
Heating volume of hot water (radiators)	100 -135 m <sup>3</sup>
Heating volume of hot water (radiators)	180-230 m <sup>3</sup>
HEATING VOLUME WITH GRATE IN UPPER POSITION:	
Heating volume of solid fuel emission	190-250m <sup>3</sup> (total)
Heating volume of solid fuel emission	70-95 m <sup>3</sup>
Heating volume of hot water (radiators)	120-155m <sup>3</sup>
MAXIMAL OPERATING PRESSURE	1,9 bar
MAXIMAL OPERATING TEMPERATURE	90 °C
WEIGHT (gross/net)	186/164 kg

The heating power is shown for stoking dry beech wood with lower heating power Hd=4255W/kg.

## DEAR BUYERS!

Thank You for the trust you showed us buying our solid fuel for floor heating. We assure You that You have chosen a quality and economic product that is a result of many years of experience of this factory in the production of solid fuels and furnaces for floor heating.

We hope that we fully met Your requirements in terms of design, as well as in terms of the surface of living area that you can heat.

Please carefully read these instructions before connecting the solid fuel and adhere to every advice provided herein.

### CAUTION

-IT IS MANDATORY TO INSTALL A THERMAL DRAIN VALVE TOGETHER WITH THE THERMAL THERMAL PROTECTION OF THE SO CALLED THERMAL FUSE IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE USER'S MANUAL.

-IT IS MANDATORY TO INSTALL A CONTACT THERMOSTAT IN ORDER TO CONTROL THE CIRCULATION PUMP AT A MINIMUM RECOMMENDED SET TEMPERATURE OF 57°C.

-IT IS MANDATORY TO USE FIREWOOD WITH A HUMIDITY PERCENTAGE OF LESS THAN 25% OR FIREWOOD THAT HAS BEEN STORED IN A DRY OPEN SPACE FOR TWO YEARS

-THE MINIMUM INSTALLED POWER OF THE HEATING SYSTEM MUST NOT BE LESS THAN 65% OF THE NOMINAL POWER OF THE SOLID FUEL AND THE MAXIMUM INSTALLED POWER OF THE HEATING SYSTEM MUST NOT BE MORE THAN 100% OF THE NOMINAL POWER OF THE SOLID FUEL.

-THE CHIMNEY TO WHICH THE SOLID FUEL IS CONNECTED MUST MEET THE REQUIREMENTS PROVIDED IN THE USER MANUAL.

-WHEN CONNECTING THE APPLIANCE TO THE CHIMNEY, NEVER USE FLEXIBLE HOSES INSTEAD OF FLUE PIPES.

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# 1. PURPOSE

The continually burning solid fuel for floor heating with solid fuel is used for:

- cooking,
- baking,
- heating apartments, individual houses and offices,
- production of hot sanitary water.

It is mostly installed as a solid fuel for floor heating, and it can also be installed for central heating.

## 2. THE RESPONSIBILITY OF THE MANUFACTURER

Upon publishing this Manual, ALFA PLAM **will not accept any civil or legal responsibility, either direct or indirect, due to:**

- **Accidents occurred due to the non-observance of the standards and specifications stated in this Manual,**
- **Accidents occurred due to the improper operation or use of the solid fuel by the user,**
- **Accidents occurred due to any modifications and repairs not approved by ALFA PLAM,**
- **Poor maintenance,**
- **Unpredictable events,**
- **Accidents occurred due to the use of spare parts that are not original spare parts or that are not intended for these models of the solid fuel.**

**The installer of the solid fuel shall take the full responsibility for the installation.**

### 2.1. THE BASIC CHARACTERISTICS OF THE USER

The solid fuel must be used by adult and responsible people.

Make sure that children do not approach the solid fuel, when it is in use, with the intention of playing.

Children must not approach the solid fuel, while in function, with the intention of playing. This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge. If they are supervised by an elderly person who is familiar with the instructions of use. Children cannot carry out the cleaning and maintenance of the solid fuel, if they are not supervised by an elderly person.

### 2.2. THE TRANSPORTATION AND USE OF THE SOLID FUEL – HANDLING

During the use of the solid fuel care should be taken that the solid fuel is not leaned forward because the centre of gravity of the solid fuel is oriented forward.

While moving the solid fuel, which must be carried out absolutely safely, ensure that the forklift truck has a carrying capacity that is higher than the weight of the solid fuel it should lift. Avoid twitches and abrupt movements.

**ALL THE PACKAGING MATERIAL SHOULD BE REMOVED AWAY FROM THE REACH OF CHILDREN AS THE MATERIALS CONTAINED IN THE PACKAGING MAY CAUSE SUFFOCATION. THESE INCLUDE PLASTIC BAGS, FILMS, STYROFOAM, ETC.**

### 2.3. THE RESPONSIBILITY OF THE INSTALLER

**The responsibility of the installer is** to perform all the checkups of the flue piping, air intake/supply, as well as all the solutions required for the installation (incorporation) of your solid fuel.

**The responsibility of the installer is** to ensure that the solid fuel is in compliance with local regulations applicable in the place where the solid fuel is installed (incorporated).

**The use of the solid fuel** must be in accordance with the instructions given in this Manual for use and maintenance, as well as with all the safety standards prescribed by local legal regulations applicable in the place where the solid fuel is installed (incorporated).

The installer must **verify (confirm)**:

- The type of the solid fuel that is being installed,
- Whether the room in which the solid fuel is being installed is appropriate, which is expressed as the minimum size of the room required for the installation as prescribed by the solid fuel manufacturer,
- Instructions of the heat generator manufacturer, related to the requirements of the smoke discharge system (smoke discharge ducts and pipes),
- The internal cross section of the chimney, material the chimney is made of, cross-sectional uniformity, whether there are any obstacles and barriers in the chimney,
- The height and vertical extension of the chimney,
- The height above the sea level at the place of installation/incorporation,
- The existence and suitability of a wind resistant protective cover of the chimney,
- The possibility of providing the external air intake and the size of required openings,
- The possibility of the simultaneous use of the solid fuel which is to be installed, together with the other equipment already existing in that place.

If the results of all the checkups are positive, then the installer may proceed with the incorporation/installation of the solid fuel. The instructions provided by the solid fuel manufacturer, as well as the fire prevention standards and safety standards must also be observed.

**When the installation is completed, the system must be put into a trial operation for at least 30 minutes in order to check up all the packing and seals of the system.**

When the incorporation and significant details are completed, the installer is obliged to provide the client with the following:

- The Use and Maintenance Manual issued by the solid fuel manufacturer (if such a manual has not been delivered with the solid fuel),
- The documents required for the compliance with existing standards.

