



**SERVICE AND INSTALLATION MANUAL FOR
CENTRAL HEATING BOILER**

BENEKOV R100

Dear customer,

thank you for purchasing the automatic boiler BENEKOV R100 and the confidence in the products manufactured by BENEKOVterm s.r.o., Horní Benešov.

To get used to handling your new product correctly right from the beginning, please read this service manual first. Please pay special attention to chapters 7 and 8. You are kindly requested to follow the instructions mentioned below and to comply with the instruction received from the producer and from the service company that installed the boiler.

This boiler has been approved for operation within the EU by the Engineering Test Institute, s.p. notified person ES 1015, authorized person 202, Brno, certificate no. B-30-00311-14 from 30.4.2014.

In accordance with the Government Order no. 176/2008 Coll., appendix 1, art. 1.7.4, this is the ORIGINAL SERVICE AND INSTALLATION MANUAL.

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1. Description and advantages of the boiler

Use of the boiler:

The BENEKOV R100 hot water boiler is designed for heating of mid-sized structures – shops, school buildings, recreational facilities, office buildings, business premises and other buildings, where a 100 KW heating capacity is sufficient.

BENEKOV R100 boiler is designed for combustion of wooden pellets.

Advantages of the boiler:

- automatic operation
- option of burning renewable energy sources (wooden pellets)
- mechanical fuel supply from the fuel container directly into the combustion chamber
- simple and quick attendance and maintenance
- low operation costs
- low emissions load for the environment
- three-pass boiler body construction ensuring high efficiency
- automatic ignition included in the basic version
- controlled burning operated by a lambda probe
- heat output modulation in whole output range
- the boiler, including the boiler body, consists of several smaller parts, which makes its transportation on-site and installation easier
- up to date design

2. Technical data

Table 1: Dimensions and technical data

Boiler type		BENEKOV R100	
Weight	kg	1470	
Water capacity	dm ³	370	
Chimney diameter	mm	250	
Heat transfer surface	m ²	11,2	
Fuel container capacity	dm ³	500	
Additional fuel container capacity	dm ³	500	
Boiler dimensions: width x depth x height	mm	1752 x 1969 x 2017	
Size of the fuel container filling gap	mm	610 x 1196	
<hr/>			
Class of boiler acc. ČSN EN 303-5		4	
Working water overpressure	bar	2,0	
Tested water overpressure	bar	4,0	
Recommended working temperature of heating water	°C	65 - 80	
Lowest temperature of incoming water	°C	60	
Hydraulic loss of the boiler	$\Delta T = 10 \text{ K}$	mbar	1,5
	$\Delta T = 20 \text{ K}$	mbar	0,4
<hr/>			
Acoustic pressure level Lp _A	dB	50 ± 3	
Chimney draught	mbar	0,25 – 0,35	
<hr/>			
Boiler connectors - heating water	Js	G 2"	

- return water	Js	G 2"
Connecting voltage		1 PEN 230 V / 16 A / ~ 50 Hz, TN-S
Max. electric input (ventilator + worm fuel feeder drive) at nominal power	W	248
Max. electric input (ventilator + worm fuel feeder drive) at minimal power	W	90
Max. electric input (ventilator + worm fuel feeder drive) at STAND BY mode	W	10
Electric protection		IP 20

Table 2: Thermal and technical data of the boiler for combustion of wooden pellets

Boiler type		BENEKOV R100
Nominal power	kW	99
Adjustable power	kW	25 – 99
Fuel consumption	kg . h ⁻¹	6,9 – 23,3
Burning length at nominal power and full container	h	13
Exhaust gas temperature		
- at nominal power	°C	143
- at minimum power	°C	89
Efficiency	%	89
Mass flow rate of exhaust gas at the output		
- at nominal power	kg . s ⁻¹	0,048
- at minimum power	kg . s ⁻¹	0,022

3. Approved fuel

Table 3 states the approved (guarantee) fuel for the BENEKOV R100 boiler.

Table 3: Approved fuel

Type of fuel	Diameter [mm]	Length [mm]	Strewn weight [kg/m ³]	Water content [%]	Ash content [%]	Heating value [ML.kg ⁻¹]
Wooden pellets	φ 6 - 14	max. 30	600 - 650	max. 12	max. 1,5	min. 17

WARNING! Poor fuel quality can significantly impair the efficiency and emission characteristics of the boiler.

The pellets must fulfil standards of norm ČSN EN 14961-2

4. Description of the boiler

4.1. Construction of the boiler

Boiler construction corresponds to the standards and requirements of:

ČSN EN 303-5:2013 - Central heating boilers – part 5: Central heating boilers for solid fuel with manual or automatic supply of fuel with nominal power up to 500 kW - terminology, requirements, proofing and marking.

The main part of the boiler is the steel body which consists of 4 main units:

- combustion chamber
- combustion chamber base
- heat exchanger
- heat exchanger base.

All parts of the boiler body that separate combustibles from heating water and all base bearings are made of 5 mm thick steel plates. In the front part of the boiler body, there is a combustion chamber fitted with a burner, in the back there is a 3-pass heat exchanger. In this device, the heat from the exhaust gas is transferred to the heating water.

The burner, which is fed from the bottom, is located in the mixer and fitted to the side wall of the base. It consists of a cast iron elbow ("retort") and a cast iron grate. The fuel conveyer consists of a fuel feeding channel and a pipe for supply of burning air. Both channels are connected by a flexible piece that serves to balance the pressure under the fire place and prevents the smoke from penetrating back to the fuel container during the burning process.

A ceramic reflector is installed over the burner. This catalyser regulates the exhaust gas stream and reduces dust. Through the side wall of the combustion chamber, secondary air is led into the reflector which facilitates complete burning of fuel.

Next to the boiler, the fuel container is situated, which is connected to the worm conveyor. Its capacity can be extended by installing an additional module (optional). Depending on the position of the container in relation to the boiler, the boiler is produced in two versions:

- **right-handed version** - the container is situated on the right side of the boiler (from the front view)
- **left-handed version** - the container is situated on the left side of the boiler (from the front view)

Behind the fuel container there is an emergency extinguishing system leading into the worm feeder.

The primary combustion air ventilator is placed on the side of the boiler under the fuel container and is connected to the mixer. The air quantity is regulated by the boiler control unit.

Both heating water input and output for connection to the heating system are situated on the outer side of the boiler. There are two outlets with G 2" inner thread. The two outlets with G 3/4" on the same boiler side are intended for installation of drain taps - one for the combustion chamber, one for the tubular heat exchanger. There is a smoke extension piece on the upper rear side of the boiler for the discharge of combustion products into a chimney.

Device for extraction of combustion gases enhances the chimney draught and forms an integral part of the boiler.

The boiler body, its cover, and the door are insulated with an insulation material that has no detrimental effects on health. This insulation diminishes the loss due to heat interchange.

The steel plates are coloured with high quality comaxit paint.

