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**KALVIS**<sup>®</sup>



**CENTRAL HEATING  
SOLID FUEL BOILER**

**KALVIS - 5 - 8(6)  
KALVIS - 5 - 12(10)**



**TECHNICAL CERTIFICATE,  
INSTALLATION AND SERVICE  
MANUAL**



012

LST EN 303-5:2012

ГОСТ 20548-87

ГОСТ 20548-93

Made in Lithuania

Product barcode sticking place.



### SALES MARK

#### **Boiler was sold by:**

Company: \_\_\_\_\_

Sales date: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone: \_\_\_\_\_

#### **In the case of failure please call:**

Company: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone: \_\_\_\_\_

**Manufacturer**      **UAB “Kalvis”**  
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**Warranty service**      **Provided by a partner you bought a product**

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## 1. Purpose

Solid fuel water heating boiler **Kalvis-5-8(6)**; **Kalvis-5-12(10)** (the boiler) is used to heat various premises having central heating system with forced circulation installed.

## 2. Safety precautions



**Boiler can be operated by adults well familiar with its construction and this technical manual.**



In the case of fire or if chimney is on fire, close air supply to the boiler and call fire fighting service (tel. 112). If possible, remove burning fuel and ember from the hearth into a tight or water filled container (beware of water steam, use protective gloves).



### **It is prohibited:**

- To modify boiler construction without a permission;
- To dry fuel and other flammable objects near or on the boiler;
- To leave unattended children or entrust boiler maintenance to children, disabled, untrained persons;
- During stoking, to open or keep open boiler door;
- To fire the boiler without filling the heating system with water. Water should not freeze in the heating system and boiler;
- To connect the boiler into a closed system without a protective valve, which prevents from overpressure in the system of more than 2,5 bar (0,25 MPa);
- When boiler is in operation, to close inlet and return line valves;
- To dispose glowing ash near residential and auxiliary buildings.



### **It is prohibited to stoke the boiler with:**

- Fine wood waste (dust), because of explosion risk or spark discharge from chimney;
- Waste (household waste);
- Furniture waste.



**It is prohibited to overheat (boil) water in the boiler!**

## 13. Product Warrantee

Manufacturer guarantees that the product is in line with the technical document specifications.

If you correctly install and operate the boiler in accordance with these instructions, the following guarantee service period will be applied calculated from the purchase date:

- for boiler case - 48 months.
- for completing parts - 12 months.
- for wearing parts (see p. 8) - 6 months.

Manufacturer obliges to eliminate failures occurring due to its fault during the mentioned period for free.

For warrant repairs apply, In the case of boiler failure, to this service providing company, specified by seller.

We ask user to take care for after warrant repairs service employee made relevant record in this certificate "Notes about warrant and non-warrant repairs" and filled warrant repairs report.



### **Manufacturer's guarantee does not apply if:**

- No purchase documents are submitted (VAT invoice, cashier's check or cash receipt voucher);
- Having lost this technical passport with manufacturer's and seller's notes, or if the notes are not filled, or if manufacturer's number is different from the number on the boiler;
- There are visible mechanical damages which could cause boiler failure;
- The boiler failed due to incorrect connection or maintenance;
- There are unauthorized construction changes;
- It is found that the boiler was repaired by unauthorized person;
- The boiler was used not in line with the user manual (wrong fuel);
- There are deformation or burnt metal (caused by using incorrect fuel or loading too large fuel charges);
- The boiler failed due to natural calamities.

***I familiarized with warrant repairs conditions. I am informed that in the case boiler is installed and operated without observing the requirements given in this manual, I loose the right for warrant repairs.***

**Buyer:** \_\_\_\_\_

(name, surname, signature)

### 11. Acceptance Certificate

Solid fuel central heating boiler "Kalvis-5-\_\_(\_\_)" meets the drawings, standard EN 303-5, ГOCT 20548-87, ГOCT 20548-93 requirements and is fit for operation.

Boiler was tested with 4.0 bar (0.4 MPa) pressure.