### 3. APPEARANCE AND STRUCTURE OF A SOLID FUEL WITH A FLOOR HEATING BOILER (fig.1)

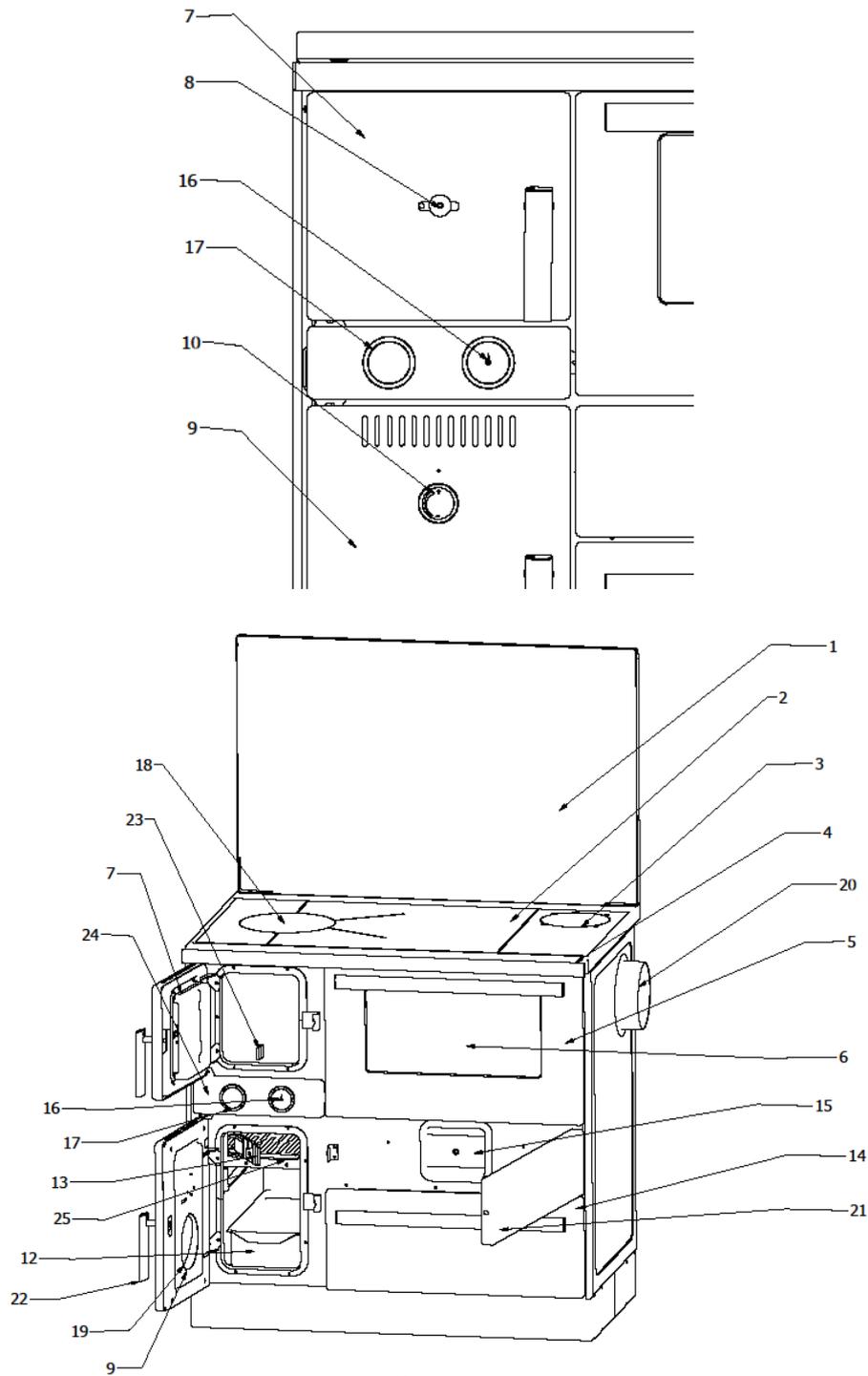


Figure 1

- |  |                                   |
|--|-----------------------------------|
| 1. Solid fuel cover                        | 14. Draving for wood              |
| 2. Cooking panel (hob)                     | 15. Cover for cleaning            |
| 3. Cooking panel extension                 | 16. Manometer                     |
| 4. Butterfly knob for opening and closing  | 17. Thermometer                   |
| 5. Oven door (oven)                        | 18. Hob cover                     |
| 6. Oven thermometer                        | 19. Thermostat flap               |
| 7. Firebox door                            | 20. Flue extension                |
| 8. Secondary air regulator knob            | 21. Cover of opening for cleaning |
| 9. Ashtray door                            | 22. Handrail                      |
| 10. Thermostat knob (combustion regulator) | 23. Grate carrier                 |
| 11. Rod for shaking ash                    | 24. Additional cover              |
| 12. Ashtray (ash box)                      | 25. Rod bracke                    |
| 13. Ember holder                           |                                   |

## 4. SAFETY AND RELIABILITY IN SOLID FUEL OPERATION

The solid fuel for floor heating is constructed so that it enables maximum safety during operation.

Safety during solid fuel operation is provided in three ways:

- combustion regulator (thermostat) (fig. 1 pos.10), located in the ashtray door, which automatically closes the air intake in the solid fuel firebox when the set water temperature in the boiler is reached,
- Thermal valve (thermal fuse) (Fig. 7, Item 13 and Fig. 7a) when installed in the heating system serves as a thermal fuse if the solid fuel becomes overheated,
- safety valve (Fig. 7 and 8, Item 5) which **MUST** be installed on an R1/2" connection (Fig. 4, Item 4.)

### NOTE:

**Thermal valve and safety valve are not delivered with solid fuel, while the thermostat is installed on the solid fuel's ash pan door.**

## 5. SOLID FUEL PLACEMENT (INSTALLING)

- The solid fuel may be installed in the kitchen part or at some other convenient spot.
- An inflammable pad should be put under the solid fuel.
- If the pad is flammable (wood, plastic), place a tin plate that should protrude from the lateral sides with 10cm and 50cm from the front side.
- The furniture and objects located in front of or close to the solid fuel must not be from flammable material. If they are from flammable material, then the minimal distance from the solid fuel (Figure a).
- If a cupboard is installed above the solid fuel, the minimum distance between the solid fuel hob and the cupboard should be at least 70cm.
- Flammable materials (for example wallpapers, frames, doors etc.) from the flue should be at a distance of at least 20cm. This distance may be reduced if thermal insulation is placed on the flue pipe and the temperature of the surrounding objects does not exceed 80°C.
- The solid fuel should be installed in horizontal position or slightly elevated from the back side (3-4mm).

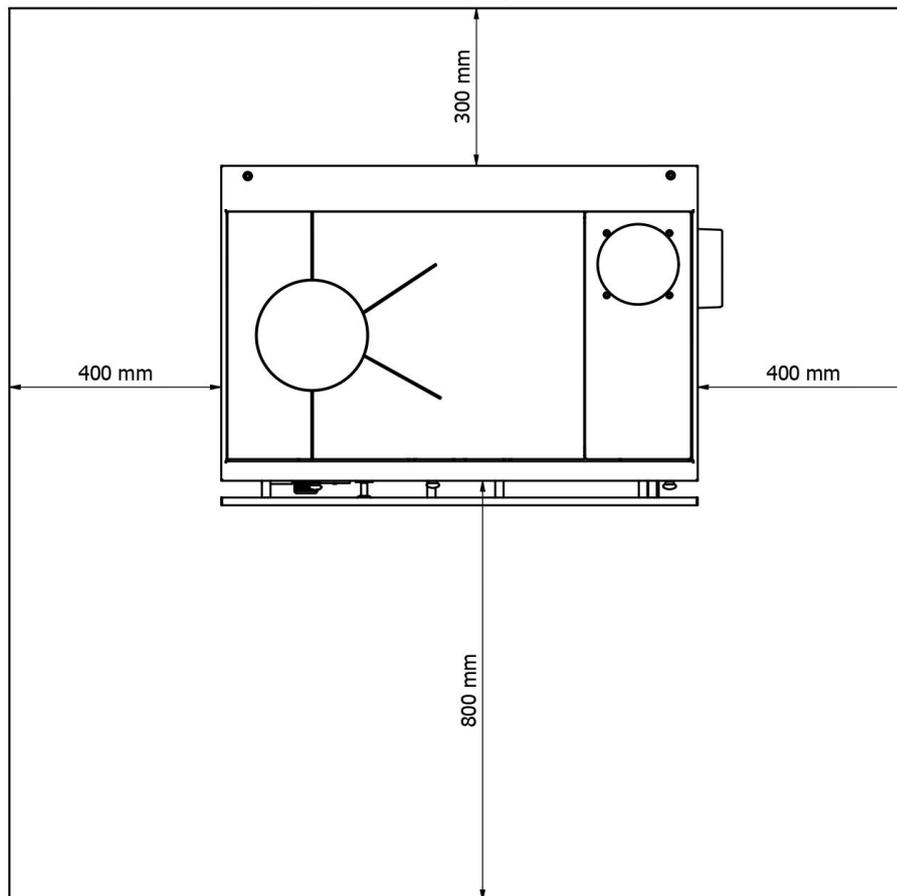


Figure a

All minimum safety distances are indicated on the product data plate, **DO NOT** use lower values than specified (see **INFORMATION ON CE MARKING**).

