



# **BIOLOGICAL TREATMENT PLANT BioC 6**

Installation and maintenance manual



EN 12566-3

# TABLE OF CONTENTS

## TABLE OF CONTENTS

BIOLOGICAL TREATMENT PLANT BioC 6 .....	4
INSTALLATION OF THE BIOLOGICAL TREATMENT PLANT .....	5
Infiltration system .....	7
Infiltration system set.....	8
Size of the infiltration system .....	8
INFILTRATION TUNNEL.....	9
MANAGEMENT OF THE BIOLOGICAL TREATMENT PLANT .....	10
MAINTENANCE OF THE BIOLOGICAL TREATMENT PLANT.....	12
Regular maintenance of the biological treatment plant .....	12
SAFETY REQUIREMENTS .....	15
DRAWINGS .....	16
WARRANTY CONDITIONS.....	17
MAINTENANCE JOURNAL OF THE BIOLOGICAL TREATMENT PLANT.....	18
APPENDIX 1.....	20

The biological treatment plant BioC 6 corresponds to the EU standard EN 12566-3 for small wastewater treatment systems and has a CE marking.

**The set includes:**

- Biological treatment plant BioC 6 1200×3100mm
- 600×500 chamber for the air pump and electronics
- Air pump Hiblow HP-60
- Pre-programmed electronics of the pump

If you wish, you can order **the control/distribution well**.

**Biological treatment plant data:**

BioC 6	Units	Value
People		Up to 10
Amount of sewage	m <sup>3</sup> /per day	0.75
Electricity consumption	kWh/per year	260 (308 when using phosphorus separation)
Electrical connections		230 V (50 Hz) / 10 A
<b>Treatment results</b>		
BOD <sub>5</sub>	mg/l	98.5%
COD	mg/l	96.1%
SS	mg/l	97.1%

	
KLAASPLAST OÜ Kuke talu, Kolu küla, Kose vald Harjumaa 75121 Eesti 16	
<b>EN 12566-3</b> Small wastewater treatment systems: packaged and/or site assembled domestic wastewater treatment plants	
Fiberglass biological treatment plant BioC 6 <b>Serial number – xxxx-xxx</b>	
Nominal size: Waterproof: Soil pressure test: Hydraulic efficiency:	2.84 m <sup>3</sup> Passed Passed BOD (98.5%) COD (96.1%) SS (97.1%)

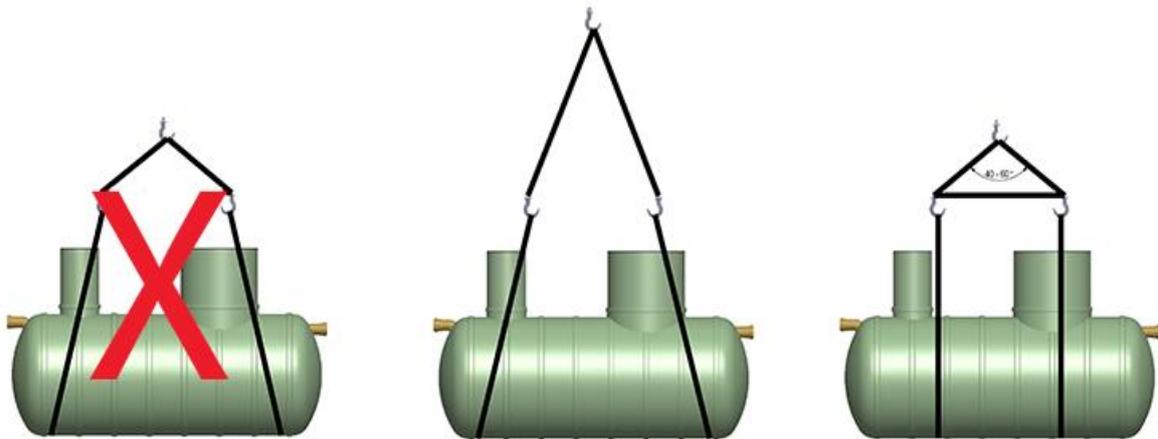
## **BIOLOGICAL TREATMENT PLANT BioC 6**

BioC 6 is a wastewater treatment plant produced by Klaasplast OÜ designed to clean up the everyday wastewater of up to 10 people. The BioC 6 biological treatment plant is ideal for private homes and small businesses that do not have a central wastewater treatment facility. After wastewater treatment, purified water can be drained into an infiltration field, infiltration tunnel, water bodies, and rainwater drainage system or used as technical water.