Fig. 1: Basic dimensions of BENEKOV R100 boiler

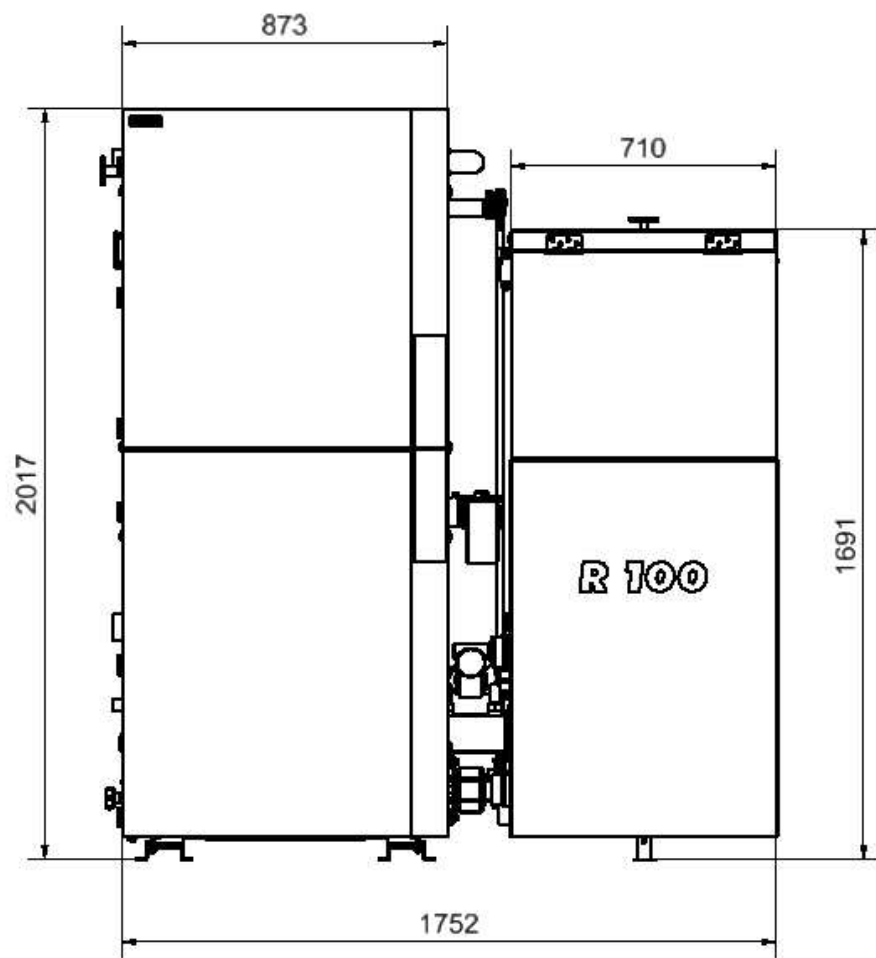
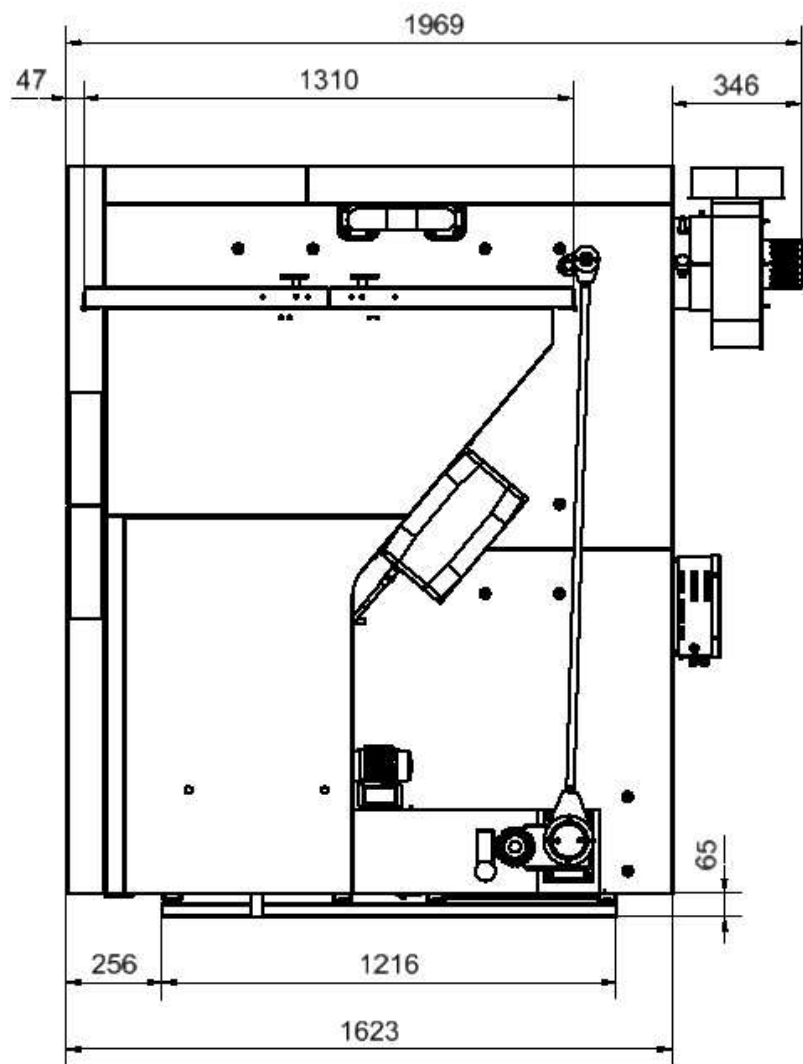
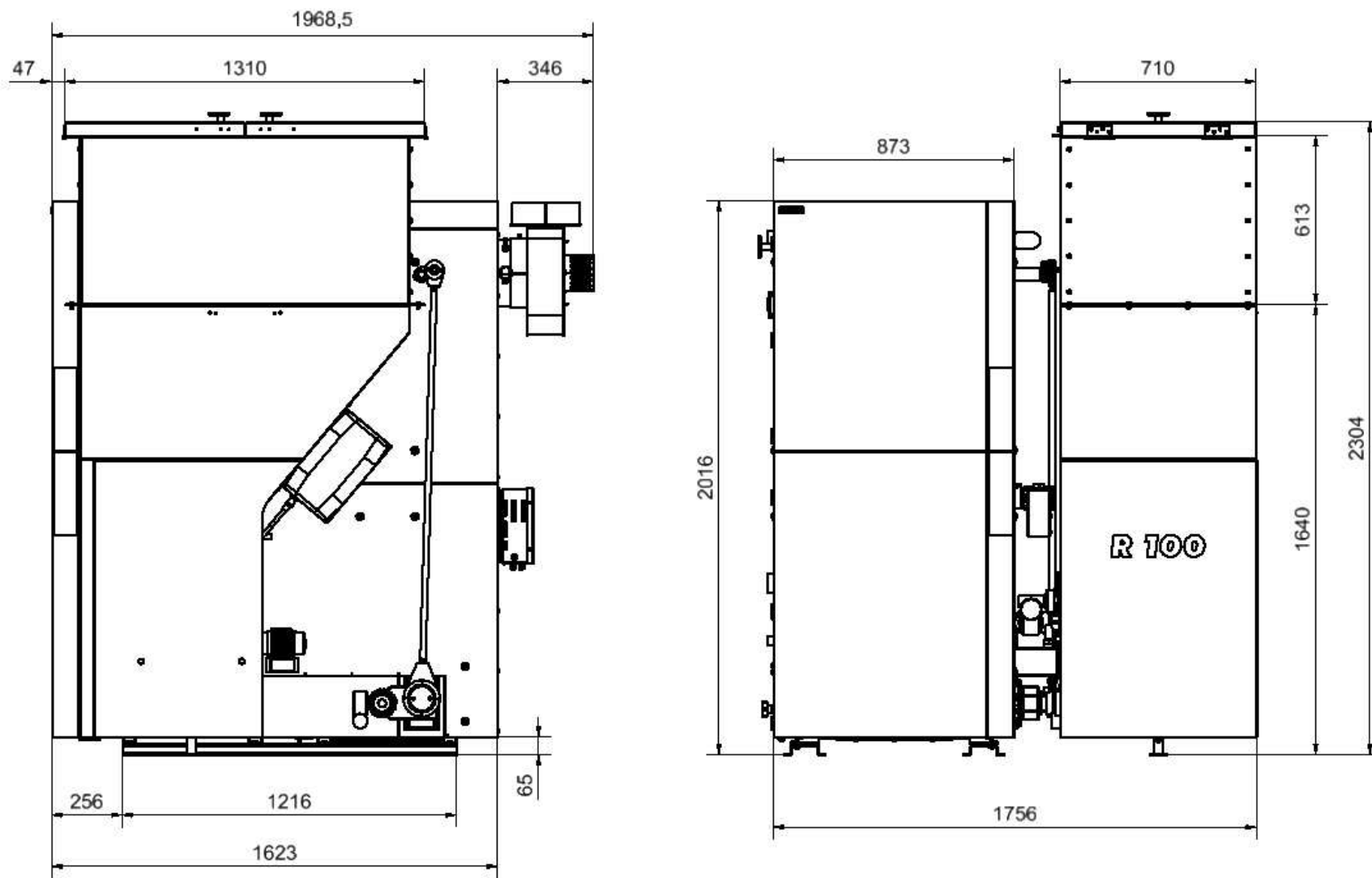


Fig. 2 Basic dimensions of BENEKOV R100 boiler (with additional module of fuel bin)



4.2. Control, regulating and security devices

The boiler is controlled and regulated by the **control unit Siemens Climatix 2** - see separate service instructions.