### 5.1. INSTRUCTIONS FOR COMBUSTION AND VENTILATION

Combustion air must be supplied to the rooms where the range is installed. The room must be constantly ventilated. An fresh air opening must be located in the lower part of the room and air should enter through it.

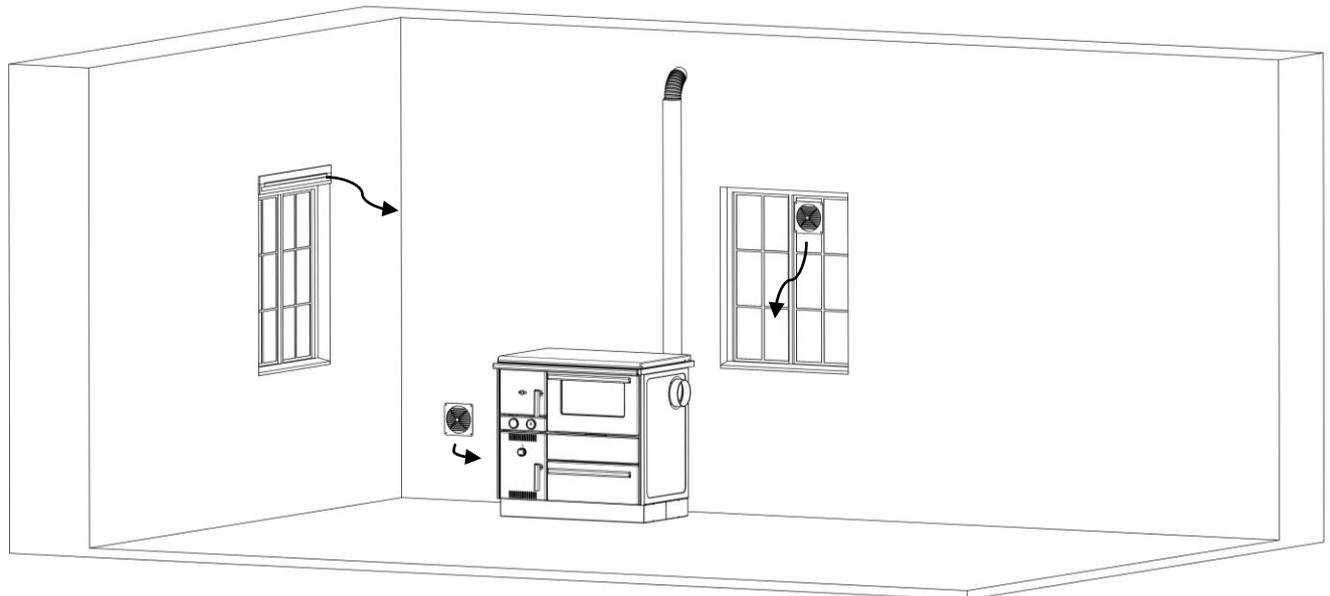
- Supply of combustion air by means of a pipeline through the basement. This connection option leads to a preheating of the combustion air, which is useful for a good and clean combustion. The installation of pipelines in the basement is simple.
- Supply of combustion air through the basement. The combustion air is preheated. The basement space must be separated from the ventilation system of the house and open to the outside. High levels of dust and moisture should be avoided.

C) Supply of combustion air from above. Air supply from above can only be performed with tested chimney systems. In this case, it is necessary to calculate the dimensions of the chimney!

D) Supply of combustion air directly from outside. If combustion air is directly supplied through the outer wall, it shall be only be slightly preheated, which is unfavorable for a clean combustion. In this case there is also risk of condensation!

NOTE: We do not recommend these versions of air supply! However, if you use these options, consult a qualified professional.

In the room where the heating device is installed, it is necessary to ensure sufficient supply of fresh air. If the windows and doors are hermetically sealed or if there are air-extracting devices, such as hoods, hair dryers, fans etc., in the room where the range is installed, combustion air (fresh air) must be supplied from outside. In any case, this should be discussed with a competent chimney sweep before installing the range.



*Supply of fresh air in the room where the range is installed*

## 6. FLUE INSTALLING

Review the unpacked solid fuel and become familiar with the parts of the solid fuel and the accessories, and especially pay attention to the following:

- The special channels of the firebox door, the ashtray, the cover for cleaning and the hob frame should have pigtails with no asbestos that seal well and do not allow uncontrolled air intake.
- The combustion regulator (thermostat) with regulation knob (fig.1 pos.10) should properly open and close the regulator flap (fig.1 pos.19).
- The ember holder (fig.1 pos.13) should be properly placed in its bearing and should be easily open.

The flue connection (plug), that is delivered together with the solid fuel and is placed in the drawer for wood, should be set and screwed on the openings of the plug carrier (hob) or on the opening on the lateral side. The existing cap must be previously removed and the same screws for connecting plugs should be used.

### WARNING:

If Your flue is not the best or it is with suspicious quality, we recommend that You install a flue connection on the plug carrier (from the top), and not on the side.

The flue reaches its rated power if the flue draft is 15,5 Pa. We recommend the following flue sizes with which this draft is obtained:

Solid fuel Denotement	Rated heating power (kW)	Flue height (m)				
		6	7	8	9	10
ALFA TERM 20	wood	Dimensions of light surface (mm.)				
	22,9	145x200	145x145	145x145	145x145	145x145

- Proper flue and meeting other requirements set out in the material that follows are a prerequisite for flawless functioning of the solid fuel.
- The flue connection should be installed with uplifting.
- Horizontal flue pipe pieces longer then 0,5m should have an uplifting of 10° towards the flue.
- The flue extension, flue pipes and the flue must not be narrowed.
- All connections as well as the flue must be well sealed, with no soot and grime in flue pipes.
- The flue should be protected from cold (it should be heat insulated). This especially applies for flues made of sheet metal and flues built on external walls.
- Flue pipes that do not have thermal insulation and do not stand vertically, must not be longer then 1,25m. Check of the draft strength is performed by using candles (fig. 2).