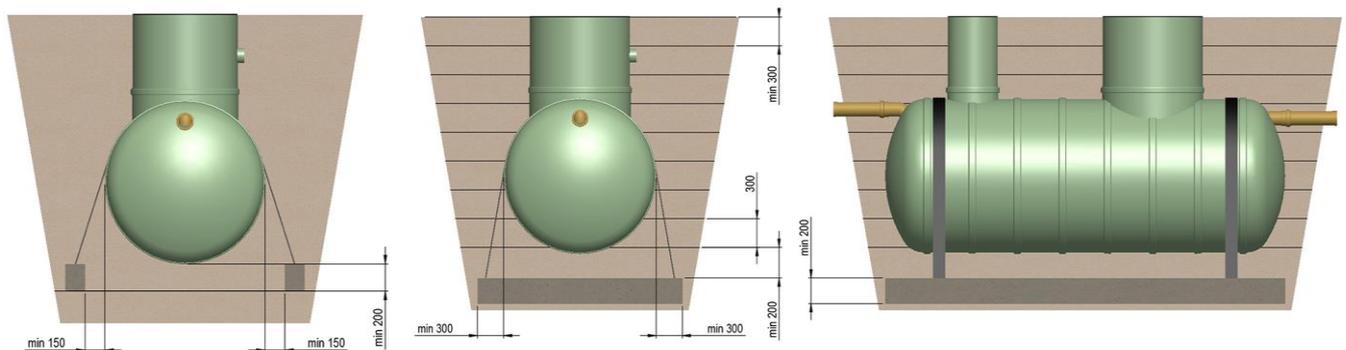
Wastewater treatment is carried out biologically. Sewage microorganisms decompose waste, which results in wastewater being cleaned. The biological treatment process is based on bacteria that feed on a wide range of biological and chemical compounds in the sewage. The wastewater product consumed by the bacteria is broken down onto the bottom of the treatment plant as sludge, which is occasionally removed from the treatment plant. The viability and reproduction of the bacteria are ensured by wastewater aeration. This method makes it possible to clean the wastewater almost perfectly. The infiltration of cleaned water into the soil does not damage groundwater.

# INSTALLATION OF THE BIOLOGICAL TREATMENT PLANT

Take care not to damage the biological treatment plant during its transport and installation. As a rule, BioC6 is installed to the depth of the sewage drainage pipe exiting the building. The inclination of the sewage pipe between the building and the biological treatment plant must be 1–2 cm/m. The sewage pipe must be of the stiffness class SN8.



*Lifting the biological treatment plant*

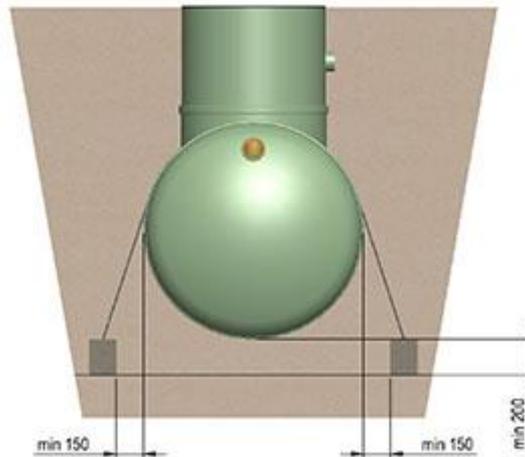


*Anchoring the biological treatment plant*

- ✓ The bottom of the pit where the biological treatment plant is installed must be filled with a 30 cm layer of sand.
- ✓ The biological treatment plant is placed on the pillow of sand in the pit. If the anchoring method is used for installation, a 25 cm pillow of sand is left between the concrete plate and the treatment plant to be installed. The biological treatment plant must not be installed directly on concrete and the pillow of sand must not contain larger stones.
- ✓ The biological treatment plant is self-anchoring. If the plant is installed in dry soil, it does not need to be anchored. The biological treatment plant is always full of water. The weight of the water keeps the plant underground. If it is installed in a soil with a high groundwater level, there is a risk of the treatment plant rising to the ground level. To prevent the plant from rising to the ground, the plant is attached to a concrete plate or concrete blocks with load-bearing straps. The straps must be placed so that they cannot slip off the ends of the body of the treatment plant. The risk of the treatment plant rising to ground level is especially high during draining.
- ✓ When the biological treatment plant and the chamber have been placed in the pit, the area

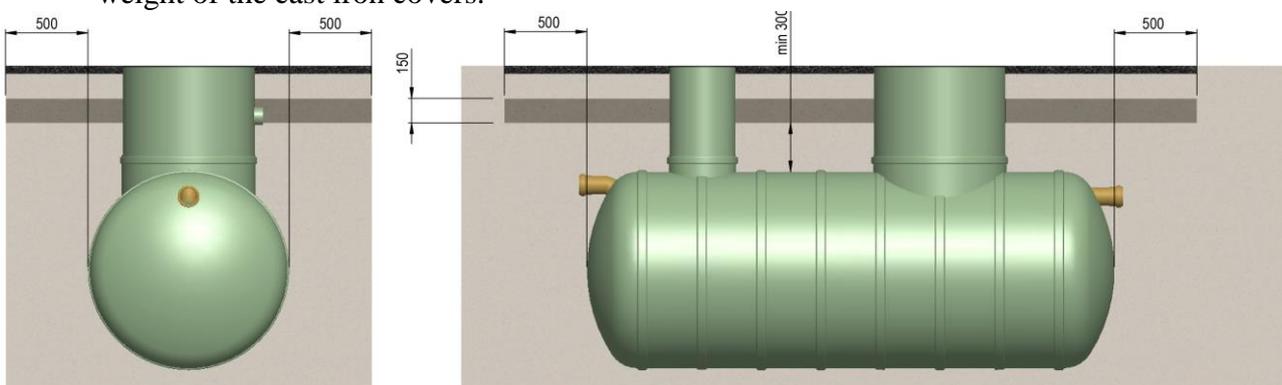
around them must be filled with compressed layers of sand of 30 cm up to the pipe connections, while filling the treatment plant with water. Filling with water will keep the biological treatment plant in place and prevent its sinking.