Security elements that ensure safe operation of the boiler:

- **Safety thermo regulator (safety switch)** is used to prevent the heating system from overheating. In production, the safety switch is set to 95°C, i.e. to a higher temperature than the possible operating temperature of the boiler. The safety thermo regulator is located on the side of the boiler in the control unit switchboard.
- **Thermal overload (motor protection)** is a part of the fuel feeding device drive that protects it from burn off, especially in the case when the feed device is blocked. This element also disconnects the ventilator to prevent fire penetration to the container. During the regular operation, the **temperature of the engine can reach 85°C** - such a temperature is not a sign of breakdown.
- **Turnstile** is a device that mechanically separates the fuel in the container from the fuel in the worm feeder. This technical solution ensures that if the fuel in the worm feeder device starts burning, the fire cannot expand in the fuel container (especially in the case of long time power cut).
- **Emergency extinguishing system** is another security element that prevents fire from expanding in the fuel container. If the temperature at the bottom of the fuel container rises over 95°C, a paraffin plug at the bottom of the container melts and the container is cooled with water from a plastic reservoir. If the boiler is equipped with a thermostatic valve with pressure tank (optional) and the temperature at the bottom of the fuel container rises over 95°C, the thermostatic valve opens and the bottom of the fuel container is filled with water from the water supply system or from the installed water pressure tank.
- **Firing flap** is placed among the second and third pass in the upper part of the boiler body and it regulates the temperature of exhausts on output. During the boiler operation, when the temperature of exhausts rises over 100°C, the firing flap must be closed, i.e. the firing flap adjusting handle on the side of the boiler must be turned in the forward direction (towards you) and secured by means of the locking screw with plastic head. When firing (cold chimney) or in cases when the boiler runs on minimum power over longer periods of time, it is recommended to operate the boiler with the firing flap partly open to prevent the exhaust temperature from dropping below 80°C. In this case, it is necessary to turn the firing flap adjusting handle in the rearward direction and secure by means of the locking screw with plastic head.

4.3. Accessories

Standard accessories:

- Instruction and operation manual with the certificate of warranty
- Instruction and operation manual for the boiler control unit
- List of service centres
- Rotary grate
- Combustion products extraction device
- Automatic ignition
- Ceramic reflector
- Cleaning rake
- Fire extinguishing device with paraffin plug

Optional accessories:

- Fire extinguishing device with thermostatic valve and pressure tank
- Additional module of fuel container
- Indoor thermostat or SIEMENS equithermal regulation

Optional accessories are available for a surcharge!

5. Placing and installation of the boiler

5.1. Regulations and directives

The heating boiler may be installed only by an authorized service company that has been certified for assembly of such devices. A project of the system must be prepared, respecting all valid regulations.

The heating system must be filled with water that matches the standard ČSN 07 7401:1992. Especially the water hardness shouldn't exceed the required parameters.

Table 5: Parameters of the heating water

Parameter	Unit	Value
Hardness	mmol/l	1
Ca ²⁺	mmol/l	0,3
Total Fe + Mn concentration	mg/l	0,3 (recommended value)

A) regulations concerning the heating system

ČSN EN 303-5:2013	Central heating boilers - part 5: Central heating boilers for solid fuel with manual or automatic supply of fuel with nominal power up to 500kW - terminology, requirements, proofing and marking.
ČSN 06 0310: 2006	Heating systems in buildings - projects and installation.
ČSN 06 0830: 2006	Heating systems in buildings - safety devices
ČSN 07 7401: 1992	Water and steam in thermal energetic devices operating with the running pressure to 8 Mpa.

B) regulations concerning the chimney

ČSN 73 4201:2010	Chimneys and smoke flues – projects, realization and connection of fuel appliances.
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C) regulations concerning the fire regulations

ČSN 06 1008:1997	Fire safety of heating installations.
ČSN EN 13 501-1-1+A1:2010	Fire safety classification of construction products and buildings constructions – Part 1: Classification according to results of reaction to fire tests

D) regulations concerning the electrical power network

ČSN 33 0165:1992	Electric regulations. Marking of conductors with colours or numbers. Implementary regulations.
ČSN 33 1500:1990	Electric regulations. Revision of electric appliances.
ČSN 33 2000-1 ed.2:2009	Low voltage electric installations. Part 1: Basic principles, determination of basic characteristics, definitions.
ČSN 33 2000-4-41 ed.2:2007	Low voltage electric installations - Part 4-41: Protection measures to ensure safety – Protection from electrical injury.
ČSN 33 2000-5-51 ed.2:2006	Electrical installations in buildings – Part 5-51: Choosing and building of electrical devices - General principles

ČSN 33 2000-7-701 ed.2:2007	Low voltage electric installations – Part 7-701: Single-purpose appliances and appliances in specific buildings – Spaces with a bath or a shower
ČSN 33 2030:2004	Electrostatics - Protection from the dangerous effects of static electricity.
ČSN 33 2130 ed.2:2009	Low voltage electric installations. Internal distribution of electric power.
ČSN 33 2180:1979	Electrotechnical regulations of ČSN. Connecting electric devices and appliances.
ČSN 33 2350: 1982	Electrotechnical regulations. Regulations for electrical devices in complicated climatic conditions.
ČSN 34 0350 ed.2:2009	Electrotechnical regulations. Regulations for the movable cables and for cables.
ČSN EN 55 014-1 ed.3:2007	Electromagnetic compatibility – Requirements for appliances for households, electrical gadgets and similar equipment – Part 1: Emissions
ČSN EN 55 014-2:1998	Electromagnetic compatibility – Requirements for appliances for households, electrical gadgets and similar equipment – Part 2: Resistance – Product group related standards
ČSN EN 60079-14 ed.3:2009	Explosive atmospheres - Part 14: Project, choice and realization of electrical installations
ČSN EN 60335-1 ed.2:2003	Electrical appliances for household and similar purposes - Safety - Part 1: General requirements
ČSN EN 60335-2-102:2007	Electrical appliances for household and similar purposes – Safety - Part 2-102: Special requirements concerning appliances for combustion of gas, oil or solid fuel equipped with electrical connections
ČSN EN 60445 ed.3:2007	Basic safety principles for the human-machine interface, marking and identification – Marking the appliance terminals and conductor ends
ČSN EN 60445 ed.2:2011	Basic safety principles for the human-machine interface, marking and identification – Marking of conductors with colours or letters and numbers
ČSN EN 61000-3-2 ed.3:2006	Electromagnetic compatibility (EMC) - Part 3-2: Limits – Limits for emissions of harmonic current (appliances with input phase power ≤ 16 A)
ČSN EN 61000-3-3 ed.2:2009	Electromagnetic compatibility (EMC) - Part 3-3: Limits – Limiting the voltage changes, voltage fluctuation and flicker in distribution networks for appliances with rated phase current ≤ 16 A which is not subject to a conditional connection

E) regulations concerning noise

ČSN EN ISO 3746:2011	Acoustics – Determining of levels of acoustic output and levels of acoustic energy of noise sources using acoustic pressure – Operating method with measuring cover area above the reflecting plane
ČSN EN ISO 11202:2010	Acoustic – Noise emitted by machines and appliances – Determining the levels of emitted acoustic pressure on the operator post and other defined places using approximate environment corrections

F) concerning machinery

ČSN EN 614-1+A1:2009	Machinery safety – Principles of ergonomic design - Part 1: Terminology and general principles
ČSN EN 953+A1:2009	Machinery safety – Safety covers – General requirements concerning construction and production of fixed and movable protective covers

ČSN EN 1037+A1:2008
ČSN EN ISO 12100:2011
ČSN EN ISO 13857:2008

Machinery safety – Preventing unwanted start
Machinery safety - Basic definitions, general principles of construction
Machinery safety – Safe distances to prevent contact of upper or lower extremities with dangerous places

5.2. Placing of the boiler

Location of the boiler with respect to power supply:

- The boiler must be placed so that the plug in the socket (230V/50 Hz) is always accessible.
- The boiler is connected to the electric power network with a tight connected cable terminated with a plug (according to the standards).
- Protection against electric shock must be ensured in compliance with the valid ČSN EN standards (see chapter 5.1.)

