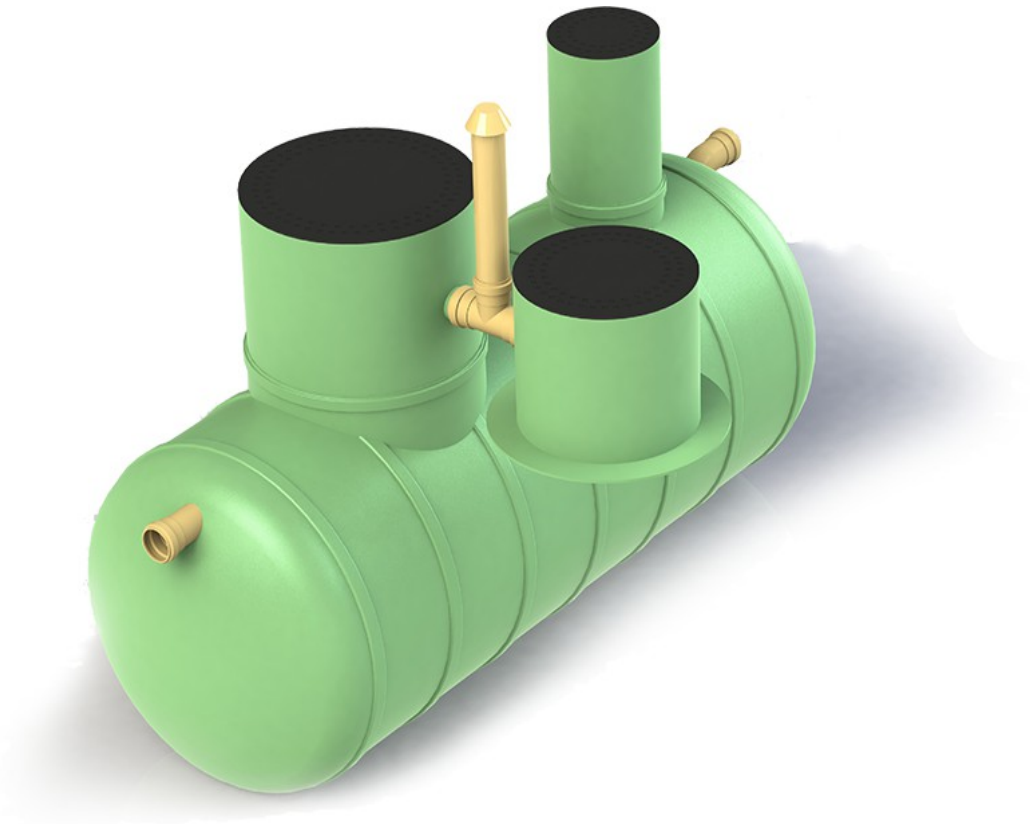
KLAASPLAST

BIOLOGICAL WASTEWATER TREATMENT PLANT BioC6

Maintenance and Installation Manual



EN 12566-3

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The BioC6 wastewater treatment plant complies with the European standard EN 12566-3 for small wastewater treatment plants and bears the CE marking.

The delivery set includes:

- BioC6 wastewater treatment plant 1200 x 3100 mm
- 600 x 500 mm shaft for air pump and electronics
- Hiblow HP-60 air pump
- Pre-programmed pump control unit

Optionally, an inspection/distribution well can be ordered.

Technical data:

Bioc6	Units	Value
Population equivalent		Up to 10
Wastewater volume	m^3/day	0.75
Electricity consumption	kWh/year	260 (308, with phosphorus removal)
Power supply		230 V, (50 Hz) /10 A
Treatment efficiency		
BOD_5	mg/l	98.5%
COD	mg/l	96.1%
SS	mg/l	97.1%

