



TOPLING

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USER GUIDE

Hot Water Boiler TKP Type

CONTENTS

	Page
1. NOTES ON THIS USER GUIDE	3
1.1. Introduction notes	3
1.2. Structure of the User Guide	4
1.3. Glossary	5
2. SAFETY TIPS	6
2.1. Proper Use	6
2.2. Always present risks	7
2.3. Used warning and safety signs	8
2.4. Duty - be informed	9
3. DESCRIPTION AND PURPOSE OF BOILER	10
3.1. Introduction	10
3.2. Technical data	11
3.3. Installation of boiler TKP type	13
3.4. Declaration of conformity	22
4. BOILER MAINTENANCE	23
4.1. Frequency of cleaning and maintenance	23
5. POSSIBLE PROBLEMS IN FUNCTIONING	26
6. FIRST COMMISSIONING	27
6.1. Requirements for successful commissioning	27
7. DISPOSAL AFTER END OF LIFE	28
7.1. Dismantling of boiler	28
7.2. Disposal of boiler	28
8. WARRANTY	29
8.1. Warranty period	29
8.2. Warranty Terms & Conditions	29
8.3. The Warranty does not apply to	29

1. NOTES ON THIS USER GUIDE

1.1 Introductory notes

EASY AND SAFE USE

This User Guide contains significant information for appropriate and safe use of hot water boiler type TKP. If you follow these Instructions, you can avoid risky situations, reduce maintenance costs, avoid failures, provide reliability and prolong boiler life.

READ USER GUIDE

This User guide must be read and applied by anyone using the boiler type TKP.

TECHNICAL CHANGES

We keep developing and enhancing our boilers. All information regarding this Guide that are related to the boiler type TKP are correct at the moment of printing.

Before the use, all details mentioned herein concerning standards and legislation must be checked and compared to standards and legislation applied in the location where the boiler is to be installed.

COPY RIGHT

We reserve the right to make changes on the boilers that would differ in technical data and drawings herein.

Written approval of Topling d.o.o. to copy, store in electronic form, transfer information in electronic format, photography, translation of this manual in whole or in part is required.

1.2 Structure of User guide

This User Guide consist of

Chapter	You can find the following herein.....
1. Notes on User Guide	... how to use the instructions.
2. Safety tips	...all related with safety use, what you should keep in mind when using a boiler.
3. Description and purpose of boiler	... structure and all about characteristics of boiler, technical data, how to connect the boiler on central heating installation
4. Maintenance	... how to clean the boiler, the frequency of maintenance and cleaning
5. Possible problems in operating	...which problems can be experienced during boiler use
6. First boiler commissioning	... requirements for successful commissioning
7. Disposal of boiler after its life ends	... what should be taken into account when dismantling and preparing of the boiler for disposal.
8. Warranty	... warranty terms and conditions

Table 1. Structure of the User guide

1.3 Glossary

Term	Explanation
TKP	The boiler intended for solid fuel combustion
Flue vent	The part of the boiler where flue gas comes out and enters the chimney pipe
Draft regulator	Is used to regulate the amount of air which enters the boiler through the flap on the lower door.
Flue gas pipe	Takes out flue gas from flue pipe to chimney
Boiler firebox	The place where solid fuel burns in the boiler
Solid fuel	Firewood, charcoal, wood briquettes
Safety valve	It is used for pressure relief in boiler water space when it is exceeded

Table 2. Explanation of terms

2 SAFETY NOTES

2.1 Proper use

MAIN PRINCIPLES

MAIN PRINCIPLES OF SYSTEM CONSTRUCTION

The boiler is made in accordance with the known principles of safe use. Improper use may cause harm, injury or even death to those who do not comply with safety guidelines as well as to third parties, which may result in damage to the boiler, and damage to other resources in the immediate environment.

Specialized person who made the boiler installation and commissioning should demonstrate you how to use it.

Use boiler only when it is completely in order. Use it the right way and for the purpose for which it is intended, always taking care of your own safety and the safety of others and the safety of property. Constantly comply with this manual.

Any defect which may impair safety must be immediately removed.

USE OF BOILER

RELIABLE AND UNRELIABLE USE

The boiler is designed to burn solid fuel (firewood, charcoal, wood briquettes).

Use of any other fuel is not allowed. The manufacturer is not liable for any damages resulting from improper use. In case of improper use the responsibility is borne by the one who used boiler improperly.

2.2 Always present risks

Despite of all precautions, the below given risks should be always considered:



Attention!

High temperature surfaces.

Contact with such surfaces may cause burns.

Wait for the boiler to cool to touch these uninsulated surfaces.



Warning!

Danger of choking carbon monoxide.

When boiler is used, carbon monoxide can be emitted through openings in the boiler.

Do not leave boiler door open more than required.

2.3 Used warning and safety signs

The following warning and safety signs are used in this User Guide:



Danger!

Danger from electrical current.
Work on devices marked with this symbol is only allowed for the qualified persons.



Warning

Work in areas that are marked with this symbol could result in serious injury or create serious damage.



Attention

High temperature surfaces.
Work in areas marked with this symbol can lead to burns.



Attention

Danger from fire.
Work in areas marked with this symbol can lead to fire.



Attention

Danger of freezing.
Work in areas marked with this symbol can lead to freezing.



Notes on proper disposal.
Additional information for the operator.

2.4 Duty- be informed

READING

USER GUIDE Anyone who intends to use the boiler is required to read and understand this manual, and special attention must be paid to the Chapter 2, Safety instructions. This especially refers to those who only occasionally use the boiler, for example, only when cleaning or other tasks related to the maintenance of the boiler.

This manual must be constantly "at hand" where the boiler is installed.



Particular attention should be paid to the standards applicable to the place where the boiler is installed.

3. DESCRIPTION AND PURPOSE OF BOILER

3.1. Introduction

Boiler types TKP have modern construction and design, and is made of quality certified materials.

Boiler testing was done according to EN 303-5 and meets all requirements for connection to the central heating system.

Hot water boiler is designed for heating of small residential units, family houses, shops and small manufacturing units

It uses solid fuel. It is designed to operate in the temperature regime of 90/70.

The firebox and convective part of the boiler are made of high-quality boiler metal sheet using welding technology. The boiler is well insulated with hard pressed mineral wool in quality sheet boiler casing.

The installation and commissioning are simple and connectors are standard.

Boiler is attested by the Faculty of Mechanical Engineering in Banja Luka. Nominal power of furnace is achieved with lignite "Stanari" which is of small thermal power, about 11 00 kJ/kg.