When the area around the biological treatment plant has been sealed with compressed sand up to the pipe connections, the piping must be connected to the treatment plant. The area around the pipes will be sealed with compressed sand.



*Installation of the biological treatment plant with sleepers*

- ✓ After the pipes are connected, the pit is filled layer by layer and the protruding ends of drainage pipes are cut off at the ground level.
- ✓ A wire is led from the electronics chamber to the switchboard or a damp-proof socket. If the wire must be extended, use a 3×1.5 cable that is intended for outdoor use.
- ✓ When installing the biological treatment plant, the chamber is connected to the electronics and the biological treatment plant to a 110 mm SN8 pipe. Three hoses from the biological treatment plant are led through the pipe. The hoses are numbered and fit into the pipes in the chamber with quick couplings.
- ✓ If the biological treatment plant is installed under an area where vehicles drive, the thickness of the filling layer over the tank must be at least 300 mm. On top of this, a concrete load equalisation plate with a thickness of 150 mm should be installed or cast and reinforced according to the gravity affecting the plate. The load equalisation plate must exceed the diameter and length of the tank by at least 1000 mm. In the case of installation under a roadway, the tank must always be equipped with cast iron manhole covers. It is important to ensure that the edges of the maintenance chamber and service shaft would not bear the weight of the cast iron covers.



*Installing the biological treatment plant under asphalt*

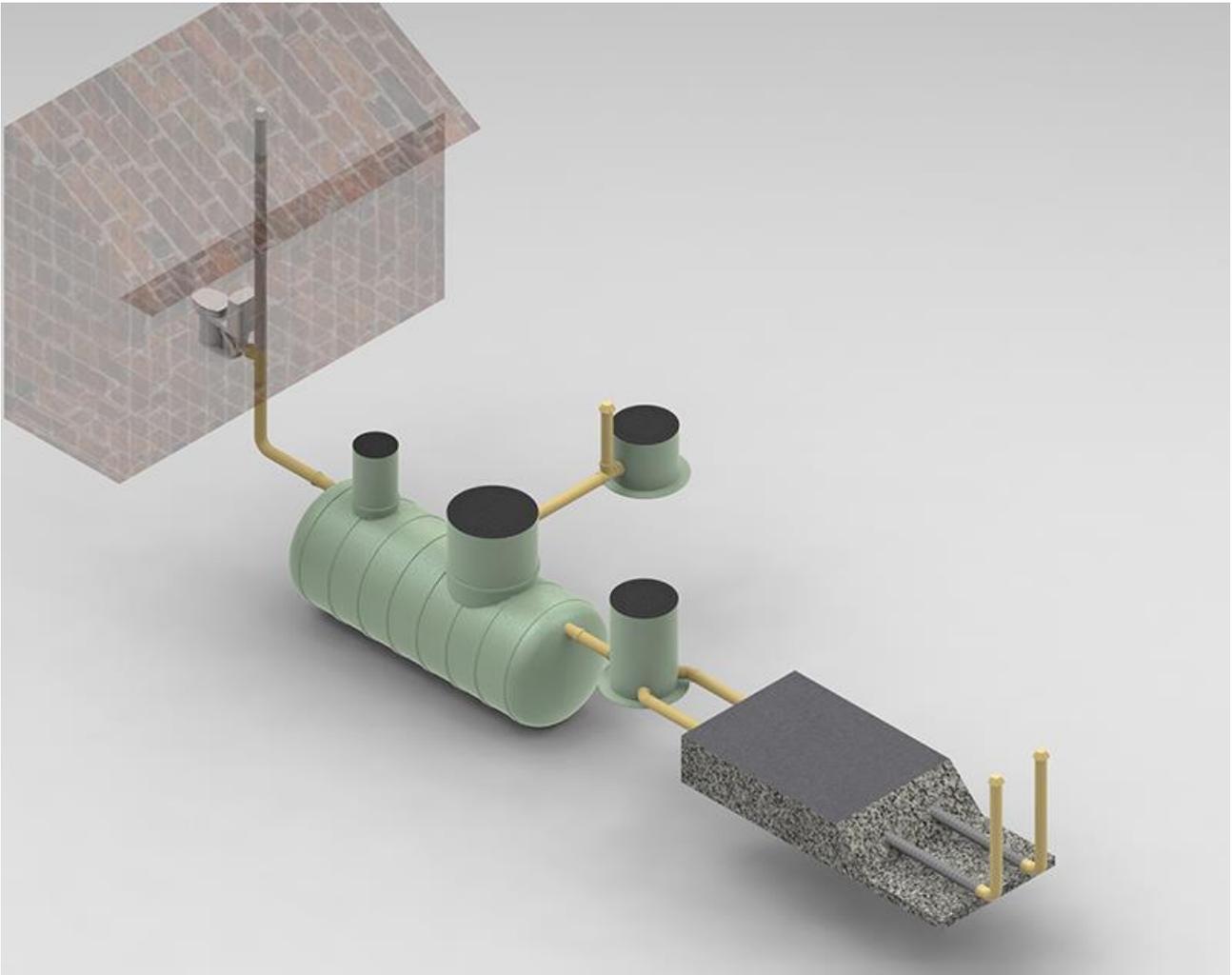
## WARNING!

**Do not enter the pit without need! Cave-ins of the walls of the pit may cause serious injuries.**

There are two ways to lead excess water into the soil: an infiltration system and an infiltration tunnel.