Location of the boiler with respect to fire regulations:

1. Location on a fire resistant floor

- Place the boiler on a fireproof, thermally insulating surface that overreaches the base of the boiler in all directions by at least 20 mm.
- If the boiler is placed in the cellar it is recommended to place it on a bedding (at least 50 mm high). The boiler has to be horizontally well-balanced, eventual unevenness can be adjusted with the help of the adjustable stand under the fuel container.

2. Safety distance from flammable materials

- During the installation and operation of the boiler, the safety distance between the outer surface of the boiler including the smoke duct and flammable materials (see detailed specification in ČSN EN 13 501-1+A1:2010) must be at least 400 mm.

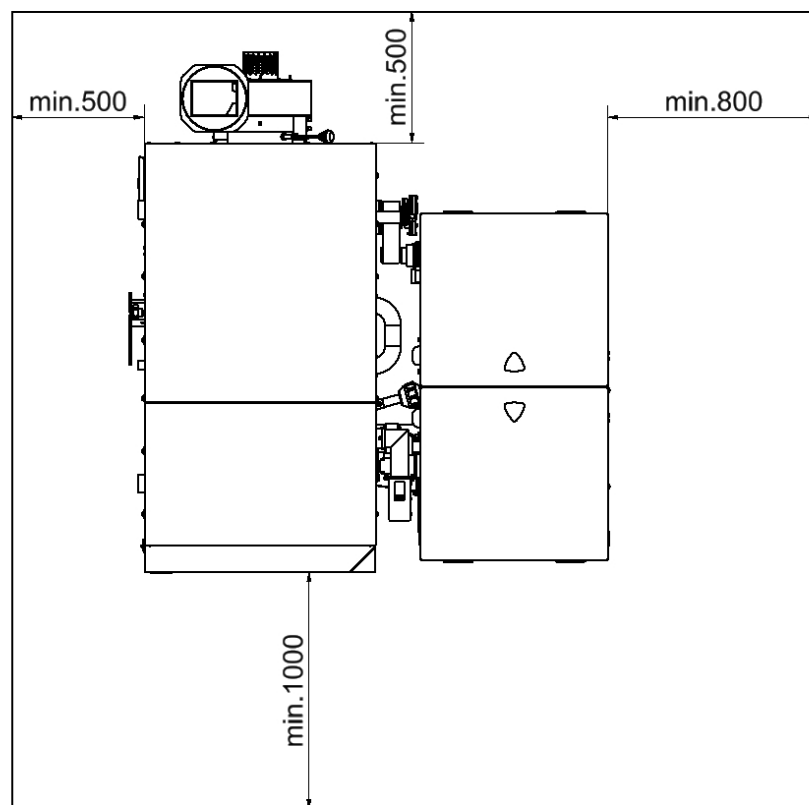


Fig. 4 Placing of boiler in the fire room

Placing of the boiler according to the required free space:

- basic environment AA5/AB5 according to ČSN 33 2000-1 ed.2:2009
- in front of the boiler, a manipulation area of at least 1000mm is required
- the minimum distance between the back side of the boiler and the wall is 500 mm
- a distance of 800 mm between the wall and the side of the boiler with the fuel container is needed to enable removal of the worm feeder
- at the side of the boiler body, there must be a handling area at least 500 mm so that cleaning of convective areas of the boiler body is possible
- above the boiler, at least 500 mm of free space is required so that cleaning of convective area of the boiler body is possible

Placing of the boiler with respect to the chimney:

- BENEKOV R100 boiler is connected to the chimney with a metal pipe of 250 mm diameter.

Fuel storage:

- It is recommended to store the pellets in original packings (PET or “big bags”) in a dry place.
- it is forbidden to store the fuel behind the boiler or next to the boiler in a distance shorter than 400mm
- the producer recommends to store the fuel at least 1000 mm from the boiler or to store it in a separate room

Permanent air circulation for burning and ventilation must be provided in the room where the boiler is installed. Air consumption of BENEKOV R100 boiler at nominal power is approximately $300 \text{ m}^3 \cdot \text{h}^{-1}$

Connection of the pipeline of the heating system or pipeline of the heating element must be carried out by a certified person.

WARNING: When the boiler is connected to the heating system, the drain tap must be placed as low and as near to the boiler as possible.

6. Installation - instructions for the contract service company

The heating boiler must be installed only by an authorized service company that has been certified for assembly of such devices.

6.1. Connectors of electrical wiring

During the installation, it is not necessary to interfere with the electrical wiring of the boiler control unit in any way. All the inlets for electrical wiring for all electrical parts of the boiler as well as its additional devices are placed in the connectors which allow easy connection to or disconnection from the switchboard of the boiler control unit.

Depending on the type and equipment of the boiler, the following connectors may be placed on the boiler and marked with icons:



- connector of the fuel feeder drive



- ventilator drive connector



- water circulating pump connector



- de-asher connector



- extraction of combustion gases connector



- automatic ignition connector



- indoor thermostat connector or equithermal regulation connector



- ignition sensor connector



- lambda probe connector



- limit switch of the fuel container cover

Free plug contacts (e.g. for connecting the indoor thermostat, circulation pump etc.) are delivered in a pack inside the boiler. Before startup, these have to be installed on the switchboard, even if they are not used.

When installing the connectors, it is necessary to make sure that the right connectors are connected – i.e. it is only allowed to connect plug contacts and plugs with identical symbols.

Prior to connecting the room thermostat or equithermal regulation, it is necessary to remove the jumper from the connector plug. Only a thermostat with a free non-potential contact (e.g. SIEMENS, HONEYWELL CM...) can be connected to the room thermostat or equithermal regulation contact. No foreign voltage may be connected to the terminals.

6.2. Connecting the boiler to the heating system

Description of fig. 4:

1. outlet of combustion gases in the chimney
2. outlet of heating water from the boiler
3. inlet of heating water in the boiler (return)
4. inlet and outlet of combustion chamber
5. inlet and outlet of heat exchanger