CE

KLAASPLAST OÜ
Kuke talu, Kolu küla, Kose vald
Harjumaa 75121 Eesti

01.26

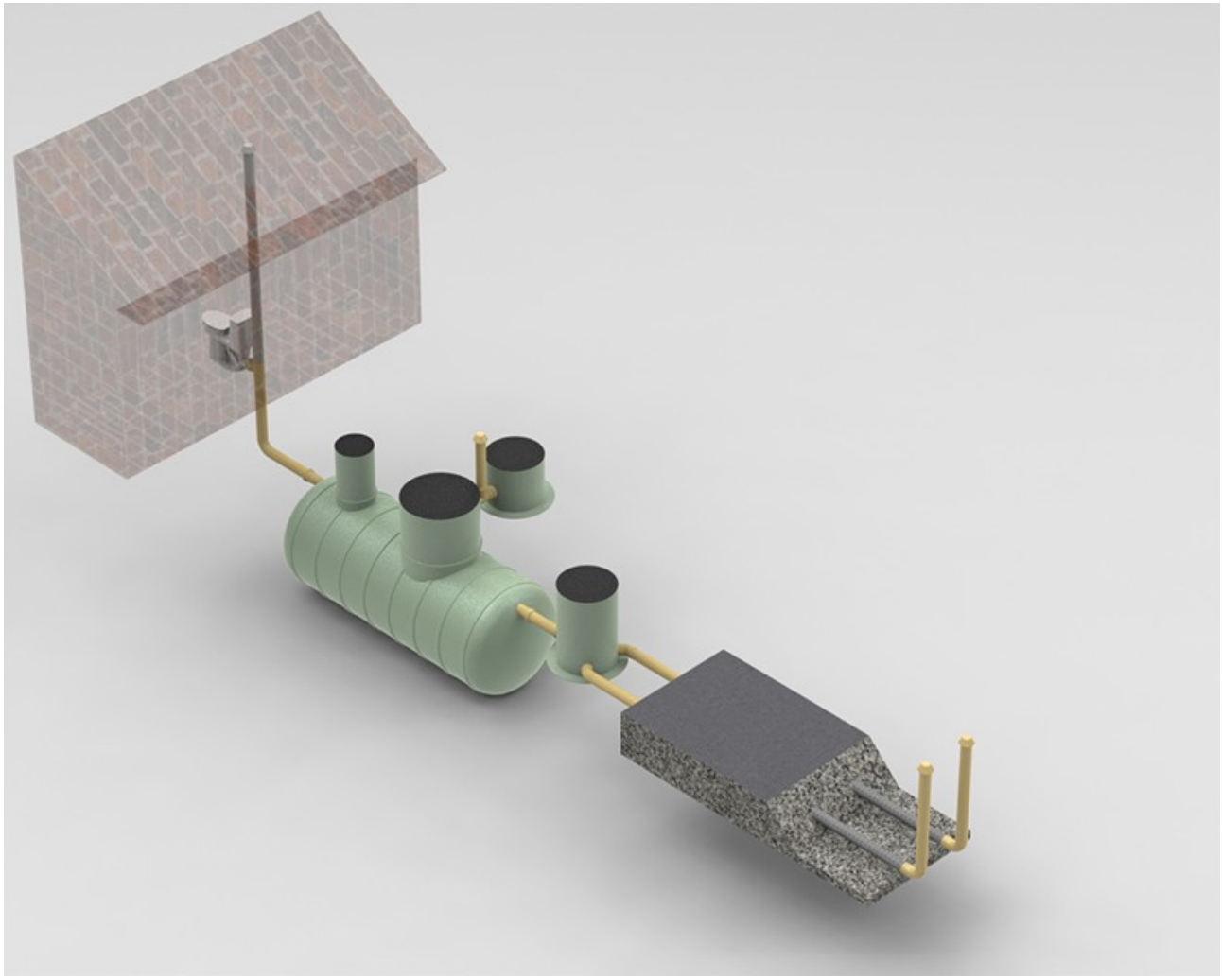
EN 12566-3 Small wastewater treatment systems:
prefabricated bio treatment systems

Fiberglass biological wastewater treatmentplant
BioC 6

Nominal size: 2,84m3
Water resistance: Passed
Surface pressure test: Passed
Hydraulic efficiency: BOD (98.5%)
COD (96.1%)
SS (97.1%)

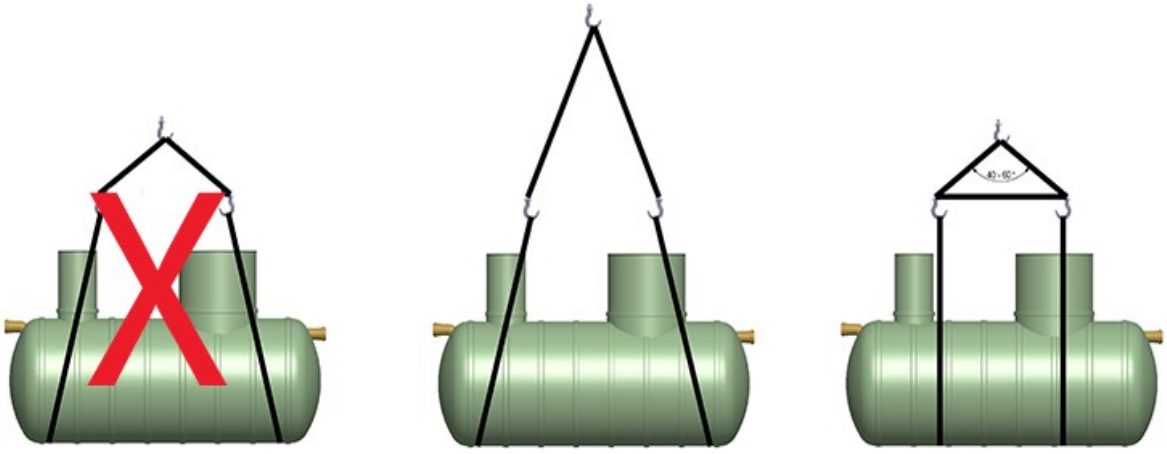
BioC6 wastewater treatment plant

The BioC6 is a biological wastewater treatment plant manufactured by Klaasplast OÜ and designed for treating domestic wastewater from 2–10 people. It is ideal for private houses and small businesses without access to centralized sewerage systems. After treatment, the purified water may be discharged into an infiltration field, infiltration tunnel, water bodies, stormwater drainage systems, or reused as technical water. Wastewater treatment is based on a biological process where microorganisms break down pollutants. The resulting sludge settles at the bottom of the tank and is periodically removed. Aeration ensures bacterial activity and reproduction, enabling highly efficient wastewater treatment without harming groundwater.