## **Infiltration system**

An infiltration field is a system of infiltration pipes buried in gravel, through which treated water is led from the biological treatment plant into the soil.

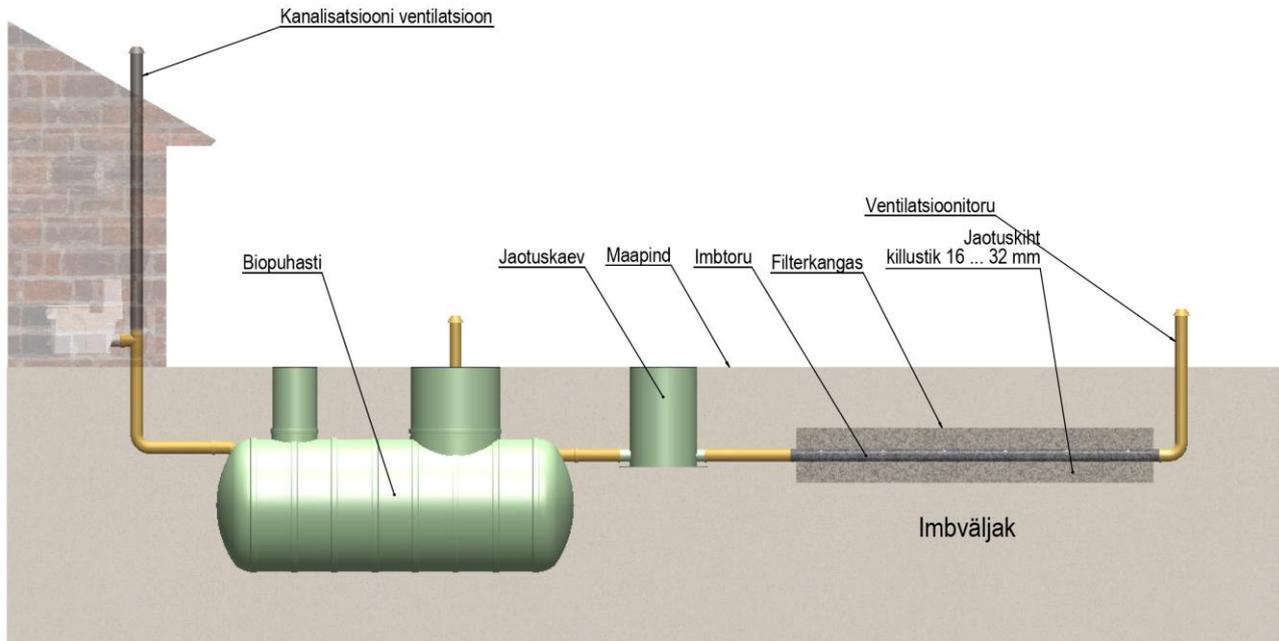


*Biological treatment plant with the infiltration system*

- ✓ The average depth of the ditch of the infiltration field is 0.3–1.25 m and the width of the bottom of the ditch is 0.9 m. In the case of digging parallel ditches, the distance between the infiltration pipes must remain between 1.5–2m. If the infiltration pipes are placed in one ditch, the distance between the pipes may be 1 m.
- ✓ When ditches are levelled, the bottoms of the ditches are filled with a layer of gravel that is 25 cm thick (fraction 16–32 mm).
- ✓ The gravel that is left under and on the sides of the infiltration field must be rinsed with water before closing the pit to remove limestone dust from the gravel. If limestone dust is not removed, it forms a cemented layer under the infiltration field, which will considerably decrease the capacity of the system on infiltrating liquids into the soil.
- ✓ The infiltration field is connected to the pipe exiting the biological treatment plant by using a collection chamber, elbows and corners.
- ✓ The infiltration pipes are interconnected with sleeves and the pipes are given a uniform

inclination in the length of the infiltration system, which must be 5–10 mm/m. The infiltration pipes are covered with gravel from the sides and on top. At the end of the infiltration ditch, at least a 10 cm layer of gravel must be left under the infiltration pipe.

- ✓ At the end of the infiltration system, the pipes are connected to ventilation ducts with elbows.
- ✓ The gravel-covered infiltration system is covered entirely with geotextile to prevent the filling soil getting mixed up with gravel.
- ✓ The ditches are filled with soil.



*Biological treatment plant with the infiltration field*

On the figure:

- Kanalisatsiooni ventilatsioon – sewage ventilation
- Biopuhasti – biological treatment plant
- Jaotuskaev – distribution well
- Maapind – surface
- Imbtoru – infiltration pipe
- Filterkangas – filter fabric
- Jaotuskiht, killustik 16 ... 32 mm – Distribution layer, 16 ... 32 mm
- Ventilatsioonitoru – Ventilation duct

## **Infiltration system set**

The infiltration system set includes:

- ✓ infiltration pipes
- ✓ geotextile fabric
- ✓ branching
- ✓ SN8 110mm elbows
- ✓ 110mm vent caps
- ✓ SN8 110mm ascension pipes