Manufacturer No \_\_\_\_\_

Manufacturing date \_\_\_\_\_

Inspector \_\_\_\_\_

### 12. Product Completeness

- 1. Boiler "Kalvis-5-\_\_(\_\_)" - 1 pc
- 2. Air draught regulator - 1 pc
- 3. Thermo-pressure gauge - 1 pc
- 4. Scrapper - poker - 1 pc
- 5. Ash cleaning scoop - 1 pc
- 6. Technical passport of the boiler - 1 pc
- 7. Wooden transportation pallet (with fastening screws) - 1 pc



### 3. General remarks

**i** Since the boiler construction is constantly being improved, minor deviations from this manual are possible.

**!** When installing the boiler, the country's building standards and fire protection requirements must be respected.

**i** Only the attested firm, the installation work specialists or duly authorized manufacturer's agent are allowed to carry out the boiler installation, adjustment and training of boiler operators. **It is mandatory to make an installation mark in this passport "the installation report"**. Installed and connected boiler must be checked by fire safety personnel.

**!** The boiler shall be installed in the heating system **that maintains at least 60 °C return water temperature. In the case of failure to comply with this requirement, corrosion from condensate significantly shortens the life of the casing.**

**!** **It is strictly forbidden to fire the boiler, without having filled it with heating system water.**

**!** When firing the boiler for the first time, while its body is heating and paint is finally curing, unpleasant-smelling volatile substances emit, so premises should be well ventilated.

**!** Use fuel no wetter than 25 % of moisture content. **At higher moisture content, boiler power decreases fuel consumption increases.**

**!** In case of an excessive chimney draught, when sawdust, wood chips, chaff, or other bulk materials are used as a fuel, during its loading or after burning of fuel and shaking the residues, sparks may fly from the chimney.

If the roof or the building itself were built using easily flammable materials or other similar construction works, building materials, fuel and so on is less than 20 meters away from the chimney, use of referred fuels is strictly prohibited!

**i** The boiler is working optimally when it reaches power close to nominal. If the boiler output is too high and significantly lower than the nominal is needed, **we recommend to install the boiler with accumulation tank.**

**i** **With lower heat demand that the boiler's nominal power, in order there was no constant loaded fuel smoldering (resins may start to accumulate in the boiler), do not fill the fuel combustion chamber at full. It is recommended to remove the heat exchanger turbulizer, reduce chimney draught by tightening the smoke damper.**

**!** **It is categorically forbidden to pour water on the burning fuel in the combustion chamber. This can cause permanent damage to the boiler.**

## 4. Product Description

### 4.1. Technical Data

Table 1

Boiler model			Kalvis-5-8(6)		Kalvis-5-12(10)	
Inserted heat exchanger turbulizer *1			+	-	+	-
Nominal power *2		kW	8	6	12	10
Release to heating system		kW	7,5	5,6	11,2	9,3
Release to premises *3		kW	0,5	0,4	0,8	0,7
Chimney draught	no less than	Pa	8	6	13	11
	no more than		13	11	18	16
Heated area *4	for B class buildings	m <sup>2</sup>	69...168	52...126	103...252	86...210
	for C class buildings		37...88	28...66	55...132	46...110
Fuel used			firewood *5			
Firewood size L x Ø, up to		cm	30 x 10		30 x 10	
Firewood position in the combustion chamber			longitudinal		longitudinal	
Loading hole dimensions		mm	215 x 130		320 x 145	
Volume of combustion chamber		dm <sup>3</sup> (l)	25		32	
Foe charge combustion duration, at nominal power *6		hour	2	2,2	2,2	3
Efficiency factor at nominal power, no less than		%	76			
Boiler class according to LST EN 303-5			3			
Boiler water volume		l	18		24	
Recommended minimum accumulation tank volume		l	280		410	
Water operation pressure in the boiler	no less than	bar (MPa)	0,3 (0,03)			
	no more than		2,5 (0,25)			
Max allowed water temperature	in closed heating system	°C	90			
	in open heating system *7	°C	80			
Lowest boiler return water temperature during operation		°C	60			
Hydraulic resistance		mbar	2,5			
Working environment temperature		°C	3 ... 40			
Temperature regulator adjustment range		°C	70 ... 90			
Discharged flue temperature at nominal power, up to		°C	210		200	
Discharge flue gas volume at nominal power		kg/s	0,013	0,011	0,020	0,018
Connection pipe dimensions:	flue pipe	mm	Ø120		Ø130	
	heating system	col	G1-B		G1-B	
	water discharge	col	G½-B		G½-B	
Overall dimensions (net/gross), no more than:	height (H)	mm	790 / 830		1010 / 1170	
	breadth (B)	mm	410 / 550		455 / 550	
	length (L)	mm	620 / 850		620 / 850	
Mass (net/gross), no more than (±10%)		kg	112 / 118		160 / 166	