The boilers manufactured in the compliance with EC Directives : The Pressure Equipment Directive
97/23/EC and

And applied harmonized standards, especially: EN 303-5:1999;

Other mentioned standards and technical specifications:

EN 287-1: 2004, EN 288-3:1992, EN ISO 7000 :2004;
EN 10204:2004;

3.2. Technical data

Identification table for boilers

Identification of the boiler can be done with identification table on boiler flue vent>

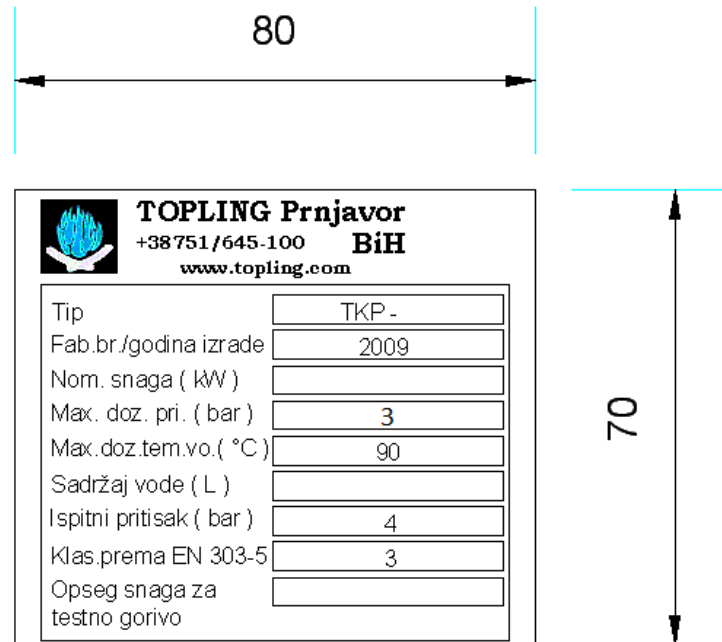


Figure 1. Identification table of the boiler type TKP

Boiler technical data

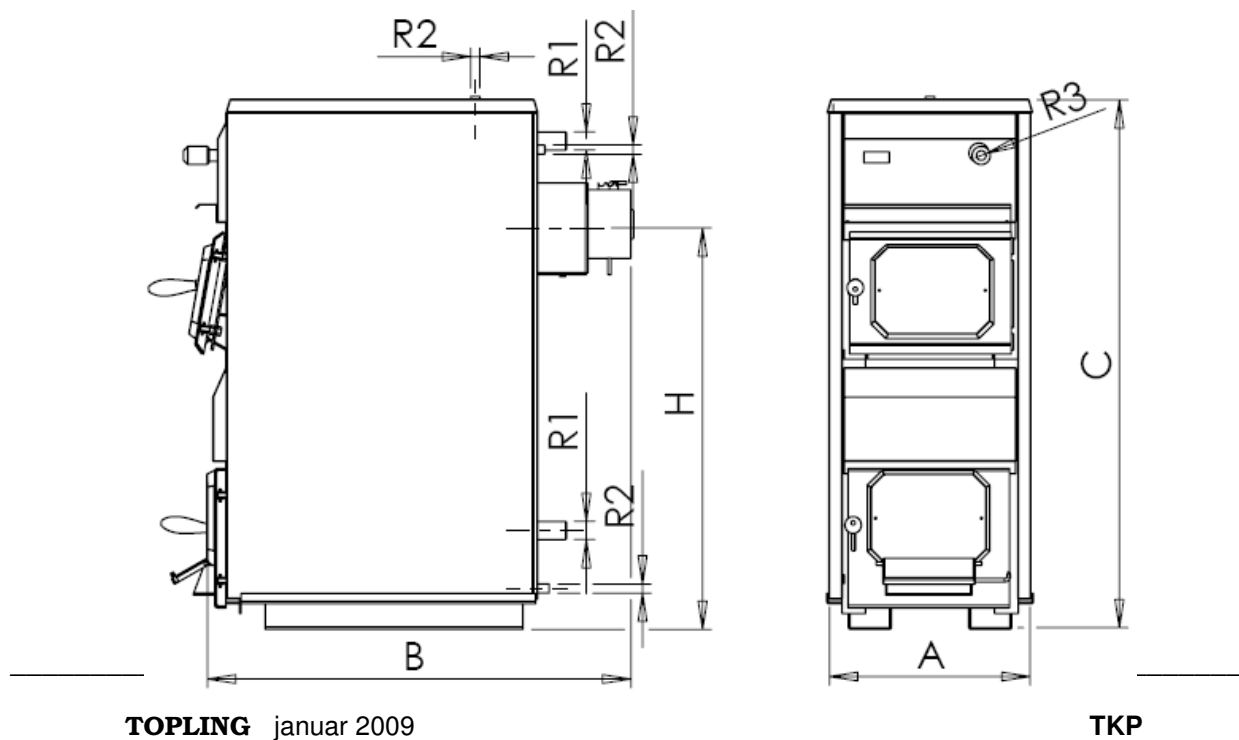


Figure 2. Boiler **TKP**

TYPE	Power rating s [kW]	DIMENSIONS [mm]						CONNECTIONS [col]			Draft [Pa]	Mass of the boiler [kg]	Water Volume inside boiler [l]
		A	B	C	D	E	H	R1	R2	R3			
TKP 20	20	465	705	1142	160	190	810	5/4	1/2	3/4	21	235	80
TKP 25	25	465	730	1250	160	190	950	5/4	1/2	3/4	22	258	85
TKP 30	30	495	775	1320	180	190	1030	5/4	1/2	3/4	23	305	109
TKP 35	35	550	785	1355	180	190	1040	5/4	1/2	3/4	25	336	135
TKP 40	40	590	760	1390	180	190	1050	5/4	1/2	3/4	26	362	140
TKP 50	50	710	785	1430	180	190	1090	5/4	1/2	3/4	28	380	150
TKP 65	65	748	890	1375	200	190	1040	6/4	1/2	3/4	30	480	200
TKP 80	80	765	990	1375	200	190	1040	6/4	1/2	3/4	35	595	220

Table 3. Characteristic dimension of boilers TKP type

TIP	TKP 20	TKP 25	TKP 30	TKP 35	TKP 40	TKP 50	TKP 65	TKP 80
Maximum power [kW]	20	25	30	35	40	50	65	80
Heat output range [kW]	10-20	12-25	15-30	17-35	20-40	25-50	30-65	40-80
Maximum operating pressure [bar]	3	3	3	3	3	3	3	3
Maximum operating temperature [°C]	90	90	90	90	90	90	90	90
Operating temperature interval [°C]	70-90	70-90	70-90	70-90	70-90	70-90	70-90	70-90
Class of the boiler according to EN 303-5	3	3	3	3	3	3	3	3
Necessary draft [Pa]	21	22	23	25	26	28	30	35
Temperature of flue gases [°C] - Maximum	250	250	250	250	250	250	250	250