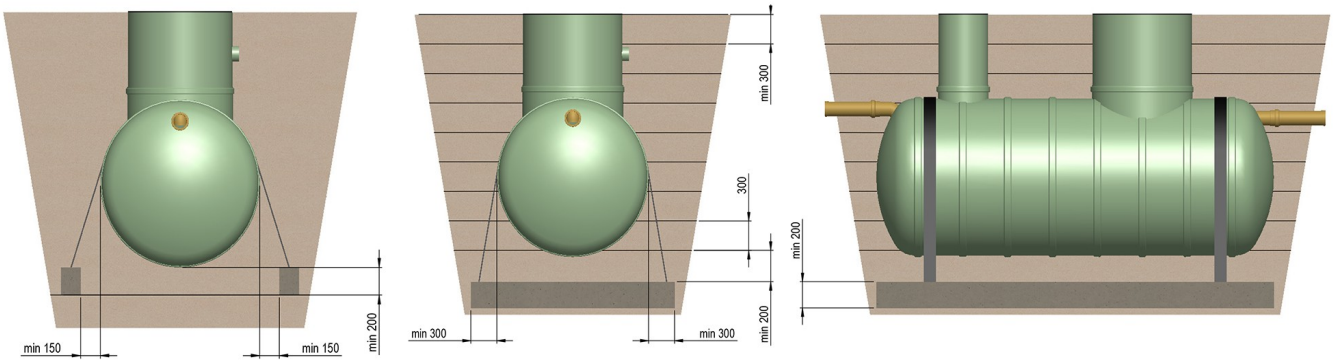
Instalation of the treatment plant

Care must be taken during transportation and installation to avoid damaging the unit. The BioC6 is generally installed at the depth of the building's outgoing sewer pipe. The slope of the sewer pipe between the building and the treatment plant must be 1–2 cm per meter. The sewer pipe must have SN8 strength classification.



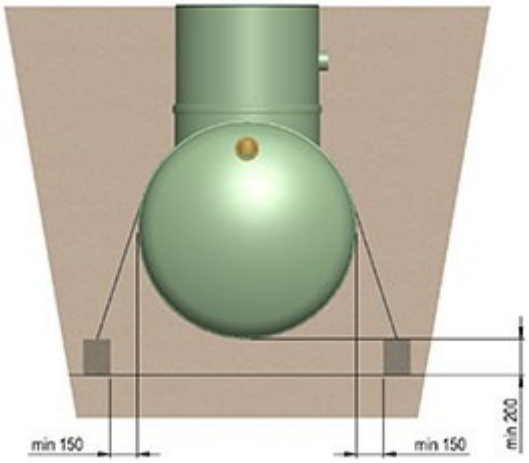
Lifting

- ✔ The bottom of the excavation must be covered with a 20 cm layer of sand
- ✔ The treatment plant is placed on a sand bed. When anchoring, a 15 cm sand layer must remain between the concrete slab and the plant. The unit must not be placed directly on concrete, and the sand bed must be free of large stones.



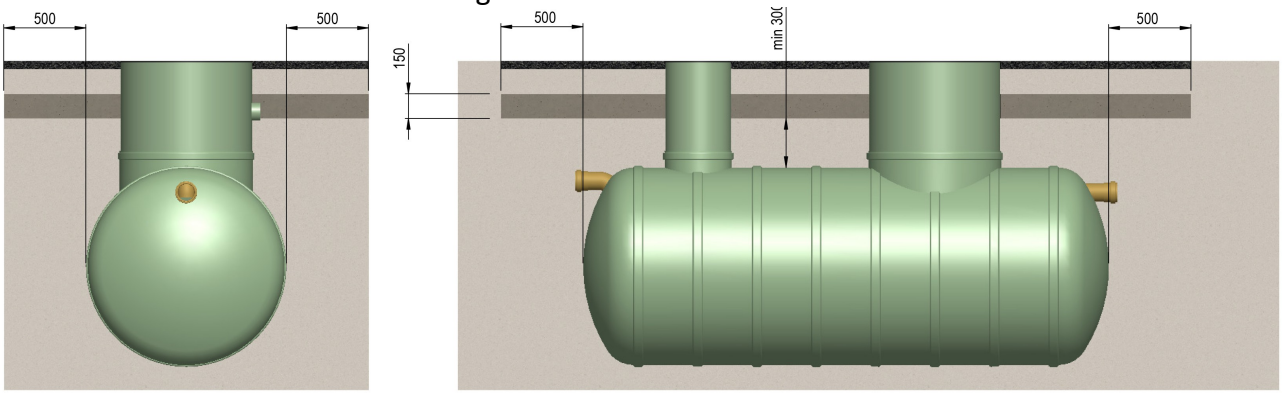
Anchoring

- ✔ The BioC6 is self-anchoring and does not require anchoring in dry soil. In areas with high groundwater levels, the unit must be secured to a concrete slab or blocks using load straps to prevent floating. Special care is required during emptying, as the risk of floating is highest at that time.
- ✔ Fill the area around the plant in 30 cm compacted sand layers while simultaneously filling the unit with water
- ✔ After reaching pipe connections, connect the piping and compact sand around the connections.