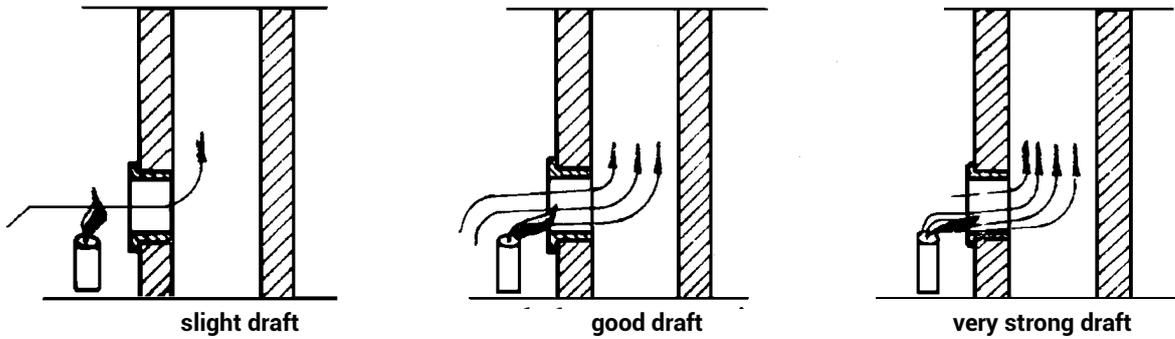
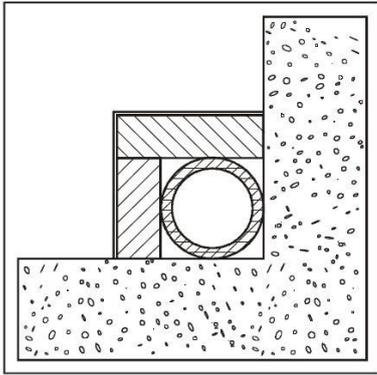


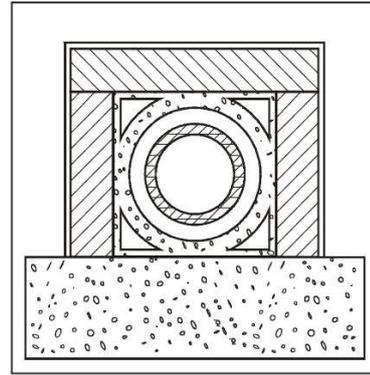
Figure 2

The flue is functioning well if it satisfies the following conditions (fig. 3):

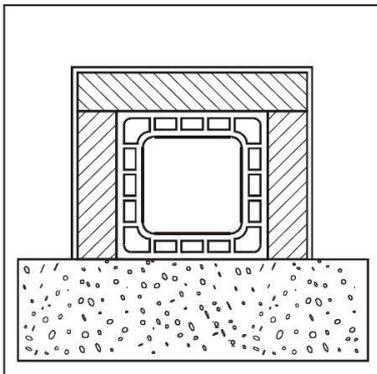
- It protrudes above the roof top (ridge) at least 0,5m.
- It is higher than the neighboring house that is close to the flue, a tree or some other barrier.
- It is in the internal walls of the house or it is well insulated if it is in the external walls.
- The extension should be closely connected to the flue if it is being extended.
- The flue pipe should not be inserted deeply in the flue opening as this reduces the space for smoke output.
- All other unnecessary openings as well as the door for cleaning should be well closed (sealed) so that so called "false" air would not be created.



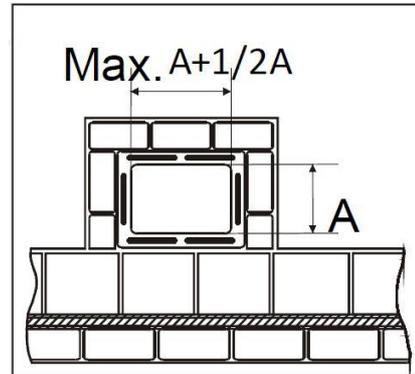
AISI 316 steel chimney with double insulated chamber, made of material resistant to 400°C. Optimal efficiency 100%



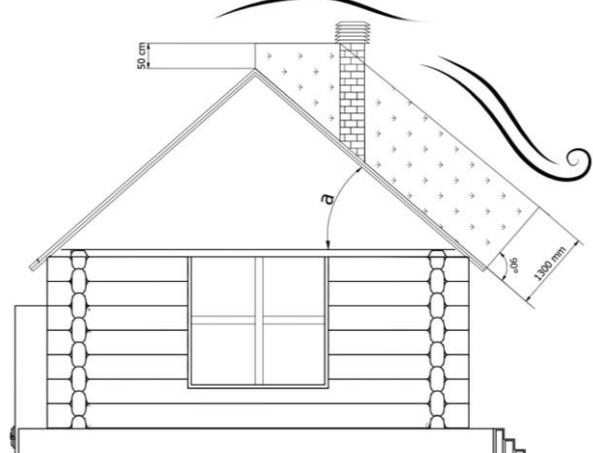
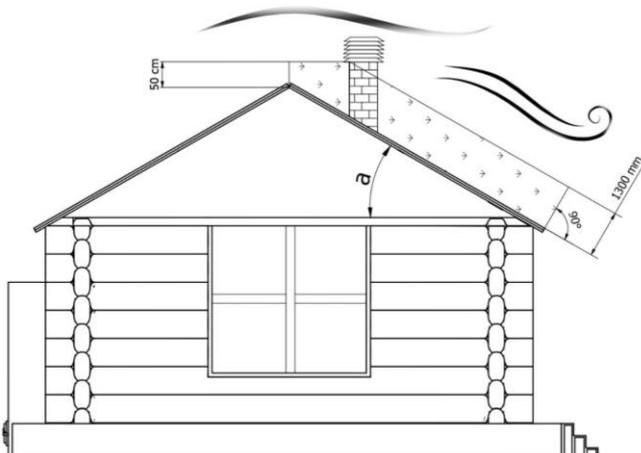
Fireproof chimney with double insulated chamber and an outer lining of lightweight concrete. Optimal efficiency 100%

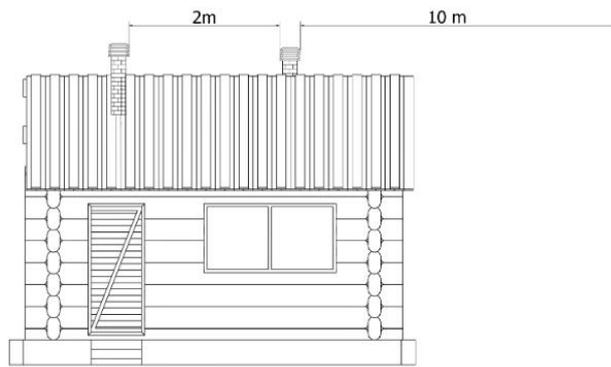


Traditional clay chimney with recesses. Optimal efficiency 80%



It is forbidden to use chimney pipes that have a rectangular internal cross-section with a ratio that differs from the plan. Modest efficiency 40%





Chimney - positioning and distance

## 7. INSTALLING SOLID FUEL IN WATER HEATING SYSTEM

Installing of the solid fuel should be performed by a qualified person according to the appropriate project.

The solid fuel is intended for floor and central heating.

It can be installed in closed and open heating system. Adhere to the regulations *JUS M.E7.201* and *JUS M.E7.202*. Diagrams of closed and open system are shown on fig.7 and fig.8.

The back of the boiler and connections are shown in Fig. 4 where:

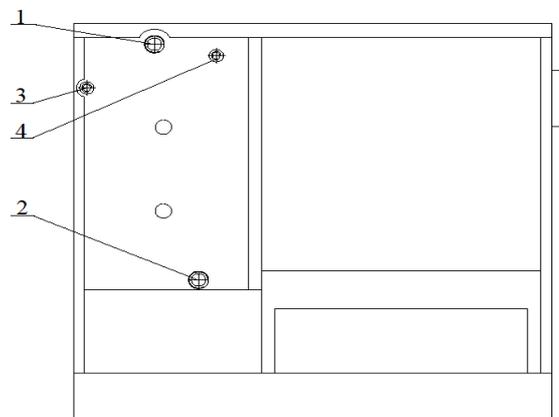


Figure 3

- Item 1 is an R1" connection with an outer thread for the flow pipe,
- Item 2 is an R 1" connection with an outer thread for the return pipe,
- Item 3 is an R1/2" connection with an inner thread for installation of the thermal valve safety pipe,
- Item 4 is an R1/2" connection with an inner thread for safety valve installation.

### 7.1. DISCHARGE AND RETURN LINE (fig.4 pos.1 and 2 and fig.7 and fig.8 pos.3 and 10)

The outlets of the discharge and return water of the boiler are 1" and they must not be reduced, that is, narrowed up to the first bifurcations. Use steel pipe 1" or copper pipe with external diameter F28mm. (or bigger diameter).