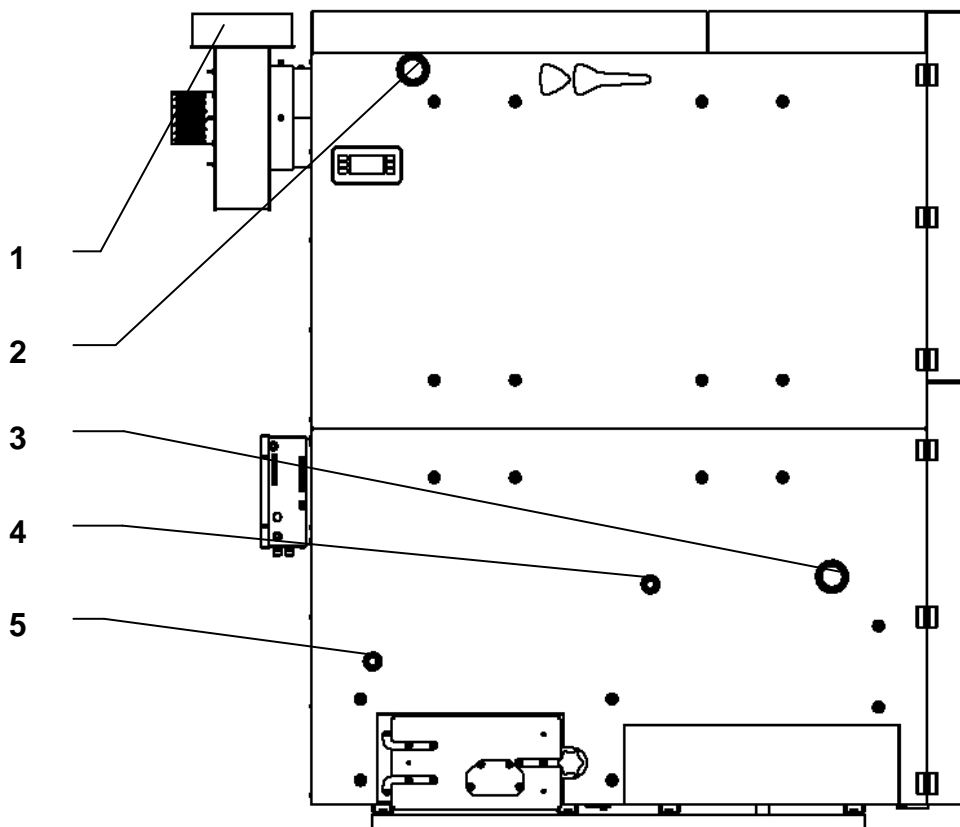


Fig. 5 Inlets and outlets of BENEKOV R100 boiler

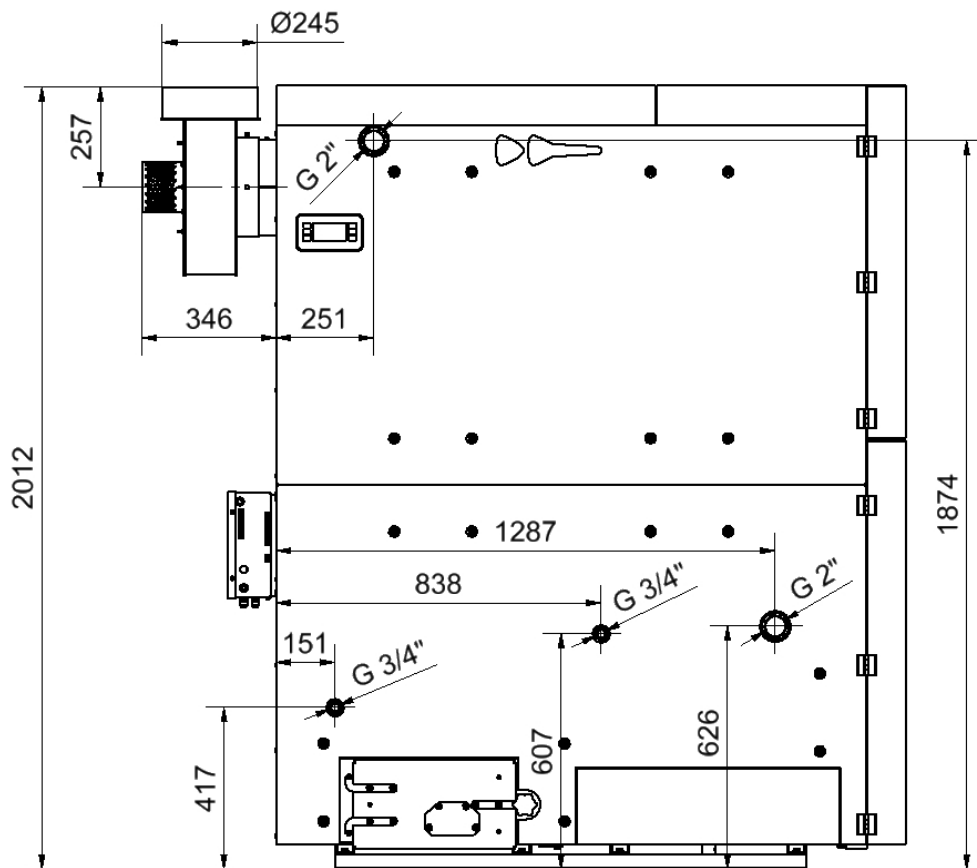


Fig. 6 Connecting dimensions of BENEKOV R100 boiler

6.3. Installing the ceramic parts

Fig 7 displays the positioning of ceramic parts in the combustion chamber, i.e.:

- place the ceramic reflector assembly (2, 3 and 4) into the combustion chamber over the burner (1) so that the central hole in the reflector is flush with the burner. The side of the ceramic reflector with hole (2) must be on the right side for the right-handed version and on the left side for the left-handed version (front view). The secondary air inlet (pos. 5) can then be inserted from the boiler side in the inner cavity of the ceramic reflector and pushed all the way in.
- place the 2 pieces of ceramic plates (6) onto the upper beams of the combustion chamber (pos. 7), securing them to each other by means of the provided locks and push the whole assembly towards the rear side of the combustion chamber.

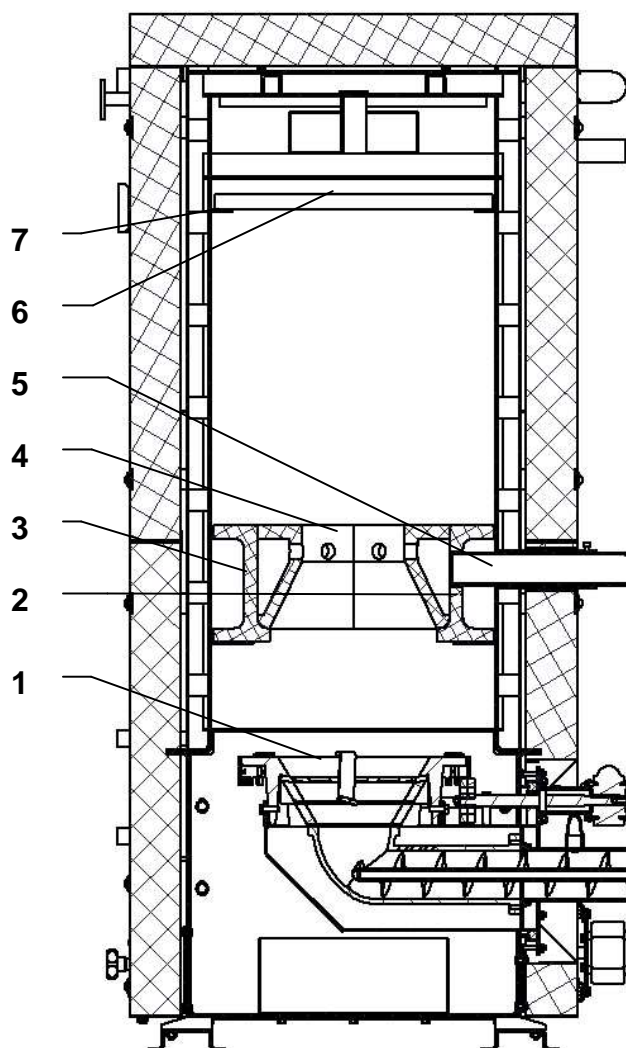


Fig. 7 Sectional view of the combustion chamber

Fig. 6 - description:

1. burner
2. side of the ceramic reflector with opening
3. side of the ceramic reflector without opening
4. ceramic reflector body (2 pcs)
5. secondary air inlet
6. ceramic plate (2 pcs)
7. upper beams

6.4. Check before use

Before the boiler is set into operation it is important to carry out/check the following:

- a) filling of the heating system with water

Necessary to ensure thorough filling the boiler and the entire heating system water and its proper venting. When filling the boiler heating water should be kept in mind that the boiler body is composed of two interconnected vessels (combustion chamber + exchanger), so you need to fill both of these vessels separate holes – see fig. 5, poz. 4 a 5.

The water used in the heating system must be clear and colourless, without suspended substances, oils and chemically aggressive substances. The water hardness must satisfy the standard ČSN 07

7401:1992 and if the hardness of the water doesn't conform to this standard the water must be treated. Even repeated warming of water with higher water hardness doesn't improve its quality and doesn't prevent appearance of salts on the surface of the heat-exchanger. A calc layer of 1 mm reduces the exchange of heat by approximately 10%.

Heating systems with open expansion tank enable direct contact of the heating water with the atmosphere. During the heating season the water in this open expansion tank absorbs the oxygen which subsequently supports the corrosive effect and at the same time the vaporisation of the heating water increases. To make up for a loss of water, it is recommended to use treated water acc. to the standard ČSN 07 7401:1992. Moreover, it is important to rinse the system to wash away all impurities.

During the heating period it is important to keep a constant volume of water in the heating system. When the heating system has to be refilled with water, it is necessary to take care that no air enters the system. The water from the boiler and from the heating system mustn't be used for any other purpose and it is recommended not to discharge the water from the system without a serious reason (repairs etc.). Draining the water and filling the system with new water increases the risk of corrosion and formation of scale.

Water may be refilled only when the boiler is cool. This prevents damage to the steel heat-exchanger.

- b) make sure that the heating system does not leak
- c) connection to the chimney – must be approved by a chimney service company
- d) connection to the electrical power network

The sockets should be connected with the earthing contact at the top and the phase wire on the left side (front view). The same applies to double sockets.

Installation and stoking test must be recorded in the certificate of warranty.