Installation with sleepers

- ✔ Once the piping is connected, the hole is filled in layers and the ends of the drain pipes that are too long are cut off flush with the ground.
- ✔ Connect the electronics shaft to the electrical panel or a moisture-proof socket. Use a 3 x 1.5 mm² outdoor-rated cable if extension is required.
- ✔ When installing a treatmentplant, the well is connected to the electronics and the treatmentplant is connected to a 110mm SN8 pipe. Three hoses from the treatmentplant are routed through the pipe. The hoses are numbered and connected to the piping in the well with quick connectors.
- ✔ If installed under a trafficked area, a minimum of 300 mm soil cover is required, plus a 150 mm reinforced concrete load-distribution slab extending at least 1000 mm beyond the tank dimensions. Cast iron manhole covers must be used. It is important to ensure that cast iron cover does not rest on the edge of the maintenance well.



Traffic load installation

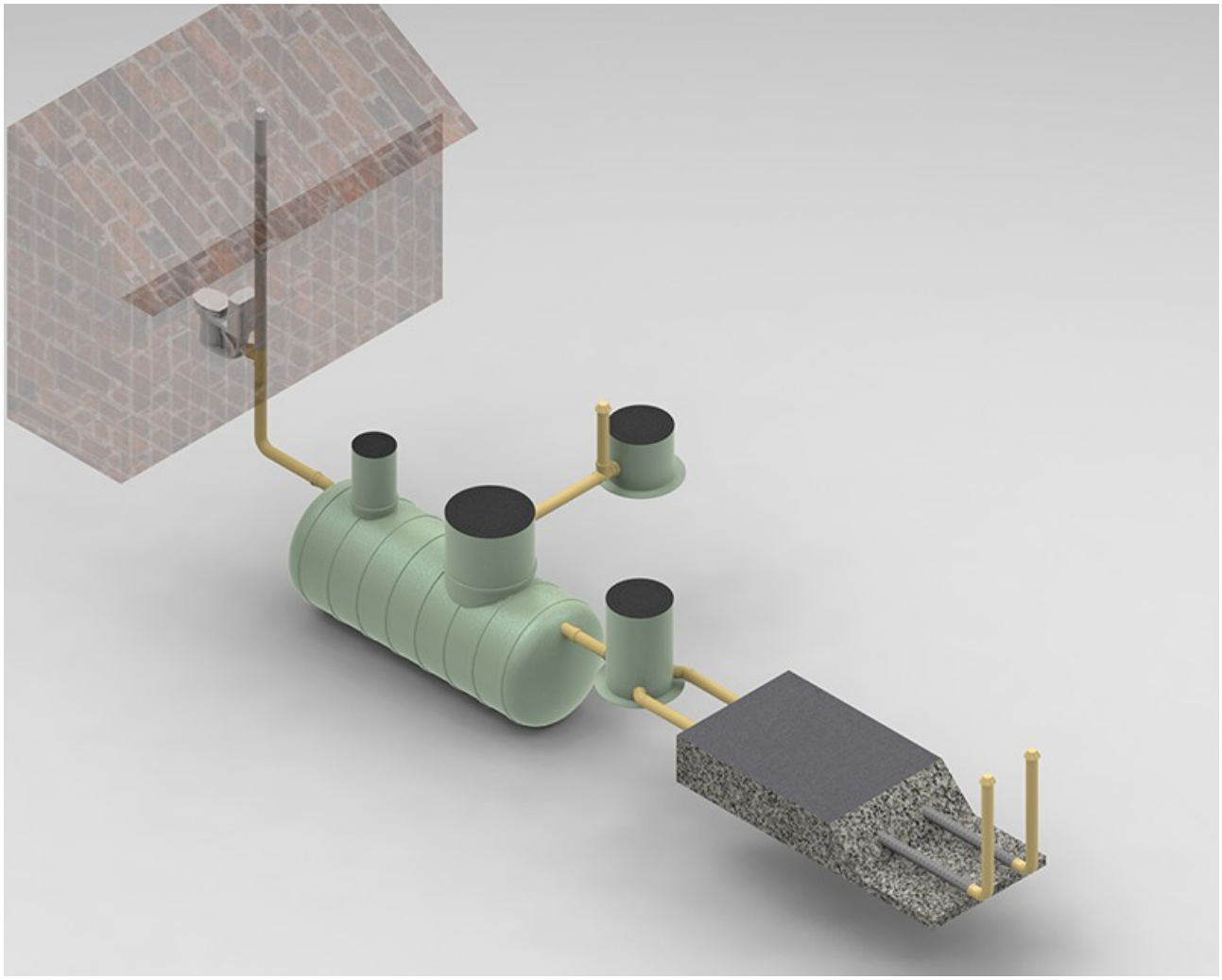
WARNING

Do not enter excavations unnecessarily. Collapse of excavation walls may cause serious injury.