## **Size of the infiltration system**

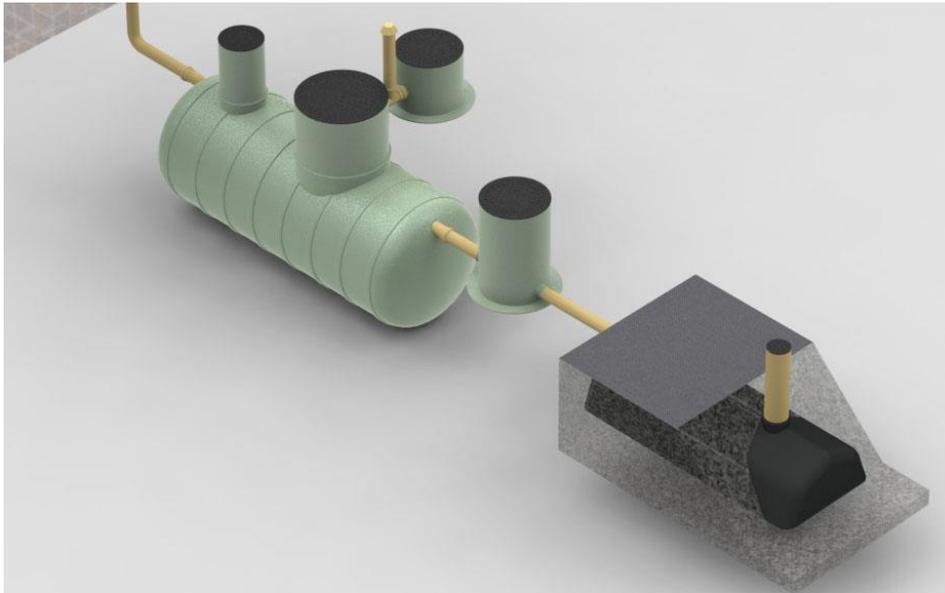
Size of the infiltration system for the biological treatment plant:

- ✓ 3m<sup>3</sup> biological treatment plant BioC 6 – 2×9m

## INFILTRATION TUNNEL

Selecting the location for the tunnel, the following things have to be taken into consideration: the distance from a cellar, the level of surface water, and existing or planned trees.

The distance from the cellar must not be less than six metres and the height from the surface water must be at least 30 cm. The distance of the infiltration tunnel from trees must be as far as the circumference of the crown of the tree.



*Biological treatment plant with the infiltration tunnel*

The requirements listed below must be kept in mind when installing the infiltration tunnel:

- ✓ Maximum short-term load-bearing capacity 7.5 t/m<sup>2</sup>. Long-term, max 3.5 t/m<sup>2</sup>
- ✓ Minimum thickness of the covering layer under a road without traffic is 25 cm
- ✓ Minimum thickness of the covering layer under a road with traffic is 50 cm
- ✓ Maximum installation depth is 2 m
- ✓ Installation of incoming water pipes and inspection/ventilation ducts
- ✓ The water pipe entering the infiltration tunnel is attached to the end plate. To do this, cut the corresponding hole into the end wall. The incoming water pipe must extend through the end wall by approximately 20 cm.
- ✓ To attach the ventilation duct, you must use the openings on top of the tunnel.
- ✓ The bottom of the pit must be levelled with about a 10 cm layer of sand. Then, the pit must be filled with gravel (fraction 16/32 mm), on top of which the infiltration tunnel is placed.
- ✓ The gravel left under and on the sides of the infiltration tunnel must be rinsed with water before closing the pit to remove limestone dust from the gravel. If limestone dust is not removed, it forms a cemented layer under the infiltration tunnel, which will considerably decrease the capacity of the infiltrating tunnel on impregnating liquids into the soil.
- ✓ In order to prevent dirt and soil flowing back into the infiltration tunnel, geotextile fabric must be wrapped around the infiltration tunnel with at least a 30 cm overlap at both ends of the fabric as well as at the infiltration tunnel. Then, the ditch must be refilled layer by layer.
- ✓ If grass is sown on top of the infiltration tunnel, waterproof fabric or a 10 cm layer of clay must be laid over it to prevent the grass above it from drying faster than the rest of the lawn.
- ✓ The ventilation ducts of the infiltration tunnel must reach enough from the ground that they remain above snow level in winter.

# MANAGEMENT OF THE BIOLOGICAL TREATMENT PLANT

## **Initial start-up of the biological treatment plant BioC 6:**

Make sure the biological treatment plant is installed and connected to the power supply according to the installation instructions. Pay particular attention to the electrical connections: the end of the wire coming from the treatment plant must be properly connected. Before switching on the biological treatment plant, make sure that it is full of water and that the air pump in the electronics chamber is plugged in. If these conditions are met, the fuse of the biological treatment plant can be switched on in the switchboard. If the biological treatment plant is located far from the switchboard, the biological treatment plant may also be plugged into the wall outlet, observing that the wall outlet is in a shaded and moisture-proof place. After the biological treatment plant is supplied with electricity, it will start to work. Since the biological treatment plant is programmed to work at intervals, the bubbling sound might not be heard immediately. The longest 'rest' period of the biological treatment plant is 15 minutes.

**ATTENTION!**  
**If no bubbling sound is heard from the biological treatment plant within 30 minutes after switching it on, contact the manufacturer.**

When the bubbling sound starts, switching on the biological treatment plant has been successful. If the product is in the 'work' cycle, remove the covers from the biological treatment plant and check that the air circulation is steady. Steady air circulation occurs when air bubbles are running under the large and small cover. Under the smaller cover, the mixture of water and air from the pipe must run towards the dividing wall. Under the larger cover, air bubbles must rise from the bottom of the treatment plant to the surface. The air circulation can be adjusted from the valve (the middle one) located in electronics chamber, which can be regulated only with the approval of the manufacturer. The valves are set to the correct positions by the manufacturer.