\*1 **With inserted heat exchanger turbulizer (extended flue path) and having set flue draught valve at 8...10 Pa draught, 8 kW boiler power is reached. After reducing the draught (closing the flue draught valve) to 6...8 Pa and removing heat exchanger turbulizer (shortened flue path), boiler power is reduced to 6 kW.**

\*2 **When stoking with 18-20 % moisture birch firewood. It is not recommended to stoke with firewood with moisture over 25 %.**

\*3 **It is recommended to avoid radiators installation in boiler room, because heat from boiler is transmitted by air. If there is possibility, additional heat (from boiler room) should be transferred into rooms next to it, by natural convection method.**

\*4 **Energy quantity calculated in accordance with the requirements of STR 2.01.02:2016 „Energy Performance of Buildings Design and Certification“, expressed for B and C class Energy Performance of Buildings.**

\*5 **As a back-up fuel, piece wood waste, sawdust briquettes can be used.**

\*6 **Fuel charge burning duration depends on the fuel type, moisture, outdoor temperature and other factors.**

\*7 **It is not recommended to install a boiler with an accumulator tank in an open heating system. Intensive boiler firing at an ambient temperature close to 80 °C will cause water to boil in the boiler, resulting in extraneous sounds.**

## 8. Transportation and Storing

Boilers are stored and transported fastened onto a wooden pallet and wrapped into polythene film, if nothing else is agreed for in the supply agreement.

Boilers are allowed to transport exclusively in vertical position by any type of covered vehicle. If weather is dry, open vehicle can be used. In order to protect boilers from turning over, scratching each other, extra protective measures are to be used. During loading/unloading it is prohibited to beat, turn, throw boilers.

Boilers are stored in dry premises without presence of fumes of chemically active substances.



*Product packing (wooden pallet and polythene film) disposal actions shall be in line with environmental requirements and rules in the user's country. In the extreme case wooden pallet can be used as fuel for the boiler. Boiler fastening to pallet screws can be used for boiler height adjustment at mounting.*

## 9. Quick Wear Parts

Door and other sealing parts from sealing rope and glass fibre; cast iron fire grate and doors, heat-proof concrete parts can become worn, burn out, disintegrate while in use.

These parts are available for purchase at boiler manufacturer or its representatives.

## 10. Boiler Disposal



Since the boiler is made from different materials, after expiration of its service life it has to be disintegrated and disposed:

- Dispose electric parts to electrical appliances recycling company;
- Remove metal parts to metal scrap collector;
- Remove remaining parts to dump or waste storage sites.



*Disposal actions shall be in line with the laws and regulations applicable in the user's country.*

## 7. Fuel types and properties

Combustion heat of absolutely dry wood actually doesn't depend on wood specie and is equal to about 4500 kcal/kg. So, as to assess different wood species, one should take into consideration their comparative weight. Weight per cubic metre of various firewood species is as follows:

- oak firewood - 500 kg;
- birch firewood - 450 kg;
- fir firewood - 330 kg;
- aspen firewood - 330 kg.

The damper is firewood the less is its caloric content. Wet firewood calorificity reduction, compared with dry firewood (dampness ~20 %) is as follows:

- 30 % moisture - 10 ÷ 15 %;
- 50 % moisture - 35 ÷ 40 %.

Just cut tree contains 35 ÷ 60 % water. Tree cut in the beginning of winter contains least quantity of water. Hardwood contains less water.

Wood has to be cut and split to make firewood. Firewood, after one year spent in garret is of 20 ÷ 25 % moisture.

After two years it is 13 ÷ 17 %, and this means that after drying half of fuel is needed than combustion with damp firewood.

## 4.2. Construction

The boiler body is welded from steel sheets and has water compartments where water is heated. Body is covered with thermal insulation decorative panels.

In front of the boiler, there is the combustion chamber and the fuel loading door. Behind the combustion chamber, there is an iron door. Inside the housing there is a fire grate and ash drawer underneath.

Air draught control manages the air supply valve located in the combustion chamber door. The air required for combustion is supplied through the grate.