Table 4. Technical data

Fuel

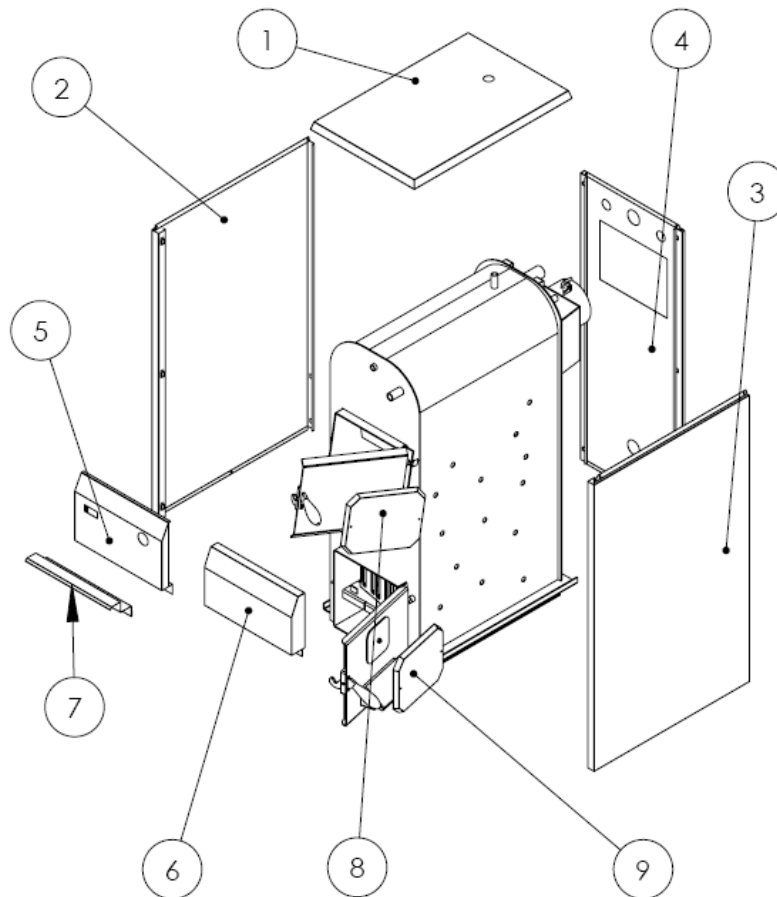
The boiler is intended for solid fuel combustion (firewood, wooden briquettes, wood waste, lignite, coke, coal). Its design allows to feed large pieces of wood.

During the testing, power ratings of the boiler is achieved with "Stanari" lignite, whose thermal power is about 11 000 kJ/kg.

3.3. Installation of the TKP type boilers

Assembly of the outer casing of the boiler TKP type

In order to prevent damage of metal casing which could occur during the transport and storage of the TKP type boilers, final assembly of the boiler casing on the boiler body is done on the location of the installation. The assembly of casing must be done in the compliance with the scheme of assembly show in Figure 3.



Legend :

1. Cover of the casing
2. Right side of the casing
3. Left side of the casing
4. The back side of the casing
5. Front upper side of the casing
6. Front lower side of the casing
7. Protection of measuring and safety instruments
8. Upper door isolation
9. Lower door isolation

Figure 3. Scheme of the assembly of boiler casing

Order of assembly of the metal casing on the boiler body:

1. Assembly of the back side of the boiler casing (Figure 3, position 4) ,
2. Assembly of the sides (Figure 3, position 3 and 4) ,
3. Assembly of the front lower side (Figure 3, position 6)
4. Assembly of the front upper side (Figure 3, position 5)
5. Assembly of the cover of the casing (Figure 3, position 1)
6. Assembly of the protection of measuring and safety elements (Figure 3, position 7)
7. Assembly of the upper and lower door insulation (Figure 3, position 6)

Handling the boilers can be done only by adults who have read and understood the technical user guide. Incorrect handling of the boiler may result in injury, failure of boilers and installations, as well as serious consequences for humans.



Boiler failures which occurred because of improper and negligent handling of the boiler are not covered with the Warranty.

The boiler must be installed on a flat, stable surface. Water supply system connections, connection or possible drainage, and connection to electrical network (220V, 50 Hz) must be provided in the boiler room.



Also, the boiler should be installed on a non-combustible surface and the safety distances of 200 mm away from flammable materials must be complied with. This applies to boilers and flue gas pipes located near flammable things and materials, flammability class B, C1 and C2.

Safe distance of 440 mm must be respected if the boiler is located along the material flammability class C3.

The boiler room must be physically separated from other rooms (especially the rooms where people live and sleep).

Safe distance must be complied with when setting the installation elements near to the boiler.



Natural ventilation must be provided in the boiler room, which is necessary for the proper operation of the boiler (See table 5).

Q (kW)	15	25	30	35	40	50	65	80
A_0 (cm ²)	775	1000	1096	1184	1265	1415	1613	1789
$a_0 \times b_0$ (cm)	28x28	32x32	34x34	35x35	36x36	38x38	41x41	43x43
A_1 (cm ²)	258	334	365	395	422	472	538	597
$a_1 \times b_1$ (cm)	16x16	19x19	20x20	20x20	21x21	22x22	24x24	25x25

$A_0 = 200\sqrt{Q}$, Q (kW) - air inlet opening

A_0 (cm) – minimum effective area of the inlet opening for ventilation and combustion

$A_1 = 1/3 \cdot A_0$ - drain opening
 Openings should be protected with outside fixed louver in order to prevent entry of rainfalls

Table 5. Dimensions of inlet and drain openings for natural ventilation of boiler room

Dimensions of the chimneys for boiler type TKP

The chimney must be sized according to the diagram in Figure No. 4. for good and safe operation. The Figure 5 shows proper installation of the chimney regarding the roof construction.