## **Turning off the biological treatment plant BioC 6.**

The biological treatment plant can be turned off in two ways:

- Turning off the biological treatment plant in the switchboard or removing the treatment plant's plug from the wall outlet
- Removing the power cord of the air pump from the socket in the electronics chamber.

## **Why turn off the biological treatment plant?**

The biological treatment plant must be turned off during regular maintenance and emptying.

**Phosphorus separation.**

The biological treatment plant has the option of ordering phosphorus separation by chemical means. To separate the phosphorus, a chemical that binds phosphorus in wastewater is pumped through the pre-programmed pump into the middle chamber of the treatment plant. The chemical that is dosed into the treatment plant is PAX XL100. The average daily consumption is 57ml. **In Estonia, the separation of phosphorus from sewage is not mandatory.**

**Control valves.**

There are three air valves in the electronics chamber that control the operation of the biological treatment plant.

- **Valve No. 1** – airflow into the diffuser. Always open by default.
- **Valve No. 2** – airflow to the sludge lift. Half open by default. Adjustable so that the diffuser and the sludge lift would both work with equal pressure.

**Valve No. 3** – airflow through the solenoid into the cleaning pipe. Open by default (operating 6min per day)

## MAINTENANCE OF THE BIOLOGICAL TREATMENT PLANT

- ✓ **When to clean** – the biological treatment plant must be emptied when the amount of sludge exceeds 70% of the capacity or when cloudy water appears in the inspection chamber installed to the treatment plant. Cloudy water means that the treatment plant is full of sludge and is no longer able to function effectively.
- ✓ **Emptying** – when emptying, it is recommended to leave 1/3 of the sludge in the middle chamber of the treatment plant, which ensures that the bacteria remain in the treatment plant. Only the first and middle chambers of the biological treatment plant are emptied. There is no need to empty the third chamber.
- ✓ **Who will empty?** – To empty the biological treatment plant, you need to order a wastewater tanker, which will suck the treatment plant empty. In order to find a district service provider, it would be wise to turn to the local government who can certainly refer you to the right service provider.
- ✓ **Bacteria** – there is no need to add bacteria to the treatment plant upon installation. Bacteria will form in the treatment plant in approximately 2 months after the treatment plant has been taken into use.
- ✓ **Air pump** – to ensure a long life and uninterrupted work of the air pump, the air filter must be cleaned 6 months after launching the pump for the first time. The air filter must be replaced once per year.  
**Electronics** – the functioning of the pump and the solenoid valve are controlled by a pre-programmed programming clock. The programming clock includes an integrated battery, which ensures preserving of the programme even in the case of a power cut.
- ✓ **Infiltration of water into the soil** – infiltration of the infiltration system can be checked through the ventilation ducts. If water can be seen through the ventilation ducts, the infiltration pipe is overgrown or the infiltration capacity of the soil has considerably dropped. Infiltration ducts must be cleaned once in ten years. Avoid planting big-rooted plants on the infiltration field. In winter, care must be taken to prevent ventilation ducts from being buried under snow. It is not recommended to clear the area above the infiltration field from snow.
- ✓ **Do not dump into the waste water treatment system** – for effective functioning of the wastewater treatment plant, pieces of cloth, female hygiene products, paper tissues, food waste, and other waste must not be dumped into the sewage system. Oils, fertilisers, paints, solvents, or other substances that may affect the biological process in the wastewater treatment plant must also not be dumped into the sewage.

### Programming of the programming clock

The table of cycles is provided in Annex No. 1.

### Regular maintenance of the biological treatment plant

Frequency of inspection	Inspect	In order	Failure	Action in the case of failure
Once per month	Visual inspection 600 mm from the well cover to see whether the water and air circulation is working. (the aeration must work at the time of the inspection)	Continuous water flow from the pipe into the middle aeration chamber. Water does not go to the first settling chamber.	Missing or disrupted water/air flow	Blow through the pipe with the maximum amount of air. For this, you need to adjust the valve No. 2. Close the valves No. 1 and No. 3 and open the valve No. 2 as much as possible. If the water and air do not start to flow, the pipe must be flushed with clean water and repeat the maximum

				air application with valves.
	Visual inspection of the aeration chamber (middle chamber) 800 mm from the well cover during the work cycle of the treatment plant	An active water and air circulation is taking place in the chamber. A large amount of small air bubbles	No circulation. Partial water and air circulation with large air bubbles	Adjust the valves in the electronics chamber. If the error persists, contact the manufacturer's maintenance team.
	Visual inspection 800 mm from the cover to the last chamber	A floating waste is absent or there is little of it	A large amount of floating waste on the surface of water	In the electronics chamber, activate the solenoid and its valve manually (when the pump is running) for 5 minutes. Close the remaining valves. The solenoid is activated manually from the programming clock. As a result of the operation described, the floating waste is pumped back into the aeration chamber. After performing this operation, restore the previous setting of the valves.
	Visual inspection of the phosphorus separation chemistry canister (if phosphorus separation is used)	Liquid level > 20% of the canister capacity	Liquid level < 20% of the canister capacity	Fill the canister with the chemical PAX-100
	Inspection of the air pump filter. Remove the air pump cover (it is shut with a screw)	Filter is clean	Filter is dirty	Clean or replace the air filter
Once in three months	Settled sludge inspection. Inspected in a clear container after a 20-minute setting. The container is filled up with a sample taken from the middle aeration chamber	Sediment volume < 70%	Sediment volume > 70%	Remove all sludge from the first chamber of the biological treatment plant and to the extent of 2/3 of the middle aeration chamber. After emptying, refill the treatment plant again with clean water