In the upper part of the housing, there is a heat exchanger with removable turbulizer, which represents a longer way for the flue to give up heat, before reaching the flue pipe.

The hot water flows into the heating system through the upper pipe installed in the back of the boiler and the cooled water returns via the bottom branch pipe. Pipe of the discharge of water from the boiler and the whole heating system is also welded in the bottom.

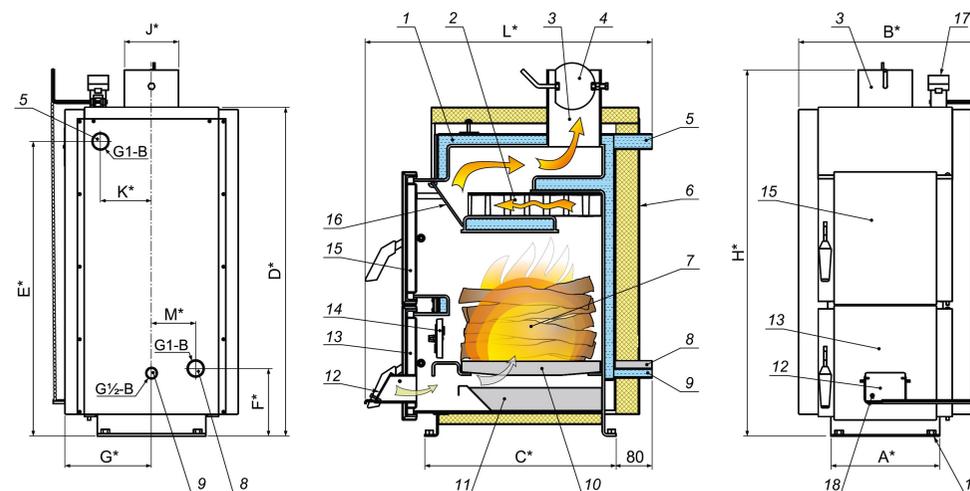


Fig. 1. Boiler construction.

1. Boiler body. 2. Heat exchanger turbulizer. 3. Flue pipe. 4. Flue draught damper. 5. Outgoing (hot) water branch pipe. 6. Decorative thermal insulation panels. 7. Combustion chamber. 8. Returning (cooled) water branch pipe. 9. Water from the boiler discharge branch pipe. 10. Fire grate. 11. Ash drawer. 12. Air supply valve. 13. Combustion chamber door. 14. Cast iron door. 15. Fuel loading door. 16. Smoke damper. 17. Air draught regulator. 18. Air supply valve adjustment screw. 19. Welded nuts for boiler fastening onto the pallet and height adjustment at installation.

\* dimensions:

Model	H	B	L	A	C	D	E	F	G	J	K	M
<b>Kalvis-5-8(6)</b>	790	410	620	235	415	705	635	145	190	Ø120	110	95
<b>Kalvis-5-12(10)</b>	1010	470	620	310	415	930	880	145	230	Ø130	150	135

## 5. Boiler Installation

**i** Boiler shall be installed observing the requirements set for the relevant premises in the relevant country.

**i** Boiler stoking needs much air, so it is necessary to ensure sufficient air supply into the premises where boiler is to be installed.

Set the boiler vertically or inclined forward by no more than 1°. Floor in the premises shall be even, inflammable, able to withstand up to 0.2 t/m<sup>2</sup> load.

Boiler installation height (levelling) can be adjusted with the means of the screws used for boiler fastening onto the transportation pallet.

Before connecting the boiler to the heating system and chimney, take into account that during operation it has to be maintained (cleaning, adjustment, worn part changing etc). The least distances from the boiler to the walls and ceiling required for correct maintenance and fire safety are given on Fig. 2.