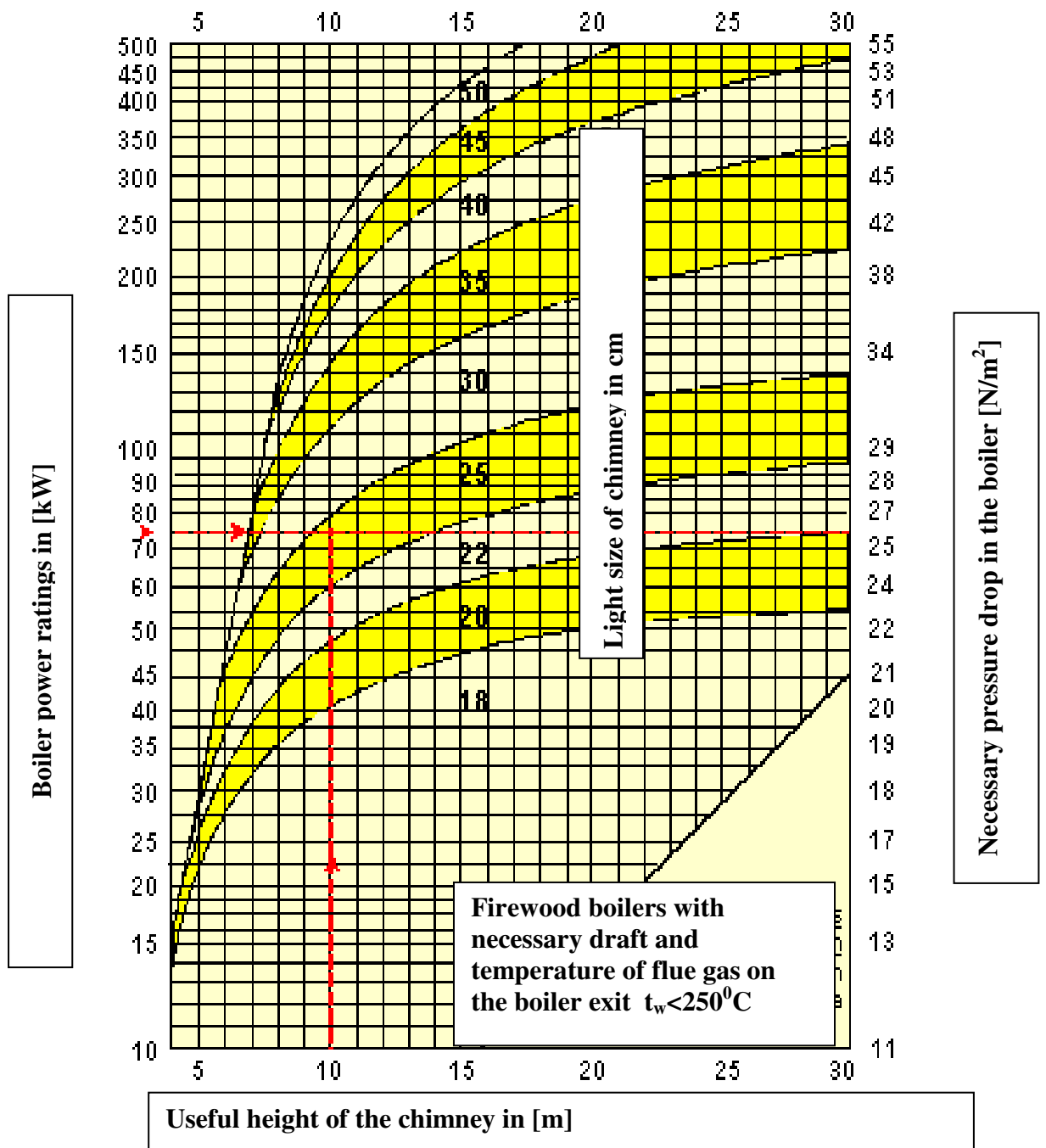


Figure 4 Selection of chimney section when using solid fuel - firewood (Schiedel)

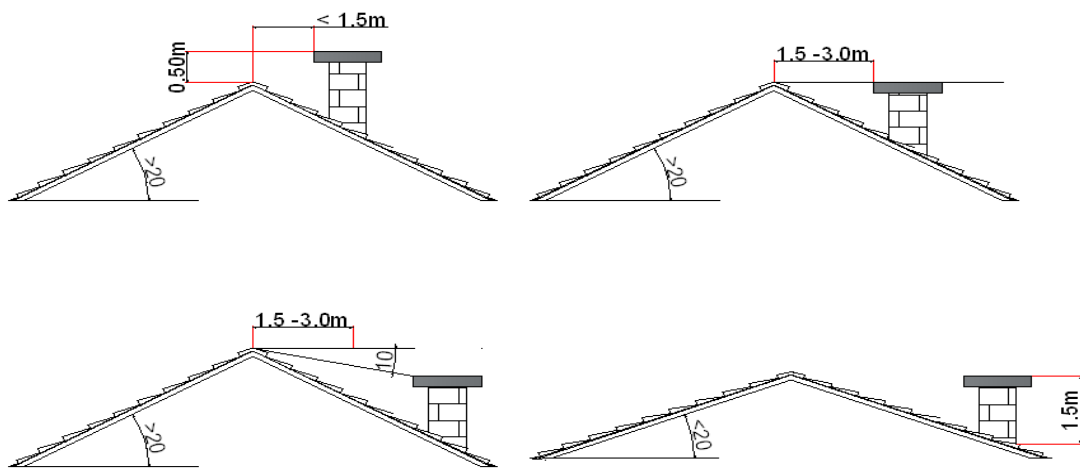


Figure 5 Proper installation of the chimney

When connecting boiler with the chimney, flue gas pipe must be installed rising and horizontally. All connections must be good fixed.



The boiler must be installed by a qualified person in the compliance with applicable regulations. Topling Compay cannot accept the responsibility for the damage caused by improper installation.

Connecting the boiler on central heating installation

In the following part of this technical user guide it is show recommended connection of the boiler type TKP on central heating installation,