6.5. Boiler startup

1. If the boiler is equipped with the fire extinguishing device with paraffin plug, fill its tank with water.
2. If the boiler is equipped with fire extinguishing device with thermostatic valve and pressure tank, proceed as follows to put the system in operation:
 - a) remove the black plastic cap from the valve on the bottom of the pressure bottle
 - b) by means of a compressor or an air pump, pressurize the pressure bottle to 0,5 bar
 - c) screw the black plastic cap back onto the valve on the bottom of the pressure bottle
 - d) connect the fire extinguishing system to the water supply system
3. Heat up in the boiler.
4. Bring the boiler to the working temperature. The recommended working temperature of the output water is 65–80°C.
5. Check again the tightness of the boiler.
6. Carry out the stoking test according to the appropriate norms (see Certificate of warranty)
7. Inform the user about the boiler attendance - see chapter 7.
8. Make a record in the Certificate of warranty.

7. Attendance by the user

7.1. Heating up in the boiler

- 1) Check the quantity of water in the heating system.
- 2) Check that the stop valves between the boiler and the heating system are opened.
- 3) Check that the water circulating pump is working correctly.
- 4) Clean the burner and the bottom of the combustion chamber.

- 5) Fill the container with the specified fuel - see chapter 3. Then **close the container carefully** to prevent the intake of false air in the burner through the feed worm.
- 6) Connect the boiler to the electrical power network (230V/50Hz) with the cable and the plug.
- 7) **If the boiler is equipped with automatic ignition**, don't take further steps as the Boiler Control Unit analyses the state of the boiler and takes further steps such as heating etc. (see the separate Instruction Control Unit user's manual). During heating up and subsequent operation of the boiler, the fire door must be closed.
- 8) **If the boiler is not equipped with automatic ignition**, it is necessary to heat the boiler manually (see the separate Boiler Control Unit users' manual). Use the manual mode on the Control Unit to transport the fuel to the combusting area. Leave the worm feeder switched on until the fuel appears in the burner (approx. 1 cm under the grate rim). Then switch off the worm feeder, place some kindling (paper, dry wood chips, solid alcohol or some other fire lighter recommended for these purposes) on the top of the fuel, set it alight and wait until it begins to burn (1-2 min.) Then add a small amount of specified fuel and switch on the ventilator. If the fire extinguishes, repeat the whole process. Close the door and let the fire begin to burn (3-5 min).

7.2. Operation of the boiler

After the fuel begins to burn, the boiler switches to automatic operation (see the separate Control Unit user manual) during which the ventilator and the cycling of the worm feeder are in operation. The main information about the heating is shown on the display of the Control Unit.

In case of blackout of the supply voltage (230 V, 50 Hz), the Instruction Control Unit keeps in memory the last data and after the voltage recovery, it returns to the previous state.

If the temperature of the heating water rises over 95°C, the emergency thermo regulator begins operation and, independently of the Control Unit, the boiler will be cut off. The Control Unit then displays overheating of the boiler.

The emergency thermo regulator can only be switched on again after the temperature sinks about 20°C below the set temperature. In this case, unscrew the black cap on the emergency thermo regulator and press the red switch. Then return the black cap to its position.

To prevent an undesirable switching of the emergency thermo regulator, it is recommended to operate the boiler at a maximum output water temperature lower than 80°C.

In case of frequent switching off, the boiler must be shut down and the cause of repeated overheating must be established.

7.3. Boiler shutdown

Before the boiler is shut down, burning fuel must be ejected from the burner to the ashtray manually by means of the worm conveyor. This operation is not necessary in case of short time repairs and if the operator is present.

In case of a shut down longer than 12 hours (e.g. cut out), **the container must be emptied** and if there is a possibility that the water in the emergency extinguishing system can freeze, it is necessary to empty the pressure tank as well.

IMPORTANT WARNINGS:

- **This appliance cannot be operated by persons (including children) who are not physically, sensorially or mentally fit to do so and have insufficient knowledge and experience needed in order to operate the boiler safely.**
- **Children must not be left unattended in the proximity of a running boiler.**
- **Due to danger of explosion or fire hazard caused by entry of flammable vapours in the fire room, during any works that involve use of flammable substances (gluing of PVC, painting with flammable paint etc.) the boiler must be shut down.**

- **When fuel is transported to the combustion chamber before ignition, it is necessary to perform a visual check only. Inserting hands in the worm feeder is forbidden as it may result in injury!**
- **It is forbidden to use flammable liquids for firing.**
- **If boiler uses the automatic ignition it is necessary to keep the fuel level in the fire grate before the ignition process max. at the same level as upper rim of fire grate and the fuel cannot cover the ignition tube. In any case there could be the danger of explosion inside the combustion chamber.**
- **The fire in the boiler may be observed through the control window in the upper part of the fire door. If it is necessary to open the door during the operation of the boiler (for example when the ash has to be removed from the ashtray) please keep in mind that it means an increased risk of sparks and smoke being released into the fire room. In such case the door must be closed immediately and properly. Opening of the door during operation must be done carefully, that means to open it slightly, wait until the combustion products release from the combustion chamber and only then open it fully.**
- **During the operation of the boiler, it is necessary to keep the container closed.**
- **The fuel in the container must not reach higher than 30 mm under the lower rim of the filling gap to ensure proper closing of the container.**
- **It is strictly forbidden to overheat the boiler.**
- **It is forbidden to lay flammable objects on the boiler or next to it closer than the prescribed safe distance (see chapter 5.2.).**
- **During cleaning of the ashtray, no flammable materials should be within 1500 mm of the boiler. The ash has to be stored in non flammable bins with a cover.**
- **During the operation of the boiler at temperatures lower than 60°C, the iron boiler body grows damp and low temperature corrosion occurs which shortens the service life of the boiler. That's why the boiler must be operated at the temperatures higher than 60°C.**
- **After the end of the heating season the boiler and the chimney must be cleaned carefully. The fire room must be kept clean and dry.**
- **It is strictly forbidden to tamper with the construction and electrical system of the boiler.**

7.4. Residual risks and their prevention

The risks connected to regular operation of the boiler as well as to logically foreseeable incorrect operation was minimized using available technical solutions.

Despite the technical and construction-related measures carried out, the operation of the boiler bears residual risks determined by means of a risk analysis. These risks are the result of the technological process during different phases of the device service time.

In particular, these risks are a result of carelessness during boiler attendance or a failure to comply with the safety instructions during operation.

To further decrease these risks and make the operation even safer, the following list contains an overview of residual risks which no technical solution can remove.

a) Electrical risks

- connection, maintenance and repair of electrical parts of the boiler can be carried out only by qualified workers and in compliance with current technical regulations and standards
- power supply installation must be in line with the current regulations
- the power cord and boiler electrical installations must be checked regularly and kept in a proper state
- if any damage occurs to the electrical equipment, it is necessary to shut down the boiler, disconnect in from the power supply and provide qualified service
- it is forbidden to tamper with the connections of the safety circuits or carry out any unauthorized changes that could have impact on safety and reliability of the device

b) Heat risks

- the boiler must not be subjected to a higher working overpressure than stated

- it is forbidden to overheat the boiler
- the boiler must be protected from corrosion caused by low temperature of returning water by means of a suitable connection with automatic temperature control of returning water
- only listed fuel can be combusted in the boiler
- it is forbidden to store combustible materials near the boiler
- it is necessary to minimize the risk of ignition of the fuel container by suitable setting of attenuation parameters
- when operating the boiler, it is necessary to pay maximum attention to heat sources as they may cause burns

c) Risks connected to manipulation with fuel

- during manipulation with fuel, solid particles are emitted. Therefore, the operator should, depending on the degree of dustiness, use suitable protective equipment.
- because of the risks connected to manipulation with fuel, it is necessary to comply with applicable fire regulations and a fire extinguisher must be available

d) Ergonomic risks

- the boiler must be in a horizontal position
- it is forbidden to insert hands in the worm conveyor
- during operation of the boiler, all doors, covers and guards must be closed properly