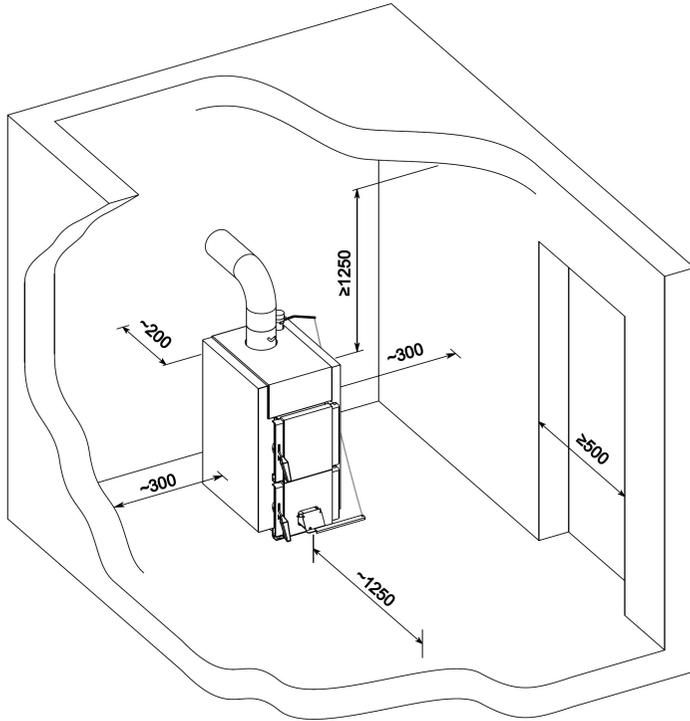


Fig. 2. Recommended distances from flammable partitions.

### III. Why boiler “weeps”, extinguishes, smoke gets out from the boiler?

Boiler works at a too low power or chimney draught is insufficient so condensate accumulates.

- If less heat is needed, load less fuel for there was combustion instead of smoldering.
- Try taking out heat exchanger turbulizer, this should improve chimney draught reducing boiler power.
- Use proper fuel, dryer wood.
- Check the return water for too low temperature, adjust mixing valve so that the returning to the boiler water temperature was no less than 60 °C.
- Check chimney draught, clean the chimney, flue pipe and boiler; check for too much ash accumulated under the fire grate.
- Check for worn door and lid sealing parts from glass fibre, replace if needed.

### IV. Why after firing the boiler water pressure increases?

After the boiler heats up to its nominal power, water pressure exceeds the permissible pressure.

- Possibly inoperable or too small expansion vessel is installed.
- Possibly there is no water circulation: check circulation pump for operation; whether water level (pressure) is sufficient in the system; is the system properly deaerated; maybe some valve is closed in the system or water filters clogged.
- Possibly, at filling the system, pressure was exceeded, reduce it.

Use chemical agents to remove hardened deposits.

Clean boiler chimney at least one a year, necessarily before the start of the heating season.



We recommend to have the boiler inspected by qualified boiler inspector once a year.

### 6.7. Frequently Asked Questions

#### I. What can happen if after full combustion there is an electric power interruption?

When there is no forced water circulation, water can boil up; boiler can overheat; if safety valve is not in proper condition, there is risk of boiler or pipeline explosion, scalding with boiling water.



a) Reduce combustion intensity: close air supply valve; close flue draught valve as far as possible not letting smoke to get into the room.



b) In the case of emergency situation, extinguish the boiler by removing fuel from the combustion chamber (for there was less smoke in the room, put burning fuel into a vessel with water, open windows and doors). Don't pour water into combustion chamber as this may cause permanent damage to the boiler.

c) In winter, if there is a long power interruption and a risk of freezing, drain water from the system.

#### II. Why, while stoking, strange sound (boiling) is heard, finishing and flue pipe colour changes?

Boiler operates at a power exceeding its nominal power, circulation pump is disrupted, too low pressure in the heating system.

- a) Check smoke valve for tightness.
- b) Check air draught regulator for correct adjustment, whether it is set for too high temperature.
- c) Check for too strong chimney draught; close flue draught valve.
- d) Possible failure or water circulation: check circulation pump for operation; whether water level (pressure) is sufficient in the system; is the system properly deaerated; maybe some valve is closed in the system or water filters clogged.
- e) Check for worn door and lid sealing parts from glass fibre, replace if needed.
- f) Increase water pressure in the system.

### 5.1. Fire Safety Precautions



- Set the boiler on inflammable base.
- If metal tubes are used to connect boiler to the chimney, such tubes must be mechanically strong enough and covered with heat insulation material.

### 5.2. Requirements for Chimney

Chimney construction and boiler connection options are shown on Fig. 3.