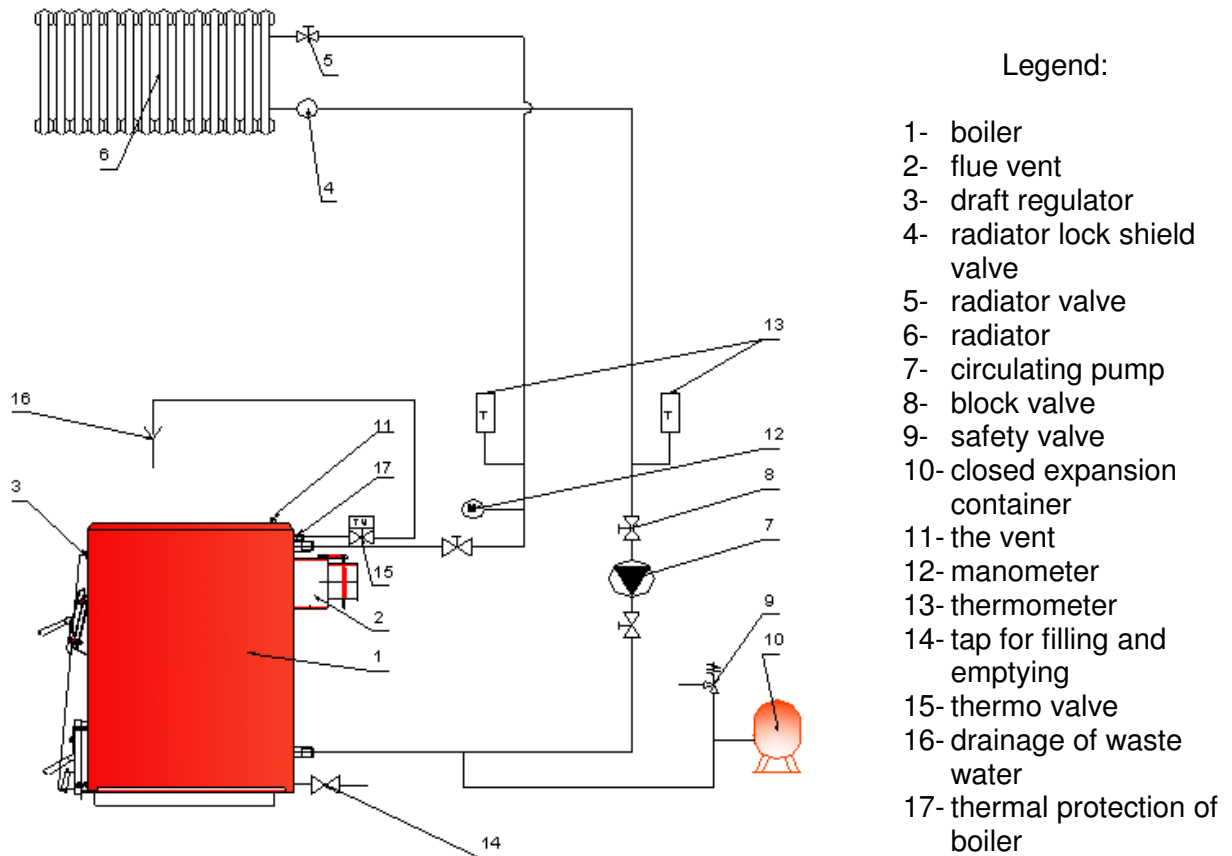


Figure 6. Connecting the boiler on central heating installation

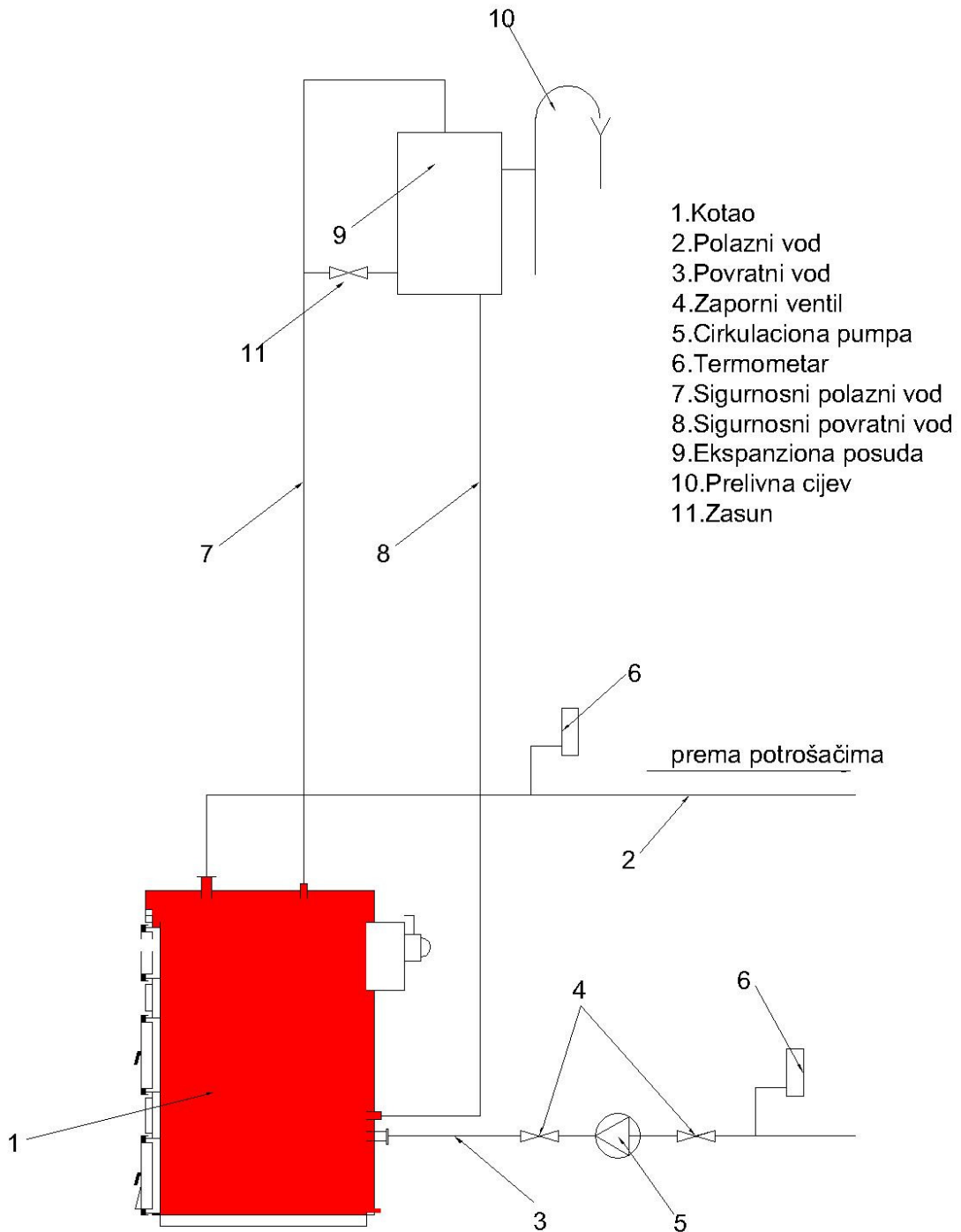


Figure 7. Connecting the boiler type on central heating installation with opened expansion container

For extra protection against boiler overheating, caused by the stoppage of the circulating pump, the user is suggested to install calfeji valve, which releases cold water into the boiler if it reaches a temperature of 100 °C, and sends hot water to drain. Scheme of the calfeji valve installation is shown in Figure 8. On boiler type TKP is necessary to install backup battery supply with converter, in order to power supply pump.