8. Boiler maintenance

- 1.) It is important to refill the fuel in time. As soon as there is only a small amount of fuel in the container, it must be refilled immediately to prevent false air or smoke from entering the container.
ATTENTION: The lid of the fuel bin must be closed properly.
- 2.) If the boiler is well-adjusted, the ash appears in the form of a fine powder which falls in the ashtray. As the combustion area has a self cleaning function, the ashtray needs to be emptied only once a week during regular operation. Use protective gloves for this activity.
- 3.) If the boiler runs continuously, it is recommended to clean the heat transfer surface of the body of the boiler once a month. The heat exchange surfaces become contaminated in course of the operation, which may significantly impair the heat transfer and the efficiency of the boiler. It is also important to clean occasionally (once a month) the inner part of the grate as any possible sediments influence negatively the flow of air in the burner nozzles. It is recommended to shut down the boiler (switch off the main switch) at least 1 hour before cleaning of the inner part of the grate is carried out. After the heating season the boiler must be completely cleaned.
- 4.) Minerals contained in the wooden pellets can form crusts on the grate, which may lead to a complete blockage of the worm-gear-system. To avoid this it is recommended that the burner area be checked at least once a month and any hard sediment on the grate be removed manually.
- 5.) Further, it is recommended that the outside of the gear engine and the ventilator be cleaned with a dry brush from time to time. **During the cleaning, the boiler must be disconnected from the electrical power.**
- 6.) A heat-resistant ceramic reflector and ceramic plates are installed over the burner. There is no special care demanded. Ash may appear on the surface of the reflector, which can be removed, but it does not impair the function of the device.
- 7.) The engine is protected against damage with a thermo contact that ensures the protection against burn off especially if the feed device becomes blocked (**regular temperature of the engine can reach 85°C**). In case of overheating (if the critical temperature was exceeded) the thermo contact shuts down the engine and the ventilator. In such a case, it is necessary to switch off the boiler, clear the fuel from the container via the discharging gap and eliminate the fault. **WARNING: before**

starting any work on the boiler, check that it is disconnected from the electrical power (the plug is pulled out of the socket).

- 8.) As the function of the ventilator can result in a slight overpressure in the burner area, keep in mind that the boiler must be tightly closed (fire door, upper cover, cleaning gap of the feeder, container cover etc.).
- 9.) **If the boiler is equipped with the fire extinguisher with paraffin plug**, make a visual check of the emergency extinguishing system from time to time and refill water if necessary.
- 10.) **If the boiler is equipped with the fire extinguishing system with the thermostatic valve and pressure bottle**, and if an emergency situation occurs (longer power failure etc.) and the fuel in the fuel container starts burning, the increased temperature will cause the thermostatic valve to open and the fire will be extinguished with water from the water supply system or from the installed water pressure tank.
 Before the boiler is put into operation again, it is necessary to remove wet fuel, fill the water pressure bottle and heat the boiler as described in 7.1.
 If the water pressure tank is a part of the emergency extinguishing system, the air pressure in the tank must be checked at least once a year. To this end, remove the cap of the valve at the tank and using a common manometer, check the pressure. If the pressure is not sufficient, adjust it to 0,5 bar with an air pump or a compressor.
- 11.) The worm feeder drive gear and the turniket drive gear are filled with synthetic oil from the production and further maintenance is not required.

9. Troubleshooting

If problems with operation of the boiler appear, try one of the following solutions:

SYMPTOM	REASON	SOLUTION
The display shows no data.	The boiler is not connected to the network.	Connect the boiler to the electrical power network (230V/50Hz) with appropriate cable with plug.
	Malfunction of the boiler controller.	Change the controller for a new one.*
The worm feeder doesn't work.	The cable of the engine is disconnected / damaged.	Connect the engine / change the cable to the engine.*
	The engine is damaged.	Change the engine.*
	The engine was overheated and the thermal protection was activated.	Let the engine cool down, after cooling the engine will start again.
The thermal protection of the engine was activated repeatedly.	The worm feeder is blocked (stone, etc.)	Dismantle the worm feeder and remove the problem. Re-assemble the device.*
	In the fuel there is a great amount of dust.	Remove the inappropriate fuel from the boiler; fill the container with the specified fuel.
The boiler drive is working, but the worm feeder doesn't work	The elastic pin between the worm feeder and the drive rod was cut.	Remove the rest of the broken pin and install a new one (8x45, ISO 8752).
The worm gear is moving but the fuel is not being transported	There is no fuel in the container.	Fill the container with recommended fuel.

	The worm gear is worn out.	Change the worm gear.*
The boiler ventilator doesn't work.	The cable of the ventilator has been disconnected / damaged.	Connect (change) the cable to the ventilator.*
	The ventilator is broken.	Change the ventilator.*
The ventilator is noisy.	The ventilator is full of dust.	Clean the ventilator.*
	The ventilator bearing is worn out.	Change the whole ventilator.*
During the boiler modulation at the lowest output, the ventilator does not turn.	The set values of ventilator speed (revolutions) are too low.	Increase the values of the ventilator turns so that continuous operation of the ventilator is ensured.
The water from the emergency extinguishing system runs in the fuel container.	The fuel has burnt off in the fuel container and the thermostatic valve was opened.	Remove the wet fuel from the boiler, refill the container with the new fuel and put the boiler into the operation.
The water from the emergency extinguishing system drops in the fuel container.	The paraffin plug is not tight.	Change the thermostatic valve.
Water drops appear on the walls of fuel container.	Wet fuel is used in the boiler.	Fill the container with dry fuel.
	Low temperature in the fire room (12°C and less).	It is necessary to ensure higher temperature of the fire room (insulation of fire room walls, installation of a heating body in the fire room etc.)
The boiler can't reach the full nominal capacity.	The time from the firing was too short.	Let the boiler fire up properly.
	The fuel dosage is adjusted to a lower capacity.	Set up the fuel dosage according to the manual to the Instruction Control Unit.
	Different fuel than recommended was used (high humidity, lower heating power etc.).	Fill the container with appropriate fuel.
The exhaust gas temperature is higher than is recommended in the user's manual.	The boiler is coated with smoke particles.	Clean the heat transfer surfaces
	The boiler is overheated.	Adjust the fuel dosage according to the Instruction Control Unit manual.
	High chimney draught.	Install a draught limiter at the chimney (this activity can be maintained by the service company only).

	The ceramic reflector is not installed in the boiler.	Install the ceramic reflector according to the user's manual.
	The firing flap in the boiler is open.	Using the handle of firing flap and cleaner, close the firing flap and secure it with the locking screw with plastic head.
Smoke appears in the fire room or in the fuel container.	Low chimney draught.	Ensure the inspection of the chimney draught at the service chimney company. If the draught value is lower than the required value (see users manual) the adjustment of the chimney is required.
	Fire door and/or the upper boiler cover and/or the fuel container cover are not closed properly.	Close the fire door and/or the upper cover of the boiler and/or the fuel container cover.
	The sealing gasket at the fire door or at the upper boiler cover was worn out/damaged	Change the sealing gasket.*
	The rubber sealing of the fuel container cover is damaged.	Change the rubber sealing.*
	The fuel container is empty.	Fill the fuel container with fuel.
The boiler is coated with smoke particles in a short period of time.	Low amount of agitated air.	Raise the ventilator capacity (see Instruction Control Unit manual).
	The boiler is repeatedly overheated	Set the boiler capacity to the nominal capacity (see Instruction Control Unit manual).
	The grate is full of dust and ash.	Clean the grate.
	The ventilator is broken.	Change the boiler ventilator.*
The ash on the grate forms clogs.	Recommended fuel was not used for burning.	Fill the container with appropriate fuel (see chapter 3).
A great quantity of unburned fuel appears in the ashtray.	The fuel dosage is wrong.	Lower the dosage of fuel in the burner (see the Instruction Control Unit manual).
	The fuel used for burning is wet.	Fill the container with appropriate (dry) fuel.
	The power of the ventilator is wrongly set and the stream of air blows the fuel out of the burner.	Lower the ventilator speed (see Instruction Control Unit manual).

* - this activity can be maintained only by an authorized service company certified by company BENEKOVterm s.r.o..

10. Instructions for long-term keeping of ecological parameters of the boiler

For fully ecological running of the boiler, it is important to keep the provisions of this manual, in particular:

- Burn only a fuel the parameters of which are guaranteed by its producer and comply with the requirements listed in chapter 3.
- Fully keep the provisions of chapters 7 to 9.