#### Requirements:

- Chimney draught has to be in line with the data in the main technical data table (see page 6);
- Chimney hole has to have no less cross-section than the cross-section of the flue pipe outgoing from the boiler;
- Boiler needs a separate chimney hole. No other connections are allowed into the same hole;
- If chimney is connected through extra elbow, it must have no less cross-section than the flue exit from boiler hole, with bending radii no less than 100 mm;
- Pipe from boiler flue pipe to chimney has to be no longer than 1.5 m and rise in the direction of the chimney, providing the option for its cleaning;
- Seal well the gaps in the joining and chimney entering places.

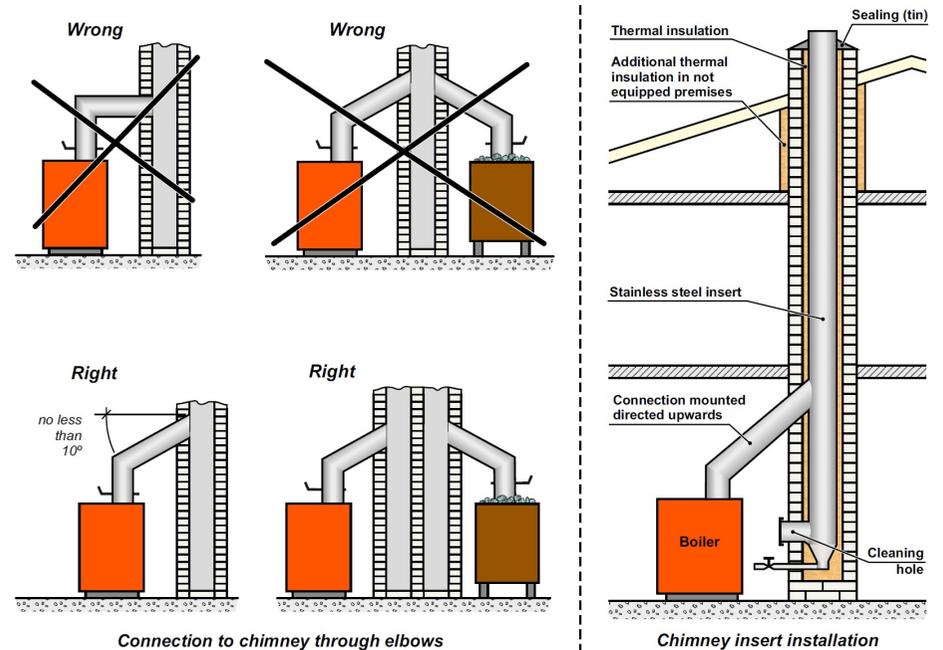


Fig. 3.

### It is necessary to know that:

- Flue out of the boiler goes through flue pipe, enters the chimney further cooling, vapor contained in the flue condenses and settles on the chimney walls, in particular in an unheated attic and external part of the chimney;
- Condensate acids and heat-frost erosion over several years can destroy the chimney;
- Not cleaned soot in the chimney over time can cause fire if chimney is in improper state or if roof covering is easily flammable.

### It is recommended:

- To install stainless steel liner in the chimney. Well mounted chimney insert prevents condensation and improves draught;
- Insert shall not significantly decrease the cross-section of the chimney;
- Insert parts should be sealed together (not by soldering);
- Condensate drain must be installed in the bottom;
- Fill in the gap between the liner and the chimney walls, at least in the outer part of the chimney, with non-combustible heat insulating material. Plaster hermetically the gap on the top and tin-coat with a slope (from the opening to the edge of the chimney);
- In the cold attic, winterize the chimney with inflammable heat insulation material;
- If fire starts in the chimney, close the air supply to the boiler and call fire service;
- Install vents in the chimney connection, in a convenient location, for periodic (once a month) soot cleaning;
- It is recommended to have the chimney once a year examined by qualified chimney maintenance professional.

## 5.3. Connection to heating system

Many heat consumers' boiler house connection schemes are becoming increasingly complex. Several alternative heat generators: solid fuel or gas boiler, additional pellet burner, electric heating, heat pumps, solar collectors, etc. are combined. For indoor, various heating radiators, underfloor or air heating, accumulation tanks, various water heating equipment are used.

Therefore, under specific conditions and user preferences, selection of a suitable boiler and preparation of connection scheme, can be entrusted only for skilled designers and experienced installers.