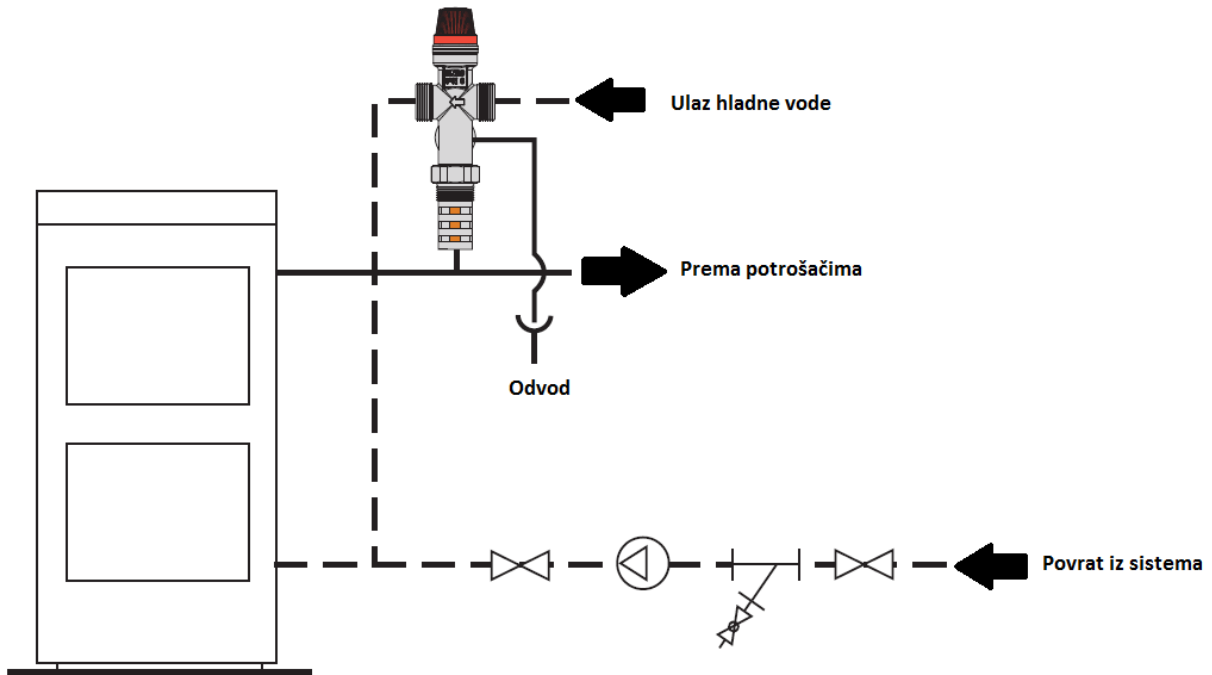


Figure 8. Scheme of the connection of "calfeji" valve

Boiler should be placed as close as possible to the chimney.
Do not close the free air supply to the boiler



WARNING

1. The boiler must be installed on a stable, flat surface. Setting and installation of the boiler must be done by a **qualified person**.
2. The boiler must be provided with a water supply system connections, and connection for possible drainage, and connection to the electrical network with the **required grounding**.
3. The boiler room must have natural ventilation provided in order to provide supply of fresh air.
4. Floor and interior the boiler room must be made of fireproof material

It is preferable that there is no humidity in the boiler room in order to prevent the corrosion of boiler metal part, and in order to prolong boiler life expectancy.

It is recommended to use softened water for feeding the boiler from the system.



Circulating pump is put into operation only after the heating system is filled with water, and you must be sure that the system is vented.

In a closed heating system it is required to install attested safety valve of opening pressure of 3 bar and to install expansion container. Between the safety valve and expansion vessel must not be installed blocking element.



The boiler water temperature must not fall below 55° C in order to avoid condensation on the internal walls of the boiler



In the event of severe winter weather and low temperatures, and if the boiler is not used it is necessary to remove water from the system and fill it with liquid anti-freeze.



THE DANGERS OF FIRE

Flammable materials and liquid cannot be in immediate vicinity of the boiler.

Commissioning the boiler

Prior to commissioning of the boiler, is necessary to fill the system with water to vent it.

After that, you have to check the following:

- whether the installation is done as designed.
- Water pressure in the boiler and installations;
- Installation of flue gas pipes and their tightness;
- Whether the draft regulator is properly installed and configured;
- Turn on the circulating pump and let the water from the boiler to the installation only when the boiler water temperature reaches 60°C;
- Fully open the flap on the chimneys.

When he performed the above tests, it can be accessed by stoking the boiler and its commissioning.



When making the fire in the boiler, you mustn't use easily flammable substances (for example petrol, gas, etc.)



In a closed heating system it is required to install attested safety valve of opening pressure of 3 bar and to install expansion container. Between the safety valve and expansion vessel must not be installed blocking element.

Adjusting proper operation of the boiler

Figure 9 shows the basic terms which are necessary for proper operation and maintenance of the boiler

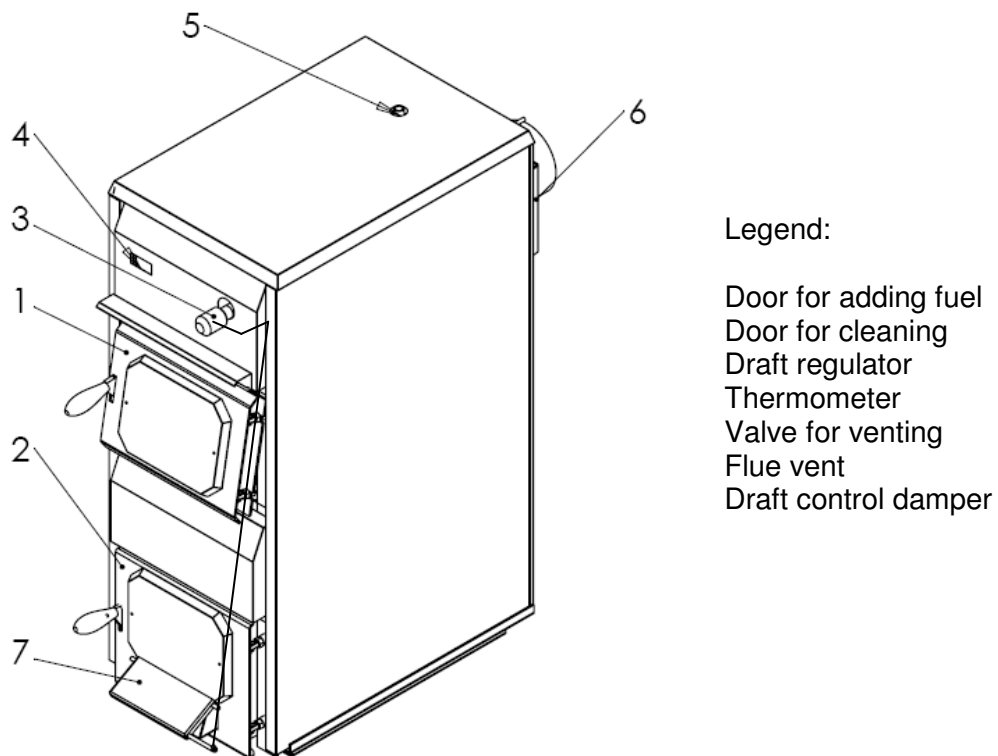


Figure 9. Boiler TKP

Door for adding fuel (Figure 9, position 1) and the door for cleaning (Fig. 9, pos. 2) have mechanical shutter. When checking the fuel or when filling, it is necessary first to open the door

slightly, in order to enable the exchange of gases in the fuel, and after that open them completely.