- ✓ **Emptying** – only the first and middle chamber of the biological treatment plant are emptied (2/3). The third chamber is not emptied. To empty the biological treatment plant, you need to order a wastewater tanker, which will suck the treatment plant empty. In order to find a district service provider, it would be wise to turn to the local government who can certainly refer you to the right service provider. When the biological treatment plant is emptied and refilled with water, it must be turned off. Before emptying, the biological treatment plant must be turned off for 30–45 minutes so the sludge would settle to the bottom. When emptying the biological treatment plant, care must be taken to prevent the end of the drain hose from damaging the equipment and pipes in the treatment plant
  - ✓ **Bacteria** – there is no need to add bacteria to the biological treatment plant upon installation. Bacteria will form in the treatment plant in approximately 2 months after the treatment plant has been taken into use.
  - ✓ **Air pump** – to ensure a long life and uninterrupted work of the air pump, the air filter must be cleaned 6 months after launching the pump for the first time. The air filter must be replaced once per year.
- Electronics** – the functioning of the pump and the solenoid valve are controlled by a pre-programmed programming clock. The programming clock includes an integrated



- battery, which ensures preserving of the programme even in the case of a power cut.
- ✓ **Measuring the volume of sludge** – The volume of excess sludge or mixture can be measured with a sedimentation flask (1,000 ml) or with any another transparent container. The sludge must settle for 20 minutes. If the sludge does not settle in the inspection container, there may be a large amount of toxic substances in the wastewater or the treatment process may be ineffective. Take a container full of activated sludge from the aerobic zone (middle chamber) and pour into the inspection container or in another transparent container. The sample must be taken when the compressor is working. After 20 minutes, check the amount of settled sludge (clearly visible between sludge and clean water). The treatment plant works properly if the amount of sediment in the container remains below 70% of the amount of liquid in the container. If the amount of sludge exceeds 70% of the volume, it is time to call the wastewater tanker to empty the treatment plant.
  - ✓ **Infiltration of water into the soil** – infiltration of the infiltration system can be checked through the ventilation ducts. If water can be seen through the ventilation ducts, the infiltration pipe is overgrown or the infiltration capacity of the soil has considerably dropped. Infiltration ducts must be cleaned once in ten years. Avoid planting big-rooted plants on the infiltration field. In winter, care must be taken to prevent ventilation ducts from being buried under snow. It is not recommended to clear the area above the infiltration field from snow.
  - ✓ **Do not dump into the waste water treatment system** – for effective functioning of the wastewater treatment plant, pieces of cloth, female hygiene products, paper tissues, food waste, and other waste must not be dumped into the sewage system. Oils, fertilisers, paints, solvents, or other substances that may affect the biological process in the wastewater treatment plant must also not be dumped into the sewage.

## **SAFETY REQUIREMENTS**

- ✓ Maintenance can be carried out by a person 18 years of age or older who is capable of performing physical work.
- ✓ The person must understand the maintenance manual. In the case of questions, contact the manufacturer of the biological treatment plant.
- ✓ Any work related to the electrical part of the device may be carried out only by a competent person holding a valid professional certificate in the Republic of Estonia.
- ✓ All recommended equipment should be used when working with the device.
- ✓ After working with the device, wash and disinfect your hands.
- ✓ Access to the device must not be snowed in or covered with ice.

**ATTENTION!**  
**HOUSEHOLD WASTEWATER MAY CONTAIN**  
**ORGANISMS HARMFUL TO PERSONAL HEALTH.**  
**THEREFORE, SAFETY PRECAUTIONS MUST BE**  
**FOLLOWED WHEN WORKING WITH THE DEVICE**