*If less heat is needed than the boiler's nominal power, don't fill the combustion chamber in full for there was no constant loaded fuel smoldering (resins can start accumulating in the boiler).*



*In the beginning of boiler operation, at ignition, during wood burning, condensate forms on the inner walls of the boiler while there is no layer of soot, giving the impression that the boiler is not water tight and leaks. Water steam condensate disappears after reaching water temperature in the boiler of 70 – 80 °C with the means of a tree-way mixing valve. We recommend maintaining as high temperature in the boiler as possible. If return water temperature is lower than 60 °C, water condensates on the inner surfaces of the boiler, condensate combines with combustion products forming chemically aggressive acids, which can drastically reduce boiler service life. In order to check boiler for tightness, stoke it for several hours with dry wood, then stop stoking and watch if condensate volume is growing. If not, the boiler is tight.*



*If improperly operating the boiler, using improper fuel or insufficient chimney draught, flue draught valve can get stuck, so during the heating season the valve has to be moved by opening-closing it several times.*

## 6.5. Boiler Extinguishing

At normal use, the boiler goes off by itself after the fuel charge burns out. In the case of forced extinguishing, first of all, remove fuel from combustion chamber.



Put burning fuel into a vessel with water – less smoke will form in the room.

In the case of forced extinguishing, open doors or windows to ventilate the room.

## 6.6. Boiler Cleaning

Ash, accumulating under the fire grate, prevents air from entering the combustion chamber. Therefore, no rarely than before every second ignition, remove ash from the ash box and scoop it from the ashtray.



**Clean the boiler, remove ash drawer and scoop the remaining ash only after the boiler has fully stopped and cooled down.**

In order to ensure more efficient and safer boiler operation, periodically remove soot from its internal surfaces. Intervals between cleaning depend on fuel quality (especially moisture), stoking intensity, chimney draught and other circumstances. We recommend to clean heat exchanger and combustion chamber when soot layer reaches 3 mm, but no rarely than 2 – 3 times a month. When cleaning, remove heat exchanger turbulizer; thoroughly clean internal surfaces of the boiler with a scraper and brush.

### 6.3. Air draught regulator adjustment

After the boiler reaches the desirable temperature (70 ÷ 90 °C), compared with the readings of thermal-pressure gauge installed on outgoing (hot) water pipe, set air draught regulator for the same temperature.



*Regulator graduation can differ from thermal-pressure gauge readings.*

Shorten the chain so that air supply valve was closed or there was a gap of no more than 2 mm. Set the desirable temperature by turning regulator hand to the relevant position.

Boiler can be supplied with the regulator having temperature limits marked not in degrees.

### 6.4. Boiler stoking

#### Refilling combustion chamber with fuel

- Fully open flue draught valve;
- Turn air draught regulator handle to close air supply valve in the door;
- Open a little fuel loading door and wait for 15...20 seconds (after opening, look when there is no smoke in the chamber);
- Open the door fully and refuel the chamber;
- Close tightly the fuel loading door;
- Return flue draught valve to the previous position for proper draught from the boiler;
- According to selected temperature, open air supply valve with air draught regulator.



Refuelling is recommended only after previous charge has fully burned out; earlier refuelling should be applied only in the cases when there is no other option.

#### Stoking efficiency



Set the necessary draught from the boiler by closing flue draught valve so that no smoke got into the premises at proper stoking.



Draught exceeding the value given in the technical data table (see page 6) reduces the boiler efficiency factor, also there is a risk of boiler overheat.

During fuel combustion, ash covers the fire grate; burning intensity as well as boiler power drops down. Due to this fact, poke the fuel. Large volume of ash prevents air from entering, therefore remove ash timely.

Don't open fuel loading door during intense burning.

Boiler stoking needs much air, so ensure sufficient air volume in the premises with the boiler.