Regulation of the boiler power is controlled with draft regulator (Fig.9, pos. 3) which is screwed into the body of the boiler.

Reading the water temperature is controlled with a thermometer (Fig. 9, pos. 4)



**We warn the user of high temperature on the boiler door and chimneys.
Gloves are necessary for safe work**

Add fuel and set the draft regulator so that its operating temperature does not fall below 550C.

In order to simply regulate the water temperature in the radiator when adding the fuel and to keep that temperature below 55°C ,it is necessary to install the at least the simplest manual control mixing valve or thermostatic valves on radiators.

Prohibition



It is prohibited to:

- **Perform any modifications that are not in compliance with this technical user guide;**
- **Use other materials as the fuel which is not recommended by the manufacturer;**
- **Overcharge boiler fuel;**
- **Use other tools and instruments for maintenance and cleaning which are not recommended by the manufacturer.**

3.5 Declaration of Conformity

EC Declaration of conformity

In compliance with EN45014:1998

We : **TOPLING**
Vijaka bb
78430 Prnjavor
Bosna i Hercegovina

hereby declare under own responsibility that the product:

Mark : hot water boiler

Type / Model..TKP15,TKP20,TKP25,TKP30,
TKP40,TKP50,TKP65,TKP80

Date of production : 2009 year

To which this Declaration applies to, is in the compliance with the following standard documents:

In the compliance with EC Directives: EC Pressure Equipment Directive 97/23/E

Applied harmonised standards, in particular:

EN 303-5:1999;

Other mentioned standards and technical specifications:

EN 287-1: 2004, EN 288-3:1992, EN ISO 7000 :2004;

EN 10204:2004;

Applied procedure for conformity compliance: Module B1
Emission limit value of the combustion products (Class) 3
Certificates which are issued: EC Control of type – Certificate no.. **0745/0347/09**

Accredited laboratory: TÜV Thüringen e. V. Service-Center Südthüringen
Industriestr. 13 98544 Zella-Mehlis

We hereby declare that the above named product in its concept and workmanship, is in accordance with the security and safety standards that comply with the above directives and standards.

Thereby all operating conditions and application requirements are in accordance with the User guide and technical documentation.

Once a single change has been made to the product not in agreement with us, this statement loses its importance.

Place and date

Full name and title of signatory:

Prnjavor

Zivanic Radislav, Director

.....
Place and date

.....
Signature, seal



4. BOILER MAINTENANCE

4.1 The frequency of Cleaning and Maintenance

In order to enable long life expectancy of the boiler without any operation interruptions, it is necessary to regularly clean and maintain the boiler. In this way you will avoid costly repairs. Keeping your firebox clean is the basic condition for the good boiler operation. A layer of soot and tar accumulates on the firebox walls and it is necessary to mechanically clean the furnace..

Boiler cleaning



Boiler cleaning can be performed only when the fuel is burned completely and the water temperature in the system is below 35 °C

For proper operation of the boiler and extending the life expectancy, the boiler should be regularly cleaned. Clean boiler saves the fuel. Only 1 mm of deposits on the walls of the firebox increases fuel consumption by 5% to 10%. When the deposits is 3mm thick, which is not uncommon after one heating season, heating costs are increased by 30%.



Clean the firebox at least once in a week, a clean thoroughly at least once in two weeks.

Clean the boiler using cleaning kit, which is the part of the standard equipment that is delivered together with the boiler (Figure 10), remove layers of ash and soot from exchange surfaces..

(water-cooled grate, boiler walls, water-cooled rack) and flue vent

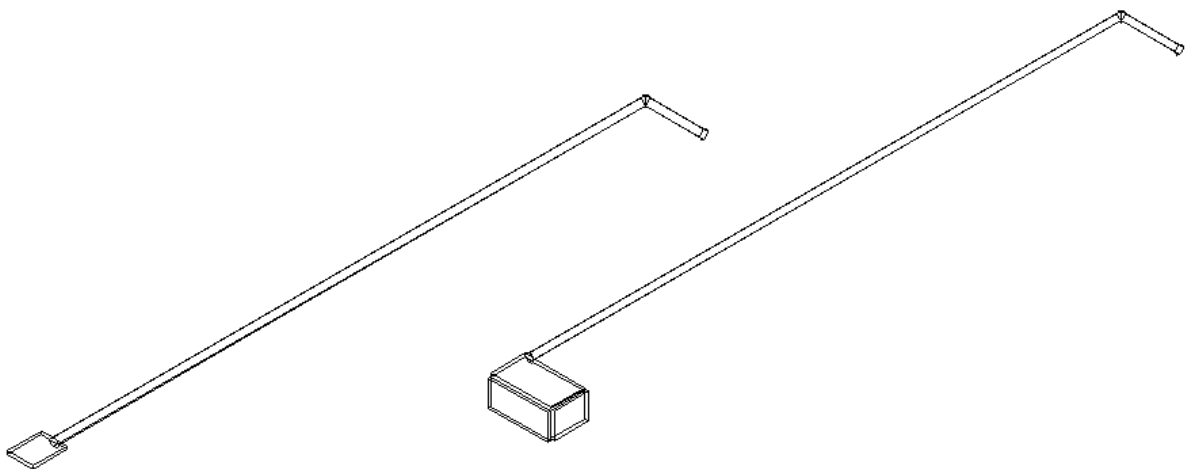



Figure10 boiler cleaning equipment

	When cleaning the boiler and flue gas pipes it is necessary to check the chimney. Dirty chimney prevents the proper operation of the boiler and can cause consequences on human health and property.
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Low temperature corrosion

Wood and coal contain a certain percentage of sulphur. As a product of combustion, sulphur dioxide and sulphur trioxide are produced. In the chemical reaction between sulphur dioxide, sulphur trioxide and water vapour which is contained in burned gases, sulphuric acid is produced.