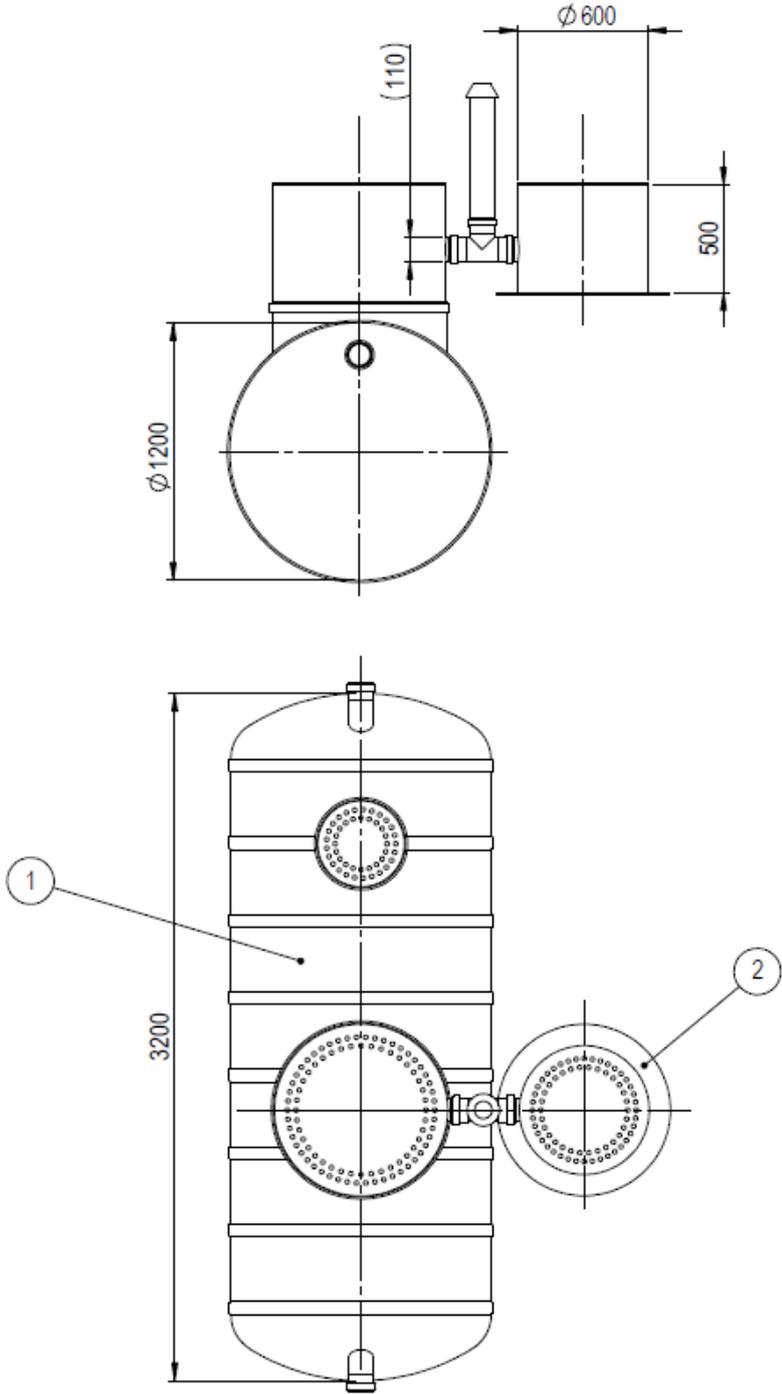
- ✓ After working with the machine, wash your hands thoroughly soap or any other disinfectant detergent.
- ✓ It is advisable to wear long trousers and a long-sleeved shirt, to avoid the sewage and sewage spills in the device touching your skin.
- ✓ Use rubber gloves.
- ✓ It is prohibited to keep food and drink next to the sample of wastewater.
- ✓ At the first opportunity, change clothes that have been soiled with wastewater.
- ✓ Wastewater on the skin must be washed off with soap or some other disinfectant detergent.

### **Recommended tools for safe maintenance of the biological treatment plant:**

- ✓ a container fitted to a pole for getting a sample from the treatment plant;
- ✓ transparent container for the settling of the sample;
- ✓ rubber gloves;
- ✓ a screwdriver to remove the cover of the air pump;
- ✓ if necessary, a flashlight for inspecting the contents of the treatment plant.

# DRAWINGS

\*patent pending



1. Sheath of the biological treatment plant

2. Maintenance shaft

## WARRANTY CONDITIONS

The fiberglass parts on the biological treatment plant have a three-year warranty. The air pump and programming clock have a two-year warranty.

The warranty covers any defects of the biological treatment plant caused during the production or due to materials, as a result of which the treatment plant has broken down or become unusable.

### **The warranty shall not apply:**

- ✓ in the case of damages to the biological treatment plant caused by transport, storage, incorrect installation and misuse;
- ✓ in the case of damages caused by natural disasters (earthquake, landslides, etc.) or other external factors (damages caused by means of transport, vandalism, etc.);
- ✓ in the case of damages caused by the use of an attachment not approved by the manufacturer or due to mistakes in the course of assembly;
- ✓ in the case of operational failures caused by: installation, maintenance or repair carried out by a person not authorised by Klaasplast OÜ;
- ✓ if any parts and/or accessories not specified by the manufacturer have been used on the biological treatment plant;
- ✓ if the biological treatment plant is installed deeper than 1m from the top of the treatment plant;
- ✓ if the biological treatment plant is not installed into compressed sand;
- ✓ if a tractor has been used to close the pit where the biological treatment plant has been installed;
- ✓ if the soil under the biological treatment plant is not properly tightened;
- ✓ if the manufacturer is not immediately informed when a problem arises;
- ✓ if the biological treatment plant has been emptied with a vibration pump;
- ✓ if the biological treatment plant is filled with pressurised water. Pressurised water and a hose moving under pressure can damage the pipes and equipment inside the biological treatment plant.

### **The warranty will not cover:**

- ✓ any damages caused by a damaged biological treatment plant to people and/or other articles and objects;
- ✓ charges for performing repairs not subject to warranty repairs;
- ✓ potential transport costs for the transportation of damaged goods to the seller's sales office.

### **ATTENTION!**

**If any problems occur, inform the manufacturer immediately.**

**The maintenance journal of the biological treatment plant is part of the technical documentation.**

**All detail replacement works on the appliance, the maintenance carried out, the time of pumping out the excess sludge, and other performed services must be written down in the journal.**

**The basis for solving any claims is a duly completed journal of the biological treatment plant.**