When performing the installation, strictly pay attention to the pipe slopes which should be 0,5% (5mm. per meter of pipe) and to the system venting (boiler, pipes, radiators).

On the discharge line you may set thermal-manometer although thermometer and manometer are mounted on the front side.

Set a "by-pass" on the return line with a pump, expansion vessel and valve for filling and draining the system. When mounting the pump, pay attention to the pump direction.

**Warning:**

**Make a "by-pass" only if there are conditions for so called gravitational heating.**

### 7.2. THERMAL VALVE WITH BUILT-IN THERMAL PROTECTION AND ADDITIONAL ELEMENTS FOR CONNECTION

To install thermal valve it is necessary to purchase and install:

1. Thermal valve with built-in thermal protection type 544, 1/2", product Caleffi (Fig. 7a) and Fig. 7, Item 13.
2. Slope pressure regulator with manometer 1/2", the same or similar as shown in Fig. 7b and Fig. 7, Item 19.
3. Filter for cold water at the input of the water supply to the thermal valve, Fig. 7, Item 20
4. Filter for hot - boiling water intake of the boiler and water outlet of thermal valve, Fig. 7, Item 21.

**Note:**

These components are not included with product for central heating you bought!

Installation of thermal valve with built-in thermal protection (Fig. 7, Item 13 and Fig. 7a) with additional elements ensuring safe operation, such as pressure regulator (Fig. 7, Item 19 and Fig. 7b). Water filter on the boiler intake (Fig. 7, item 20) and water filter on the boiler outlet in closed central heating system is MANDATORY. This specially refers to a closed system,

when the radiators are submerged and where in case of termination of the pump operation for any reason, the water temperature in the boiler rapidly increases and overheating occurs very quickly.

In the open central heating system, installation of thermal fuse is not mandatory.

#### **7.2.1. THERMAL VALVE WITH BUILT-IN THERMAL PROTECTION (Fig. 7, Item 13 and Fig. 7a)**

Thermal fuse is installed near the solid fuel, depending on the available space. It can be installed in any position. You should take into account the direction of cold water intake and hot water outlet from the boiler which is clearly marked on the valve body.

The thermal fuse probe (Fig. 7, Item 22) is best to place in the thermal valve connection (Fig. 7, Item 18). It can be placed on the discharge - distribution pipe (Fig. 7, Item 3) but at a distance from the boiler of 500 mm the most or at the highest point of the boiler before the exhaust pipes.

Seal it with hemp or other sealing material by tightening.

Fig. 7 shows the thermal valve installation diagram.

The device is of one piece with the thermal valve and valve for filling.

Valve opening temperature is 100°C (+0°C/-5°C).

The fluid recommended in the installation is water and glucose antifreeze of 30%.

##### **Note:**

At reaction, and valve operation, during fluid cooling in an overheated boiler part of the new fluid is injected into the boiler, but the part is also ejected from the boiler. It will be poured down the drain. If the antifreeze is in the installation you must keep in mind that a certain percentage will go out and pour down the drain!

We recommend the thermal valve Caleffi type 544, 1/2" as shown in Figure 7a.

#### **7.2.2. SLOPE PRESSURE REGULATOR 1/2" WITH MANOMETER (Fig. 7, Item 19 and Fig. 7b)**

When installing the thermal valve it is required to mount the slope pressure regulator as shown in Fig. 7, Item 19. The pressure that is maintained by pressure regulator must be set at a higher pressure than the pressure that is in the heating system. If you do not have a higher water pressure of at least 0.8 bar compared to the pressure in the heating system thermal valve will not work or cannot inject cold water into the boiler that needs to be cooled.

Pressure regulator should be set to 2.8 to 3 bars.

You should take into account the direction of placing the slope pressure regulator

#### **7.2.3. WATER FILTER OF THE BOILER INTAKE (Fig. 7, Item 20)**

In front of the slope pressure regulator on water intake from water supply line it is necessary to install a filter that will clean the water from solid objects, primarily of sand, which can damage the tap seal or seals of the thermal valve and the slope pressure regulator.

This filter does not need to be resistant to high water temperatures due to cold water that flows through.

#### **7.2.4. WATER FILTER OF THE BOILER OUTLET (Fig. 7, Item 21)**

It is required to install the filter on the boiler outlet which will clean the hot - boiling water from dirt and solid objects that can damage the tap seals, or seals of the thermal valve.

This filter must be resistant to water temperatures up to 150°C.

##### **NOTES:**

- After the completion of thermal valve activation, checking the pressure in the installation and filling the system with cold water is mandatory.

- In cases where antifreeze is used, after filling the installation with water it is required to check percentage content of antifreeze in a mixture of water and antifreeze!

- To avoid elimination of the antifreeze agent solution from the installation, it is best to have backup battery supply of the pump with an inverter.

### **7.3. SAFETY VALVE (fig. 7 and 8 pos. 5 and fig. 4 pos. 6 )**

On the back side of the boiler under the hob, a connection R1/2" is welded (fig.4 pos.6) in which you are OBLIGED to set a safety valve. The safety valve should be between 2,5 to 3 bar. It can be installed directly on the terminal or at a distance from the solid fuel of 1m the most, provided that there is no block valve between the boiler and the safety valve.

In an open heating system, the safety valve is not put normally, but we advise that you put it as one more type of insurance of the boiler and the system (due to unforeseen circumstances).

##### **WARNING:**

**If the safety valve is not set as previously explained, the guarantee ceases.**

### **7.4. THERMOMETER AND MANOMETER (fig. 1 pos. 16 and 17 and fig. 5)**

On the solid fuel itself, on the additional cover (fig.1 pos.24) between the firebox door and the ashtray door, thermometer and manometer are mounted (fig.1 pos.16 and pos.17, and fig.5) so they do not have to be placed on the installation.

The thermometer pos. 17 shows the temperature of water in the boiler (operating temperature) in °C.

The manometer pos. 16 shows the water pressure in the boiler, that is, in the system, in bars.



Figure 5



Figure 6

## 8. PRACTICAL INSTRUCTIONS AND ADVICE FOR HEATING SYSTEM USE

- We recommend that you choose a closed system due to the risk of corrosion in an open heating system.
- All connections must be well sealed and fastened.
- Before commissioning, the complete installation should be examined with water with pressure of 2,4 bar.
- It is desirable that water is drained out from the system at least once because of the grime located in the system.
- For an installation in which only a solid fuel "alfa term 20" is connected, we recommend expansion vessel from 18 (l) but not less than 12(l) which would be placed on returning water, as close as possible to the boiler, and no block valve should be set between the boiler and the expansion vessel.