By cooling the flue gases on the boiler heating surface, vapours of sulphuric acid and water vapour are condensed. Condensed sulphuric acid and water vapour deposit on the walls of the boiler in the form of thin films and melt iron. As the product of the melting, ferrous sulphate occurs, which later turns into rust. High corrosiveness of sulphuric acid is that it is ageing re-released by hydrolysis of ferrous sulphate.

In this way, a small amount of sulphuric acid can always participate in the corrosion process.

By reducing the temperature of flue gas, sulphuric acid vapour condensates. With the fall of the temperature of flue gases, the speed of the creation of acid film and corrosion is increased.

	Upon completion of the heating season, the boiler must be cleaned thoroughly in order to extend life expectancy of the boiler.
---	---

Interval	Component	How it is performed
Every seven days	Clean interior, exchange surface of soot deposits	Use the cleaning kit, shown in Fig.8 to scrape carbon deposits from the walls of the boiler
Every 7 to 14 days	Cleaning the boiler	Use the cleaning kit, shown in Fig.8 scrape carbon deposits from the walls of the boiler
Every six months	Check whether the flue vent, flue pipe elbow, flue gas pipe are clean and if necessary clean them.	Wait for the boiler to cool down, dismantle flue gas pipe and flue pipe elbow and perform the cleaning with the same kit which is delivered with the boiler
When necessary, at east once a year	Clean the flue gas pipes and chimney	Authorized chimney sweeper should perform cleaning of the chimney
Annually	Thorough annual cleaning at the end of the heating season.	Clean all the components described in the upper part of the table

Tbale 6 Frequency of maintenance



When cleaning the furnace of ashes and soot deposits by vacuum cleaning, the ash has to be cooled, i.e. to have the room temperature, in order to avoid the risk of the combustion of the vacuum cleaner with which we suck up the ashes.



When cleaning chimney, flue pipe and the elbow there is a risk of burns because these surfaces may have the temperature up to 200 °C during the operating regime. It is necessary to leave enough time for cooling down.



When performing the cleaning works, there is a risk of carbon monoxide poisoning, if the combustion process is not over and the clearing process is performed carelessly. In this case, carbon monoxide is emitted through openings on the boiler (i.e. open doors, removed flue pipe, or the elbow). Never leave the boiler door open longer than it is necessary.

5. POSSIBLE PROBLEMS IN FUNCTIONING

Problem	Cause	Elimination
The boiler operates, but it cannot achieve the set temperature	The boiler is dirty	Clean the boiler and chimney
	There is no enough fuel in the firebox	Use enough amount of the fuel in the firebox. Avoid wet fuel whose moisture exceeds 35%
Boiler is getting wet	Flue gas condensation	1. It is installed the excessive force of radiators. The boiler does not have enough power. Replace the boiler with a boiler of a higher power or adjust the number of radiators with the boiler power.
	The boiler is damaged	It is necessary to weld the boiler. Only the authorized service or the producer can perform that.
The smoke returns from the boiler	The chimney, flue vent or the firebox are dirty	Clean
	Too small opening of the chimney	Adjust cross section of the chimney with the boiler power
The boiler is overheating „shots“ can be heard in the boiler	There was a power failure, the circulating pump is not working and the boiler is overheating. There is a danger of explosion of the boiler	In order to avoid this, the best solution is to have spare battery power with converter.
		If you do not have a backup power supply for pump, it is necessary to flare embers from the boiler and open the bypass valve, which is connected in parallel with the circulating pump on the piping system.
		It is necessary also that thermal protection if the boiler is connected (see Figure 6, positions 15 and 17) as an additional protection against overheating of the boiler.
Boiler achieves the set temperature, but the radiators do not heat	The pump does not operates, but there is a voltage	The pump is bunt up,. It is necessary to unscrew the cap of the pump and to try to start it with the screwdriver. The producer is not responsible for failures which occurred on circulation pump because it is not the constituent part of the boiler.
	The pump has no voltage	Check pump fuse. The Manufacturer is not responsible for this type of failure.

Table 7 Possible problems during the operation

6. THE FIRST COMMISSIONING



The boiler should be put into operation by a qualified person. If unqualified person performs the putting into operation, there is the possibility of damage and complete destruction of the boiler. Improper handling can cause injuries.

6.1. Requirements for successful commissioning

The following conditions must be met before starting safe putting into operation of the boiler:

TURN OFF THE ELECTRICAL SUPPLY TO THE BOILER

- Is the main switch for power supply to boiler turned off?

CHECK MECHANICAL COMPONENTS OF THE BOILER

- Are all mechanical components properly implemented into the boiler?
- Are all mechanical components properly and firmly fixed to each other?

CHECKING OF PIPING AND INSTALLED COMPONENTS

- Is the circulation pump properly implemented?
- Is the safety valve properly implemented?



Danger!

Risk of electric shock during the connection to circulating pump to electric network.

7. DISPOSAL AFTER END OF LIFE

7.1. Dismantling boiler

**Danger!**

The boiler must be disassembled by a professional.

Material damage and injury can occur if an unprofessional person disassembles the boiler.

Dismantling of the boiler from central heating installations should be performed at following stages:

1. Stop with adding fuel
2. Leave enough time for boiler and the boiler mechanism to burn the remains of fuel and to cool down after that
3. Isolate boiler heating system by closing the valve, and then drain the water from the boiler
4. Demount boiler casing
5. Separate mineral wool from the boiler

7.2. Disposal of boiler

The following components of the boiler are made of steel and must be handed to the centre for collection of secondary raw materials.

- The body of the boiler,
- Casing of the boiler

Glass Braid (located on the door of the boiler), mineral wool and plastic parts, must be separated and handed to the centre for collection of secondary raw materials.



Do not throw the boiler components in the dumpster.

8.WARRANTY

8.1 The warranty period

You have a five-year warranty on the boiler type TKP.

8.2 Conditions of the warranty

- The boiler must be properly installed on central heating installation
- The boiler must be used in accordance with the recommendations stated in this user guide

8.3. The Warranty is not applied to

- The warranty is not valid if the damage is the result of the improper use
- If the installation and putting into operation is performed by an unauthorized persons
- If the service is performed by an unauthorized persons
- If the boiler is not maintained in the compliance with the recommendations written in this guide
- If the damage is caused by natural disasters (earthquakes, floods, fires, lightning, etc.)
- If the unoriginal spare parts are installed
- If there is a power failure, and the circulating pump has no backup power source
- If the failure occur because of the improper installations (circulation pump, expansion, etc.), i.e. of the parts which are not the constituent part of the boiler, but are the condition for the functioning of the boiler.
- Because of improperly or incompletely filled Warranty sheet.