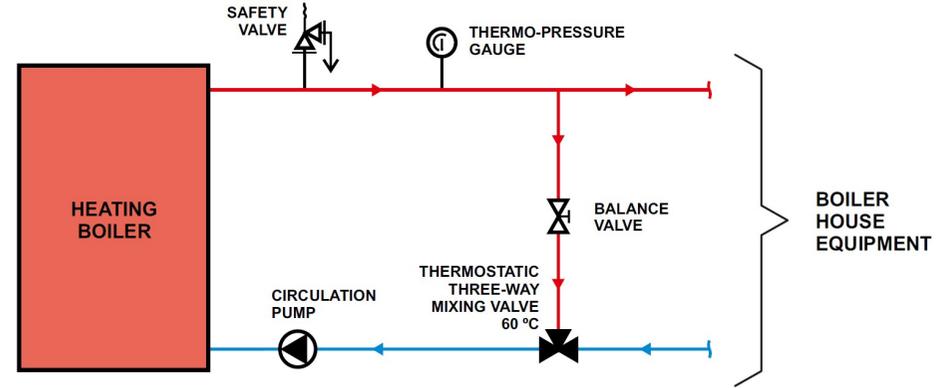


Fig. 5.

*A part of recommended boiler connection circuit, execution of which ensures long-term boiler operation, prevents from condensate formation inside the boiler. Circuit shows no auxiliary technology equipment (valves, expansion vessel etc.)*



Fig. 5 shows only recommended part of the circuit for boiler connection into the heating system, ensuring no less than 60 °C return water temperature to the boiler. Circuit shows no auxiliary technology equipment (valves, expansion vessel etc.).

#### Requirements for connection:

- In order to avoid condensation in the boiler, which could reduce operation time of the boiler, the heating system has to maintain no less than 60 °C return water temperature.
- **Safety valve (G $\frac{1}{2}$ B) has to be installed in the system as close to the boiler as possible, in order to protect boiler housing from the pressure exceeding 2.5 bar (0.25 MPa). No closing fittings are allowed between the boiler and the safety valve.**



**If valves disconnecting the boiler from the heating system are installed in the system pipes, they must be fully open. To avoid accidents due to inadvertence, after opening the valves, it is appropriate to remove their handles.**

- In the case boiler is connected into a closed heating system with membrane expansion vessel, its permissible pressure can be up to 10 bar, air pressure must be equal with the system pressure, e.g. 0.6 bar. In the case of preparing open-type heating system, instead of membrane expansion vessel, open-type expansion tank can be installed.



**During installation, a sleeve with G $\frac{1}{2}$ B thread shall be welded in a clearly visible place on the outgoing water pipe to be used to screw in the supplied thermal-pressure gauge.**

- If boiler operates at much lower nominal power than it is given in the technical data sheet, boiler efficiency is drastically reduced, ecological indicators get worse. In this case, boiler with accumulation tank is recommended.



*If there is system freezing risk or during boiler repairs, drain water from the system and boiler through discharge branch pipe.*

#### 5.4. Air draught regulator installation

Screw in the air draught regulator (the regulator) using hemp or sealing tape.

Connect chain to air supply valve (*also see par. 6.3*).

## 6. Boiler Maintenance



*Flue pipe and other boiler surfaces not covered with thermal insulation panels during operation become extremely hot, don't touch them.*

Recommended moisture for the fuel to be used is no more than 25 %.



*If using damp fuel (firewood or sawdust) for stoking, condensate combines with flue gas products forming acids, reducing boiler service life by a number of times.*

If damp fuel is used for stoking, the specified efficiency factor cannot be reached, so much more firewood is needed.



*User at his/her option can use a different solid fuel, **without making claims towards boiler manufacturer regarding the operation results and boiler service life.***



*In order to prevent smoke from getting into the premises, close tightly the combustion chamber and fuel loading doors, except the cases when the boiler is fired or fuel is loaded.*



*If more air-consuming equipment is installed in the boiler operation premises, air supply to the premises must be sufficient for all equipment.*

### 6.1. System preparation for heating



*Before firing the boiler, check whether the system is filled with heating water and deaerated.*



*It is advisable to fill the system with desalted soft or at least rain water. If prepared soft water is used in the system, boiler housing will serve longer.*



*Valves disconnecting the boiler from the system have to be open.*

### 6.2. Boiler ignition

Before firing the boiler, fully open flue draught valve.

Load chopped dry wood or chips through combustion chamber door and internal cast iron doors onto the fire grate and get on fire.

After fuel burns well, load the combustion chamber (hearth) with fuel (*on how to load, see below: Filing combustion chamber with fuel*). Adjust flue draught valve for proper draught from the boiler.

Finely chopped firewood burns more efficiently, increases boiler power.

Put firewood into the combustion chamber (hearth) freely, for while burning they could fall down to the bottom of the chamber.