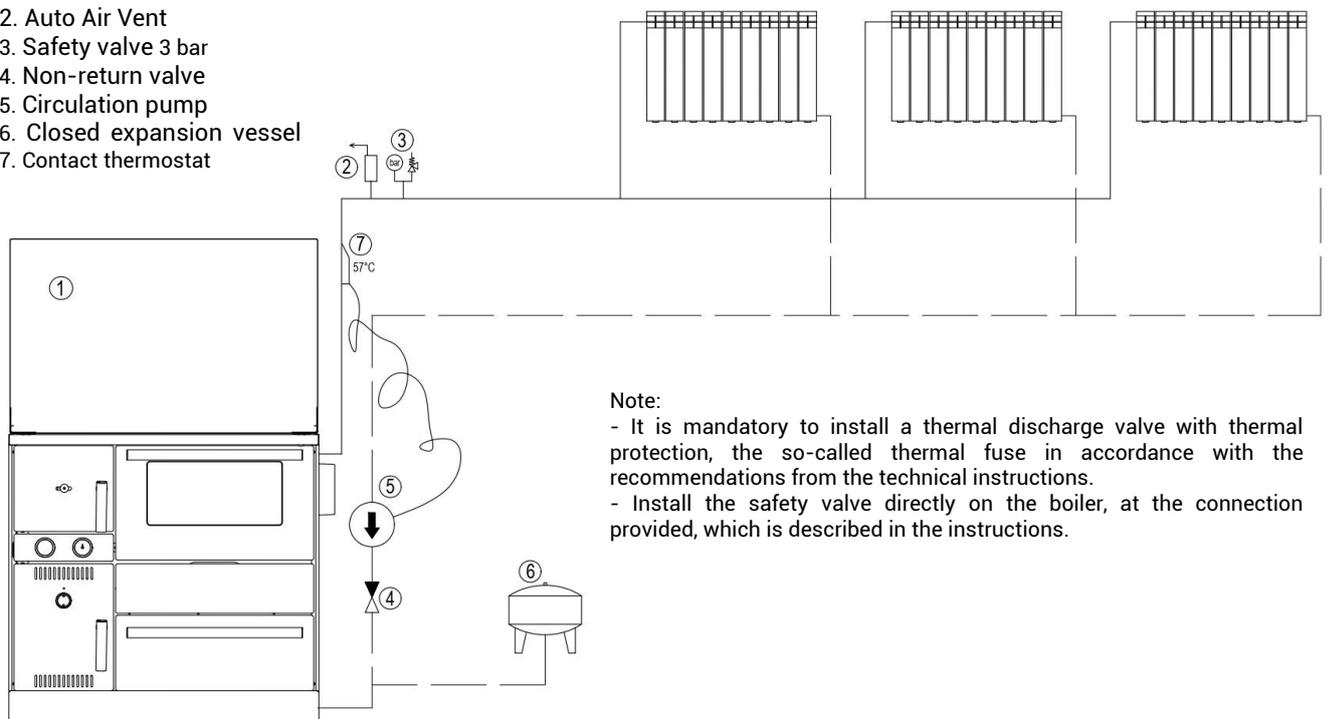
In order to reduce the risk of condensation, it is recommended to use a three-way mixing valve with a fitting thermostat when installing the solid fuel.

**We recommend that you do not adjust the water temperature below 57 °C due to possible condensation of the boiler, neither above 75°C.**

### Scheme of the hydraulic installation of a solid fuel (radiator heating)

Legend:

1. Solid fuel
2. Auto Air Vent
3. Safety valve 3 bar
4. Non-return valve
5. Circulation pump
6. Closed expansion vessel
7. Contact thermostat



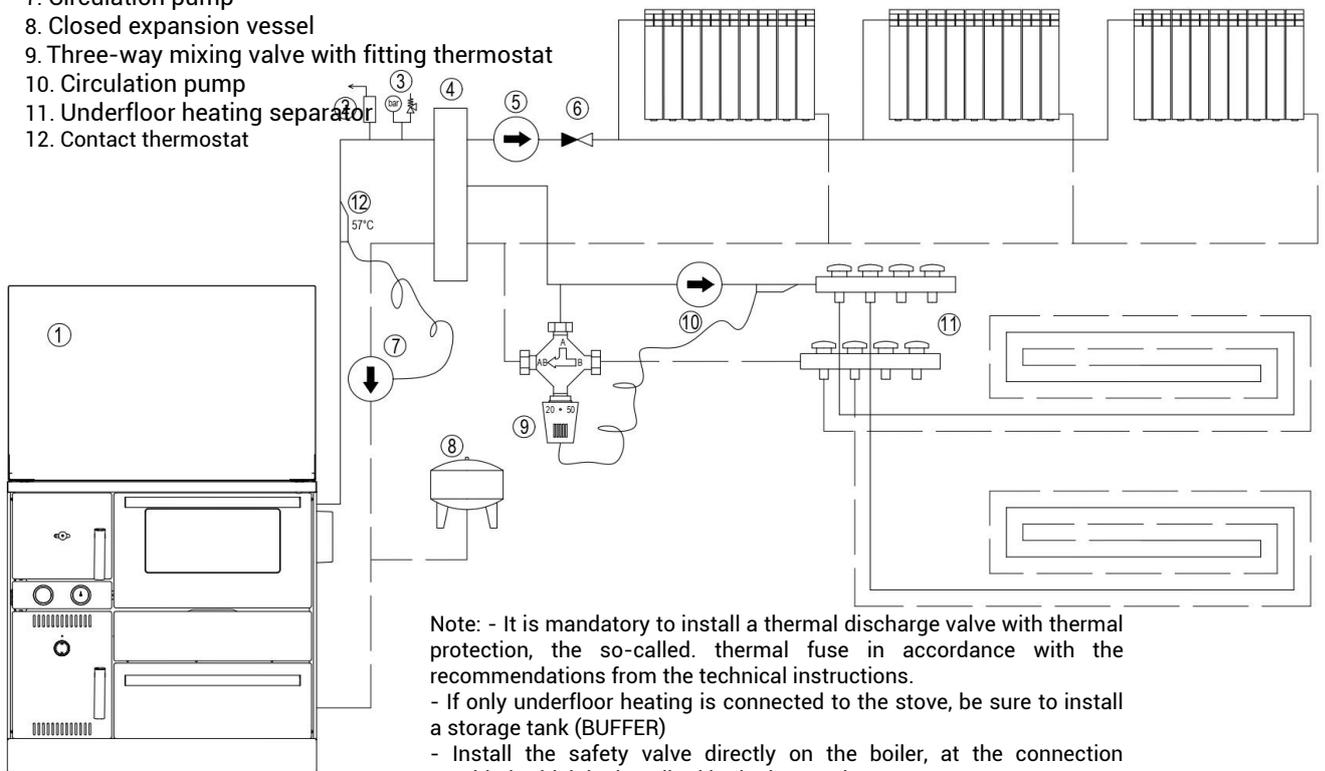
Note:

- It is mandatory to install a thermal discharge valve with thermal protection, the so-called thermal fuse in accordance with the recommendations from the technical instructions.
- Install the safety valve directly on the boiler, at the connection provided, which is described in the instructions.

## Scheme of the hydraulic installation of a solid fuel (radiator and floor heating)

Legend:

1. Solid fuel
2. Auto Air Vent
3. Safety valve 3 bar
4. Hydraulic crossover
5. Circulation pump
6. Non-return valve
7. Circulation pump
8. Closed expansion vessel
9. Three-way mixing valve with fitting thermostat
10. Circulation pump
11. Underfloor heating separator
12. Contact thermostat



Note: - It is mandatory to install a thermal discharge valve with thermal protection, the so-called. thermal fuse in accordance with the recommendations from the technical instructions.  
 - If only underfloor heating is connected to the stove, be sure to install a storage tank (BUFFER)  
 - Install the safety valve directly on the boiler, at the connection provided, which is described in the instructions.



Figure 7a



Figure 7b

- It is desirable to insert a pump R1" for more speed whose flow capacity is always appropriate for the current need of the system. Directly in front and behind the pump, install shut-off valves so that displacement of the pump could be performed for repairs, changes etc., without releasing water.
  - Mount a tap for the filling and draining the system at the lowest system point.
  - Before commissioning the system should be filled with water as follows:
    - a) If the system is open, fill the system through the tap for filling and draining until water starts to leak from the overflow pipe of the expansion vessel,
    - b) If the system is closed, the system pressure (working pressure) should be 1÷1,5 bar.
- In both cases, fill the system slowly so that air can come out through the air releasing valves. If the valves do not open themselves, they should be manually open until water starts to leak, than close them.
- The water from the heating system should not be drained in summer neither since it protects the internal side of the system from spreading oxidation (corrosion).
  - If you don't use the boiler for a longer period in winter, and there is not antifreeze asset in the system, it is best to drain the water from the system. At the same time open the valves on the radiators, the combined valves and the other shut-off elements in the system.
  - Fire must not be kindled if the water in the boiler is frozen, neither if there is not enough water in the boiler.