Infiltration system

Excess treated water can be discharged into the soil via an infiltration field or infiltration tunnel. Minimum distances: At least 5 m from buildings with basements. At least 30 cm above groundwater level. Distance from trees must equal the tree canopy radius.

Infiltration field consists of perforated infiltration pipes buried in gravel.



Infiltration field

- ✔ Trench depth: 0.3–1.25 m; width: 0.9 m Pipe spacing: 1.5–2 m (parallel trenches) or 1 m (same trench).
- ✔ Once the trenches are leveled, the bottom of the trench is filled with a 25 cm thick layer of gravel (with a fraction of 16-32 mm).
- ✔ The gravel remaining under and on the sides of the infiltration field must be rinsed with water before backfilling the excavation to remove limestone dust from the rubble. If the limestone dust is not removed, it will later form a cemented layer under the infiltration field, which will significantly reduce the system's performance in absorbing liquids into the soil.

- ✔ The infiltration field is connected to the pipe leaving the biological treatment plant using an intermediate well, elbows or bends.
- ✔ The infiltration pipes are connected to each other with couplings and the pipes are given a uniform slope along the length of the infiltration system, which must be 5-10 mm/m. At the end of the infiltration trench, a layer of gravel at least 10 cm thick must remain under the infiltration pipe. The infiltration pipe is covered with gravel on the sides and top.
- ✔ At the end of the infiltration system, the pipes are connected to the ventilation pipes using elbows.
- ✔ Cover gravel with geotextile, then backfill with soil.

Infiltration system set

The infiltration system kit consists of:

✓ Infiltration pipes
✓ Geotextile fabric
✓ SN8 110mm branch
✓ SN8 110mm elbows
✓ 110mm ventilation caps
✓ SN8 110mm pipes

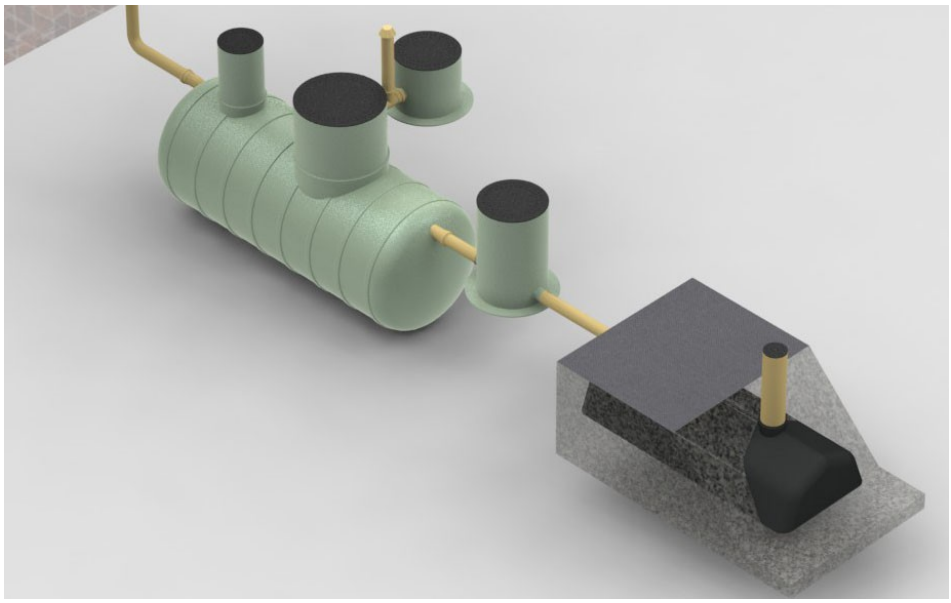
System sizing

Size of the infiltration system for the biological treatment plant:

1–4 persons: 2 x 6 m pipes or 2 x 300 L tunnels
5–6 persons: 2 x 9 m pipes or 3 x 300 L tunnels
7–8 persons: 2 x 12 m pipes or 4 x 300 L tunnels

For larger systems, contact the manufacturer.

Infiltration tunnels



Biocleaner with tunnels

The following requirements must be kept in mind when installing an infiltration tunnel:

- ✔ Load capacity: Short-term: max 7.5 t/m². Long-term: max 3.5 t/m².
- ✔ Minimum soil cover non-traffic areas 25 cm
- ✔ Minimum soil cover traffic areas 50 cm
- ✔ Maximum installation depth: 2 m
- ✔ The water pipe entering the infiltration tunnel is attached to the end wall. To do this, a hole must be cut in the end wall. The water pipe must extend through the end wall by approximately 20 cm.
- ✔ The holes on the top of the tunnel must be used to attach the ventilation pipe.
- ✔ The bottom of the trench must be leveled with a layer of sand approximately 10 cm thick. Then, the trench must be filled with gravel (fraction 16/32 mm), on top of which an infiltration tunnel is placed.
- ✔ The gravel that remains under and on the sides of the infiltration tunnel must be rinsed with water before backfilling the excavation to remove limestone dust from the gravel. If the limestone dust is not removed, it will later form a cemented layer under the infiltration tunnel, which will significantly reduce the infiltration tunnel's performance in absorbing liquids into the soil.
- ✔ To prevent dirt and soil from flowing back into the infiltration tunnel, lay a geotextile fabric over the infiltration tunnel, with an overlap of at least 30 cm at the ends. Then start backfilling the trench in layers.
- ✔ If grass is sown on top of the infiltration tunnel, a waterproof fabric or a layer of clay approximately 10 cm thick must be placed above the infiltration tunnel to prevent the grass above the infiltration tunnel from drying out faster than the rest of the lawn.
- ✔ Ventilation pipes must be installed above ground level so that they remain above the snow line in winter.

Control of the biological treatment plant

Initial start-up of the BioC6 biological treatment plant:

Make sure that the biological treatment plant has been installed and connected to the electrical grid in accordance with the installation instructions. Pay particular attention to the electrical connections, ensuring that the cable coming from the treatment plant is properly connected. Before switching the treatment plant on, make sure that it is filled with water. Once these conditions are met, the circuit breaker for the treatment plant can be switched on in the electrical panel. If the treatment plant is located far from the electrical panel, it may also be connected to a wall socket using a plug, ensuring that the socket is located in a sheltered and moisture-protected place.

ATTENTION!

If the plant does not start to make a gurgling sound within 30 minutes after the product is plugged in, contact the manufacturer.

When you hear gurgling, the bio-cleaner has been successfully switched on. When the product is in the “operating” cycle, remove the covers from the treatment plant and observe whether the air circulation is uniform. Uniform air circulation occurs if air bubbles are visible under the large and small lids. Under the smaller hatch, the water and air mixture must flow out of the pipe towards the partition wall. Under the larger hatch, air bubbles must rise to the surface from the bottom of the cleaner.. The cleaner works perfectly when bubbles come from both outlets similarly and evenly.

Switching off the BioC6 biological treatment plant:

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

- By switching it off from the electrical panel
- By unplugging the power plug from the wall socket

Why switch off the biological treatment plant?

The biological treatment plant must be switched off during scheduled maintenance and emptying.

Phosphorus removal:

As an optional extra, the biological treatment plant can be equipped with chemical phosphorus removal. For phosphorus removal, a pre-programmed pump doses a chemical into the central chamber of the treatment plant, which binds phosphorus from the wastewater. The chemical dosed into the plant is PAX XL100. The average daily consumption is approximately 57 ml. In Estonia, phosphorus removal from wastewater is not mandatory.

Control valves:

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

- **Air line No. 1 with valve** – Air flow to the diffuser. Default: always open.
- **Air line No. 2 with valve** – Air flow to the sludge lift. Default: half-open. Adjusted so that both the diffuser and the sludge lift operate with even pressure.
- **Air line No. 3** – Air flow to the cleaning pipe through a solenoid valve.

Maintenance of the biological treatment plant

Routine maintenance of the biological treatment plant

Inspection Frequency	Inspection Item	OK	Incorrect	Action if Incorrect
Once per month	Visual inspection through the 400 mm manhole cover to check whether water and air flow are functioning (aeration must be operating at the time of inspection)	Continuous water flow from the pipe into the central aeration chamber. Water does not flow into the first settling chamber	No water/air flow or intermittent water/air flow	Blow the pipe through with the maximum amount of air by adjusting valve No. 2. Close valve No. 1 and fully open valve No. 2. If water and air flow do not resume, flush the pipe with clean water and repeat the application of maximum air using the valves
	Visual inspection of the aeration chamber (middle chamber) through the 800 mm manhole cover during the treatment plant's operating cycle	Active circulation of water and air in the chamber. Many small air bubbles	No circulation. Partial circulation of water and air with large air bubbles	Adjust the valves in the electronics chamber. If the problem persists, contact the manufacturer
	Visual inspection of the final chamber through the 800 mm manhole cover	No floating sludge or only a small amount present	Large amount of floating sludge on the water surface	Manually activate the solenoid in the electronics chamber for 5 minutes (while the pump is operating). Close the remaining valves (No. 2 and No. 3). The solenoid is activated manually via the timer program. As a result of this procedure, the floating sludge will be pumped back into the aeration chamber. After completing the procedure, restore the previous valve settings
	Visual inspection of the phosphorus removal chemical canister (if phosphorus removal is used)	Liquid level >20% of the canister volume	Liquid level <20% of the canister volume	Refill the canister with PAX-100XL chemical
	Air pump filter inspection. The air pump cover is removed with a screw	Filter is clean	Filter is dirty	Clean or replace the air filter
Once every three months	Inspection of settled sludge. Checked in a transparent container after 20 minutes of settling. The container is filled with a sample taken from the central aeration chamber	Sludge volume <70%	Sludge volume >70%	Completely remove sludge from the first chamber of the biological treatment plant and remove 2/3 of the sludge from the central aeration chamber. After emptying, refill the treatment plant with clean water