11. Instructions for disposal after service life

Keeping in mind that the boiler is made of common steel materials, it is recommended to dispose of its parts in the following way:

- | | |
|--------------------------------|--------------------------------|
| - Boiler, covers | - through the company KOVOŠROT |
| - Other steel parts | - through the company KOVOŠROT |
| - Insulating material SIBRAL | - in the common waste |
| - Insulating material ORSIL T | - in the common waste |
| - Insulating material TECHROCK | - in the common waste |

12. Warranty and the liability for defects

The producer provides a guarantee for the boiler for a period for 24 months from the date of sale to the final user on condition that the boiler will be used and operated in accordance with the instructions contained in the manual.

The user is obliged to entrust the installation of the boiler, its putting into service and removal of defects which exceed the range mentioned in chapters 7 and 8 only to an authorized service company that is certified by BENEKOVterm s.r.o. Otherwise, the guarantee of proper function of the boiler becomes invalid.

An important condition for the guarantee to be valid is connection of the boiler to the heating system in such way that the temperature of the return water is controlled automatically and does not fall under 55-60°C. This condition can be fulfilled by using a mixing valve with servo drive, a thermo valve (such as ESBE TV) etc. A solution based on knowledge of the complete heating system should be proposed by a qualified person.

If the boiler is operated according to the instructions mentioned in this "Operation and installation manual", no special service is needed.

When the "Certificate of quality and completeness of the BENEKOV boiler" is completed by the service company, it serves also as the certificate of warranty.

The boiler should be maintained regularly - see chapter 8.

Under no circumstances is the producer responsible for loss of profit, good reputation or contracts or for any accidental, special or subsequent damages that occur in connection with use or impossibility to use this product.

Each defect must be reported in written form as well as by phone immediately after its detection. When placing a complaint, it is always necessary to state the product number of the boiler.

If the instructions contained in this manual are not followed, the guarantee becomes invalid.

The guarantee does not cover those cases that originated in the incorrect attendance of the device, failure to comply with the technical conditions of operation, common wear, voluntary damage and damage that occurred as a result of irreversible and uncontrolled event (fire, flood, burglary, violent waste, etc.).

The certificate of warranty must be filled in by the seller to become valid.

The producer reserves the right to introduce changes as a result of innovation of the product that are not mentioned in this manual.

NOTICE

Please, send the completed certificate of warranty for the producer of BENEKOV R100 boiler to the address below:

BENEKOVterm s.r.o.
Masarykova 402
793 12 Horní Benešov
Czech Republic

User/customer supplement to the certificate of warranty

Record of the validated guarantee and post-guarantee repairs and about action taken

Record date	Action taken	Service company (signature, stamp)	Signature of the customer

Declaration of conformity of boiler BENEKOV R 100

Prohlášení o shodě

v souladu s ust. § 13 odst. 2 zákona č. 22/1997 Sb., o technických požadavcích na výrobky, v platném znění a podle ust. § 13 nařízení vlády č. 163/2002 Sb., kterým se stanoví technické požadavky na vybrané stavební výrobky, v platném znění

Firma: **BENEKOVterm s.r.o.**
Masarykova 402, 793 12 Horní Benešov, Česká republika
IČO: 25839811, DIČ: 358-25839811

Jako výrobce výrobku: **Kotel teplovodní automatický na dřevěné pelety**
BENEKOV R100

Popis a určení funkce výrobku: Automatický teplovodní kotel s ocelovým svařovaným výměníkem, litinovým hořákem se spodním přívodem paliva, šnekovým podavačem a vestavěným zásobníkem paliva. Palivem pro tyto kotle jsou dřevěné pelety. Kotel BENEKOV R100 je určen pro vytápění objektů s tepelnými ztrátami do 99 kW.

Prohlašuji a potvrzuji, že:

- posuzování shody bylo provedeno postupem stanoveným v ust. § 7 nařízení vlády č. 163/2002 Sb., v platném znění na základě dokumentu ZÁVĚREČNÝ PROTOKOL o počáteční zkoušce typu výrobku č. 30-12200/3 ze dne 30. 4. 2014 s platností do 30. 4. 2016.
- norma určená k posouzení shody: ČSN EN 303-5 Kotle pro ústřední vytápění a další technické předpisy: ČSN 06 1008, ČSN EN ISO 11202, ČSN EN ISO 3746, ČSN EN 15036, ČSN EN 60335-1 ed.2, ČSN EN 60335-2, ČSN EN 62233, ČSN ISO 80000.
- Strojírenský zkušební ústav, s.p., Hudcova 424/56b, 621 00 Brno, autorizovaná osoba 202, která vydala ZÁVĚREČNÝ PROTOKOL o počáteční zkoušce typu výrobku č. 30-12200/3 ze dne 30. 4. 2014.
- vlastnosti výrobku splňují základní požadavky podle nařízení vlády č. 163/2002 Sb., konkretizované určenou normou ČSN EN 303-5 a požadavky jiných technických předpisů, že výrobek je za podmínek obvyklého, výrobcem určeného použití bezpečný.
- výrobce přijal opatření, kterými zabezpečuje shodu všech výrobků uváděných na trh s technickou dokumentací a se základními požadavky.

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Leopold Benda,
jednatel společnosti BENEKOVterm s.r.o.

V Horním Benešově dne 2. 5. 2014

Original ES declaration of conformity of boiler BENEKOV R 100

Původní ES prohlášení o shodě

Výrobce: **BENEKOVterm s.r.o.**
Masarykova 402, 793 12 Horní Benešov, Česká republika
IČO: 25839811, DIČ: 358-25839811

Osoba pověřená kompletací technické dokumentace a oprávněná vypracovat ES prohlášení:
Leopold Benda
Masarykova 402, 793 12 Horní Benešov, Česká Republika

Výrobek: **Kotel teplovodní automatický na dřevěné pelety**

Typové označení: **BENEKOV R100**

Popis a určení výrobku: Automatický teplovodní kotel s ocelovým svařovaným výměníkem, litinovým hořákem se spodním přívodem paliva, šnekovým podavačem a vestavěným zásobníkem paliva. Palivem pro tento kotel jsou dřevěné pelety. Kotel BENEKOV R100 je určen pro vytápění objektů s tepelnými ztrátami do 99 kW.

Výrobce prohlašuje, že výrobek splňuje všechna příslušná ustanovení:

- Směrnice Evropského parlamentu a Rady 2006/42/ES (nařízení vlády č. 176/2008 Sb. o technických požadavcích na strojní zařízení)
- Směrnice Evropského parlamentu a Rady 2006/95/ES (nařízení vlády č. 17/2003 Sb. o technických požadavcích na elektrické zařízení nízkého napětí)
- Směrnice Evropského parlamentu a Rady 2004/108/ES (nařízení vlády č. 616/2006 Sb. o technických požadavcích na výrobky z hlediska jejich elektromagnetické kompatibility)

Výrobce také prohlašuje, že přijal opatření, kterými zabezpečuje shodu všech výrobků uváděných na trh s technickou dokumentací, se základními požadavky na výrobek a se schváleným typem.

Seznam harmonizovaných a ostatních norem použitých při posuzování shody:

ČSN EN 303-5:2013, ČSN EN 614-1+A1:2009, ČSN EN 953+A1:2009, ČSN EN 1037+A1:2008, ČSN EN ISO 12100:2011, ČSN EN ISO 13857:2008, ČSN EN ISO 3746:2011, ČSN EN ISO 11202:2010, ČSN 33 0165:1992, ČSN 33 1500:1990, ČSN 33 2000-1 ed.2:2009, ČSN 33 2000-4-41 ed.2:2007, ČSN 33 2000-5-51 ed.2:2006, ČSN 33 2000-7-701 ed.2:2007, ČSN 33 2030:2004, ČSN 33 2130 ed.2:2009, ČSN 33 2180:1979, ČSN 33 2350:1982, ČSN 34 0350 ed.2:2009, ČSN EN 55 014-1 ed.3:2007, ČSN EN 55 014-2:1998, ČSN EN 60079-14 ed.3:2009, ČSN EN 60335-1 ed.2:2003, ČSN EN 60335-2-102:2007, ČSN EN 60445 ed.3:2007, ČSN EN 60445 ed.4:2011, ČSN EN 61000-3-2 ed.3:2006, ČSN EN 61000-3-3 ed.2:2009, ČSN 06 1008:1997, ČSN EN 13 501-1+A1:2010, ČSN 73 4201:2010, ČSN 06 0310:2006, ČSN 06 0830:2006, ČSN 07 7401:1992

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