## 9. COMMISSIONING AND STOKING

Before stoking, the entire system for floor (central) heating should be filled with water, well vented and the solid fuel should be properly connected to the flue as explained in the previous paragraphs.

**WARNING:**

**The solid fuel must not be used without water. It must be connected to an installation on which consumers (radiators) are connected with a minimum power of 8 kW.**

When the system is cold, the flap of the power regulator (combustion regulator, thermostat) located in the ashtray door (fig.1 pos.10 and pos.19) should be open. Pull ahead the butterfly knob for opening and closing (fig. 1 pos.4 and fig. 16). That way the butterfly knob is open and kindling is enabled. Later when the solid fuel is inflamed, we adjust the regulator flap on the appropriate position that depends on the pulling power of the flue and the desired power, and the butterfly knob should be pushed back. Then the butterfly knob is closed and full use of the combustion is enabled, thus better heating, cooking and baking. During this, the door of the firebox and the ashtray (fig. 1 pos. 7 and pos. 9) must be closed if we want regulated combustion. The butterfly knob for kindling is open only during the kindling of the solid fuel (10 to 15 minutes).

The firebox and ashtray doors can be open and closed manually, as well as with the bent wrench as shown on figure 6.

We stoke the solid fuel as all permanently burning solid fuels on solid fuels. When the grate is in lower position, we perform kindling through the open door of the ashtray and the ember holder (fig.9 and fig.10). We open the ember holder (fig. 1 pos.13 and fig.9) by raising and pulling. When the grate is in upper position through the open door of the firebox (fig.11) on the grate we put paper, small pieces of chopped wood and kindle. When everything is burning well, we can fill the solid fuel with wood if the grate is in upper position. If the grate is in lower position, do not put at once all the needed heating material for full firebox, but divide it on two or three parts and put it in the firebox at intervals of 10-15 minutes on flaming heating material. The solid fuel filled in this manner burns from 1 to 6 hours, depending on the intensity of combustion in the solid fuel and the adjusted power regulator (thermostat).



Figure 9



Figure 10



Figure 11

The firebox can be filled from the upper side as well (fig.12). The cover is lifted by using a wrench and firewood is put. It is not recommended to put some organic waste in the solid fuel (plastic bags, bones etc.) because in this case tar collects on the walls of the flue channel and this can cause a fire.

After every filling it is recommended that the solid fuel burns with maximum power for at least half an hour since in the beginning all volatile compounds in the fuel burn, which are actually the main causes for condensate creation in the solid fuel.

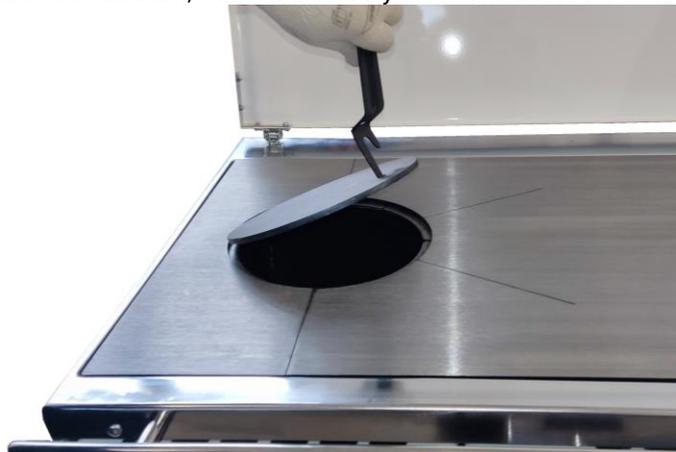


Figure 12

## 10. GRATE USE IN UPPER AND LOWER POSITION

For cooking, baking and frying in the transit period, the upper grate position is used (fig.11) so that the flame could directly reach the hob thus saving the costs for cooking, baking and heating.

The solid fuel is delivered with a grate in lower position. In order to move the grate from the lower to the upper position, it is necessary to do the following:

- Remove the hob from the solid fuel and open the door of the firebox and the ashtray.
- The grate should be pushed completely back with a rod for shaking the grate and then through an opening of the ashtray door and the space for ash and the front part of the grate should be lifted by hand and should be pulled out from its bearing (position). After this, the carrier of the grate is lifted and pulled out.
- The placement of the grate in upper position is performed in reverse order. The grate carrier is placed on the grate holders (pieces 4) welded in the boiler firebox in front and on the back side (pieces 2+2) (fig.1 pos.23). In the grate carrier

bearing insert the grate under an angle (aslant) so that the back part of the grate enters first and then put down the front part of the grate. Move the grate forward and backward so that it lies well in the grate carrier bearing. Put the hob in the carrier bearing of the hob frame.

- Placement of the grate in lower position (fig.9 and 10) is performed in the same manner as the upper position, provided that in the end the front part of the grate is lifted a little and through the rectangular opening of the rod carrier (fig.1 post.25) the rod for shaking the grate should be inserted. The grate is slowly put down so that the grate notch falls in the opening of the rod for shaking the grate.

Warning:

- In the lower grate position, the heating of water is better, larger number of radiators can be heated and bigger surface of living space, but cooking is more difficult.

- In the upper grate position, the heating of water is weaker, small number of radiators can be heated and small surface of living space, but cooking is much easier.

- In both grate positions baking is the same (it is not impeded).

## 11. AUTOMATIC REGULATION

The solid fuel power is adjusted with a thermostat (power regulator, combustion regulator) located in the ashtray door and which automatically adjusts the lapse of the regulator flap depending on the adjustment of the regulating knob (fig.1 pos.10 and pos.19) and the height of water temperature in the solid fuel heater. The regulation knob has many positions written on the knob and this is shown in table 1 as follows:

Table 1

Position of regulator knob	0	3	4	5	7	9
Water temperature in the solid fuel (°C)	Closed regulator	30	40	50	70	90

The cover (flap) for air in the power regulator system completely regulates the air intake for combustion if the remaining openings are closed.

## 12. SECONDARY AIR REGULATOR

A secondary air regulator is placed in the firebox door (fig.1 pos.8 and fig.13). It is used for regulating the subsequent ignition and combustion of unburned gases. Its opening and closing is performed manually through a knob positioned on the firebox door.

Leave the secondary air regulator open when the grate is in lower position while solid fuel usage. Close the secondary air regulator when the grate is in upper position.

## 13. COOKING, BAKING AND FRYING

The solid fuel is mainly used for heating during the heating season. For this purpose the grate is placed in lower position. For quicker baking, cooking and frying use dry wood for stoking.

The butterfly knob for stoking must be closed, and the power regulator must be open. After baking, cooking and frying is completed, put the power regulator on the green position.

When baking, the water temperature should be increased to at least 60°C, if necessary by closing some radiators while baking, and adjust the solid fuel temperature according to the food that is baked.

## 14. HEATING MATERIAL

The heating material can be kept in the heating material drawer (fig.14). The drawer moves on rails. If we want to take out the drawer from the solid fuel we must lift it up so that it would fall out from the rails.

Use heating material that is shown in the table 2 which will ensure that the boiler has rated thermal power of a flue draft of 15,5 mbar (15,5 Pa).

Do not burn dust, sawdust and waste that releases smoke intensively!



Figure 13



Figure 14



Figure 15

Table 2

Heating material	Heating power (kJ/kg.)
Dry beech firewood	15300

WARNING:

In order to get rated heating power and as higher rate of usage, we recommend that you use dry beech wood cut with a length of L=33cm as a heating material.