- ✔ **Emptying** – Only the first chamber and the middle chamber (2/3) of the biological treatment plant are emptied. The third chamber is not emptied. To empty the treatment plant, a wastewater vacuum truck must be ordered to pump it out. To find a service provider in your area, contact your local municipality, who will direct you to the appropriate provider. During emptying and refilling with water, the biological treatment plant must be switched off. Before emptying, the treatment plant must remain switched off for 30–45 minutes to allow the sludge to settle at the bottom. When emptying the plant, care must be taken to ensure that the suction hose does not damage the equipment and pipes inside the treatment plant. After emptying, refill the plant with clean water.
- ✔ **Bacteria** – It is not necessary to add bacteria when installing the biological treatment plant. Bacteria will develop naturally in the plant approximately 2 months after it has been put into operation
- ✔ **Air pump** – To ensure a long service life and trouble-free operation of the air pump, the air filter must be cleaned 6 months after the pump has been put into operation. The air filter must be replaced with a new one once per year.
- ✔ **Electronics** – The pump operation and the solenoid valve are controlled by a time relay and a timer, which are pre-programmed. The timer has a built-in battery that preserves the program even in the event of a power failure.
- ✔ **Measuring sludge volume** – The volume of excess sludge or mixture can be measured using a 1000 ml sedimentation cylinder or another transparent container. The sludge must be allowed to settle for 20 minutes. If the sludge does not settle in the test container, the wastewater may contain a high amount of toxic substances or the treatment process may be inefficient. Fill the container with activated sludge mixture taken from the aerobic zone (middle chamber) and pour it into the measuring cylinder or another transparent container. The sample must be taken while the compressor is operating. After 20 minutes, check the amount of settled sludge (a clear boundary between sludge and clean water will be visible). The treatment plant is operating correctly if the volume of sludge in the container remains below 70% of the total liquid volume. If the sludge volume exceeds 70%, it is time to order a wastewater vacuum truck to empty the plant.

- ✔ **Water absorption into the soil** – Absorption in the infiltration system can be checked through the ventilation pipes. If water is visible through the ventilation pipe, the infiltration pipe may be clogged or the soil's absorption capacity has significantly decreased. The infiltration pipes should be cleaned once every ten years. Avoid planting deep-rooted plants on top of the infiltration field. In winter, ensure that the ventilation pipes are not buried under snow. Removing snow from the infiltration field is not recommended.
- ✔ **Do not dispose of the following into the biological treatment plant** – For effective operation, do not dispose of cloth, feminine hygiene products, paper towels, food waste, or other garbage into the sewer system. Oils, fertilizers, paints, solvents, and other substances that may interfere with the biological treatment process must also not be discharged into the sewer system.

Safety requirements

- ✔ Maintenance may be carried out by a person aged 18 or older who is physically capable of performing manual work.
- ✔ The person must understand the maintenance instructions; in case of questions, contact the manufacturer of the biological treatment plant.
- ✔ Any work related to the electrical components of the device may only be performed by a qualified electrician holding a valid professional certificate.
- ✔ When working with the device, all recommended tools and equipment must be used.
- ✔ Access to the device must not be blocked by snow or ice.

ATTENTION!

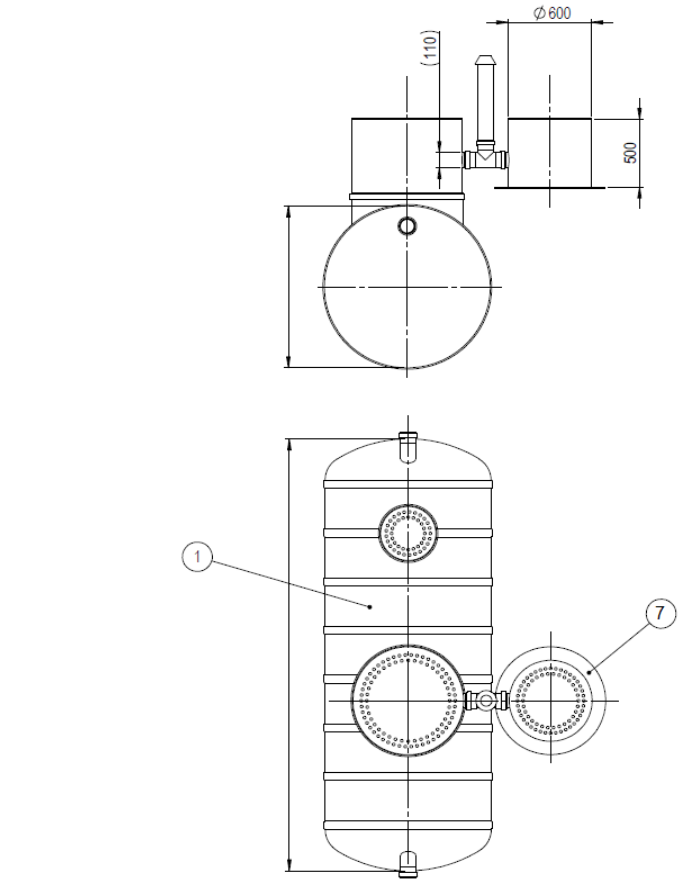
DOMESTIC WASTEWATER MAY CONTAIN ORGANISMS THAT CAN HAVE A DANGEROUS EFFECT ON HUMAN HEALTH, THEREFORE SAFETY REGULATIONS MUST BE FOLLOWED WHEN WORKING WITH THE DEVICE

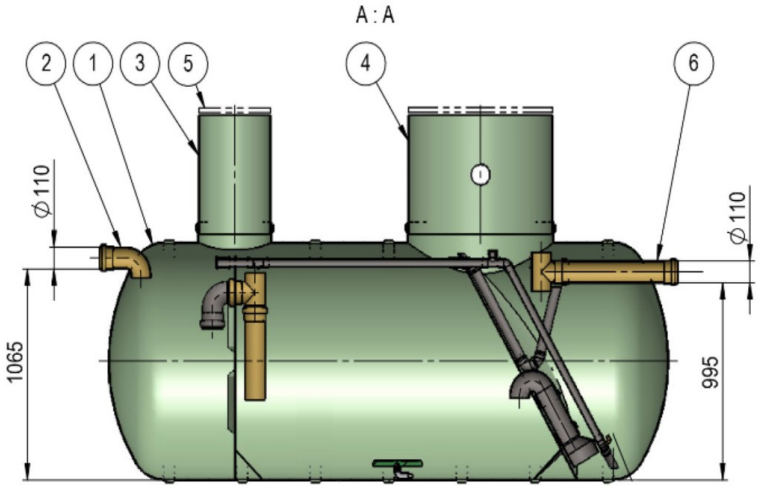
- ✔ After working with the device, hands must be thoroughly washed with soap or another disinfecting cleaning agent.
- ✔ It is recommended to wear long trousers and a long-sleeved shirt and to avoid contact of the skin with wastewater or wastewater splashes from the device.
- ✔ Rubber gloves must be used.
- ✔ It is prohibited to keep food or beverages next to a wastewater sample.
- ✔ Clothing contaminated with wastewater must be changed at the first opportunity.
- ✔ Wastewater that comes into contact with the skin must be washed off with soap or another disinfecting cleaning agent.

Recommended tools for safe maintenance of the biological treatment plant:

- ✔ A container attached to a handle for taking samples from the treatment plant
- ✔ A transparent container for settling the sample
- ✔ Rubber gloves
- ✔ A Phillips screwdriver for removing the air pump cover
- ✔ A flashlight, if necessary, for inspecting the inside of the treatment plant

Drawings





1. Biological treatment plant tank D1200x3100
2. Inlet
3. Emptying well
4. Maintenance well
5. Cover
6. Outlet
7. Equipment well

Warranty terms

The fiberglass components of the biological treatment plant are covered by a 10-year warranty. The electronics are covered by a 2-year warranty.

The warranty covers defects resulting from manufacturing or material faults of the biological treatment plant that cause the unit to break or become unusable.

The warranty does not apply in the following cases:

- ✔ Damage caused during transport, storage, improper installation, or improper use of the biological treatment plant.
- ✔ Damage caused by natural disasters (earthquakes, landslides, etc.) or other external factors (damage caused by vehicles, vandalism, etc.).
- ✔ Damage resulting from the use of fastening methods not specified by the manufacturer or from errors made during installation.
- ✔ Operational failures caused by installation, maintenance, or repairs performed by a person not authorized by Klaasplast OÜ.
- ✔ If parts or accessories not specified by the manufacturer have been used in the biological treatment plant.
- ✔ If the biological treatment plant has been installed deeper than 1 meter from the top of the plant.
- ✔ If the biological treatment plant has not been installed in compacted sand.
- ✔ If the excavation has filled with a tractor by pushing the backfill in.
- ✔ If the side backfill of the biological treatment plant has not been properly compacted.
- ✔ If the manufacturer is not immediately informed upon the occurrence of problems.
- ✔ If the biological treatment plant has been emptied using a vibration pump.
- ✔ If pressurized water is introduced into the biological treatment plant. Pressurized water and a hose moving under pressure may damage the pipes and equipment inside the unit.
- ✔ If the biological treatment plant maintenance log has been filled in incorrectly or left incomplete.

The warranty does not cover:

- ✔ Damage caused by a defective biological treatment plant to persons and/or other items or objects.
- ✔ Payment for repair work that is not covered under warranty.
- ✔ Possible transport costs for delivering defective goods to the seller’s point of sale.

ATTENTION!

If problems occur, inform the manufacturer immediately.

The maintenance log of the biological treatment plant is part of the technical documentation. The log must record all replacement work of the device parts, performed maintenance work, time of pumping out of sludge and other performed maintenance.
The basis for resolving claims is the biological treatment plant log completed in accordance with the requirements.

Biological treatment plant maintenance log

Date	Visual inspections	Work performed	Sludge concentration

Date	Visual inspections	Work performed	Sludge concentration

Date	Visual inspections	Work performed	Sludge concentration