## 15. CLEANING AND MAINTENANCE

Before every filling with fuel, the solid fuel grate must be cleaned with a spade by opening the ember holders or through the open door of the firebox. The ash from the ashtray should be removed at least once a day and larger residues (slag) should be removed by opening the door of the ashtray and the ember holder. The clean heating surfaces guarantee economic operation of the solid fuel. Cleaning of the solid fuel once a month is recommended, and if necessary more frequently as well.

Do not clean enameled surfaces of the solid fuel and the solid fuel frame with a wire brush and wire sponge since the enamel and the protection may be damaged, instead, use a damp cloth and cleaning assets and fine detergents. Clean the oven after every use while it is still warm. Leave the oven door open after cleaning for couple of minutes so that unpleasant odor would not be sensed during the next warming up.

Temporarily clean the solid fuel hob with fine sandpaper and in case of longer brakes it should be greased with oil that does not contain acids (vegetable oil). Remove burnt things from the hob by using a palette knife or a knife and eventually treat it with graphite or ash from the ash box or with oil.

It is forbidden to artificially cool the solid fuel with unnatural draft and soaking the firebox with water so that it gets cold.

## 16. SOLID FUEL STORAGE

After finishing the stoking season, the solid fuel should be cleaned from ash and smoke. Water should be released only in case when some repair of the installation should be performed. If the installation is not used in the heating season, pour a certain quantity of some antifreeze liquid or release the water from the installation as a protection from freezing.

## 17. FAULTS

Table 3

RB	Faults	Possible cause	Elimination
1	<b>Water pressure in installation is slowly decreasing</b>	The installation does not seal	Check the sealing of welded connections, threaded fasteners, nuts etc.
2	<b>Cold radiators on the highest installation point and a sound is heard</b>	Air in the installation and low pressure in the installation	Increase pressure in the installation and release air from the installation and from radiators
3	<b>Moisture builds up in the boiler</b>	1. Condensation of flue gases	1. Compare the total power of the installed radiators with the power of the stove. If the total power of the installed radiators is greater than the total power of the stove delivered to the water, replace the furnace with a stronger one, or adjust the number of radiators to the power of the stove.
4	<b>The radiators do not heat along the entire length</b>	Air in radiators	Release air from radiators through the vent valve
5	<b>The safety valve drains water from the installation, and the pressure is less than 3 (2,5) bar</b>	Safety valve failure	Replace safety valve
	<b>The pressure in the installation is more than 3 (2,5) bar and the safety valve does not drain water from the installation</b>	Safety valve failure	Replace safety valve
6	<b>Sudden water temperate increase in the installation</b>	Air in the installation	Perform radiator venting
		Closed valves towards radiators	Open all valves in the heating system and provide normal water circulation in the installation
		Circulation pump failure	The circulation pump should be repaired or replace it thereby allowing operation of the heating system
		Electrical power loss	You should open all valves that reduced the heating system. This mostly refers to the "by-pass" valve. Stop or reduce stoking with strong control so that the water temperature in the system would not exceed 90°C until electricity arrives.

7	<b>Sudden pressure increase in the installation while water temperature increase</b>	Decreased pressure in the expansion vessel or completely empty. Remove the cover or the vessel valve cap and release some air through the valve. If the membrane is destroyed, water shall leak from the valve, and if it is only half-empty, only air will come out	If water is leaking from the valve, replace the expansion vessel. If only air comes out from the valve, remove the installation vessel and pump it. The pressure in the vessel must be equal to or greater than height difference of the highest and lowest installation point. Example: For height difference of 5m. the pressure is $P_{min} \geq 0,5$ bar.
		Air in the installation	Perform venting of the installation
8	<b>The circulation pump does not switch on or blow a fuse</b>	No power on the electrical connection. Loose connectors.	Check and tighten the screws at the connection spots. Check and if necessary, replace the fuses, eliminate the malfunction of the motor or installation connection
		Capacitor failure	Replace the capacitor
		Rotor blockage	Before the start of each heating, examine the easy rotor turning. Hot water deposition may lead to rotor blockage. Turn around the motor shaft with a wrench until free turning of the rotor is enabled.
		The pump is blocked due to sediment	Disassemble and clean the pump.
9	<b>The thermometer or manometer does not show the amount of temperature or water pressure in the installation</b>	Thermometer or manometer failure	Replace the thermometer or manometer
10	<b>Noise (sounds) from the eating system</b>	Defective pump. Great clearance between the rotor shaft and bushings	Reduce pump speed. Replace the pump envelopes or the entire pump
		The pump is functioning at too high speed	Select low speed.
		Air in installation	Release air from the heating system
		Loose knobs or some screw on the solid fuel	Tighten knobs and screws
11	<b>Sounds in the pump</b>	The pressure at the pump suction part is to low	Increase system pressure or check the expansion vessel.
12	<b>The solid fuel overheats, loud noise (cracking) is heard in the boiler of the solid fuel.</b>	Electricity outage has occurred, the circulation pump does not work and the boiler of the solid fuel overheats. There is a danger of boiler rupture.	To avoid this occurrence, it is best to have backup battery power supply of the circulation pump with an inverter. Installation of a thermal exhaust valve (Fig. 7, pos. 13) is required as additional security against solid fuel overheating. If you do not have backup supply of the circulation pump or a thermal exhaust valve installed, then you should open the bypass valve connected in parallel with the circulation pump on the pipeline system and remove embers from the solid fuel.
13	<b>Cooling thermal fuse is activated (thermo valve) because water temperature increased over 95°C due to:</b>	- loss of electricity	This is proper and do not touch anything. When the system is cold, thermal valve will be closed. After that, check the pressure in the installation and fill the system to the required.
		- open ashtray door and no regulated combustion	Close the ashtray door and through the knob on the cover of the ashtray door and thermostat, reduce the water temperature in the system.

		- the grate is in lower position and small number of radiators are switched on	Transfer the grate to upper position or switch on some other radiator. Keep the ashtray door closed.
14	<b>Water condensate in the boiler</b>	Damp heating material	Change heating material
		Too low temperature of returning water from the heating system	Insert combined valve or switch off some radiator from the heating system
15	<b>Outlet water temperature is not appropriate (low)</b>	Non-calorific heating material	Change heating material
		Heating system is oversized (a large number of radiators)	Switch of some radiators
		Little heating material is inserted in the firebox	Increase the quantity of heating material in the firebox
16	<b>Fire does not burn regularly</b>	Weak flue draft	Make a new flue or repair the old one
		Flue pipe connections do not seal. The doors on the solid fuel and the flue do not seal. The flue draws "false air".	Seal all connecting spots so that "false air" would not occur
17	<b>There is not enough heat in baking, cooking</b>	The thermostat is set to a lower temperature	Increase water temperature through a thermostat or shortly open the ashtray door
18	<b>There is too much heat in baking, cooking</b>	The thermostat is set to a high temperature	Reduce water temperature through the thermostat or stoke moderately
19	<b>The boiler-solid fuel releases smoke during initial startup</b>	Combustion and heating of the solid fuel and flue	It is normal for the solid fuel to release some smoke during initial startup, and this stops after some time.
20	<b>The boiler-solid fuel releases smoke during regular use</b>	Uncleaned flue, flue pipes and solid fuel	Clean the internal part of the flue, the flue pipe and solid fuel.
		Damp heating materials of the heating materials you use intensively release smoke	Change heating material. Use dry hating material and heating material that does not release smoke
		Overloaded firebox	Fill the firebox slowly, gradually, in a couple of times
		Bad flue	Repair or make a new flue
21	<b>The grate is stuck when cleaning is performed</b>	Some spike is stuck, slag or something else on the grate	Clean the grate of undesirable objects

