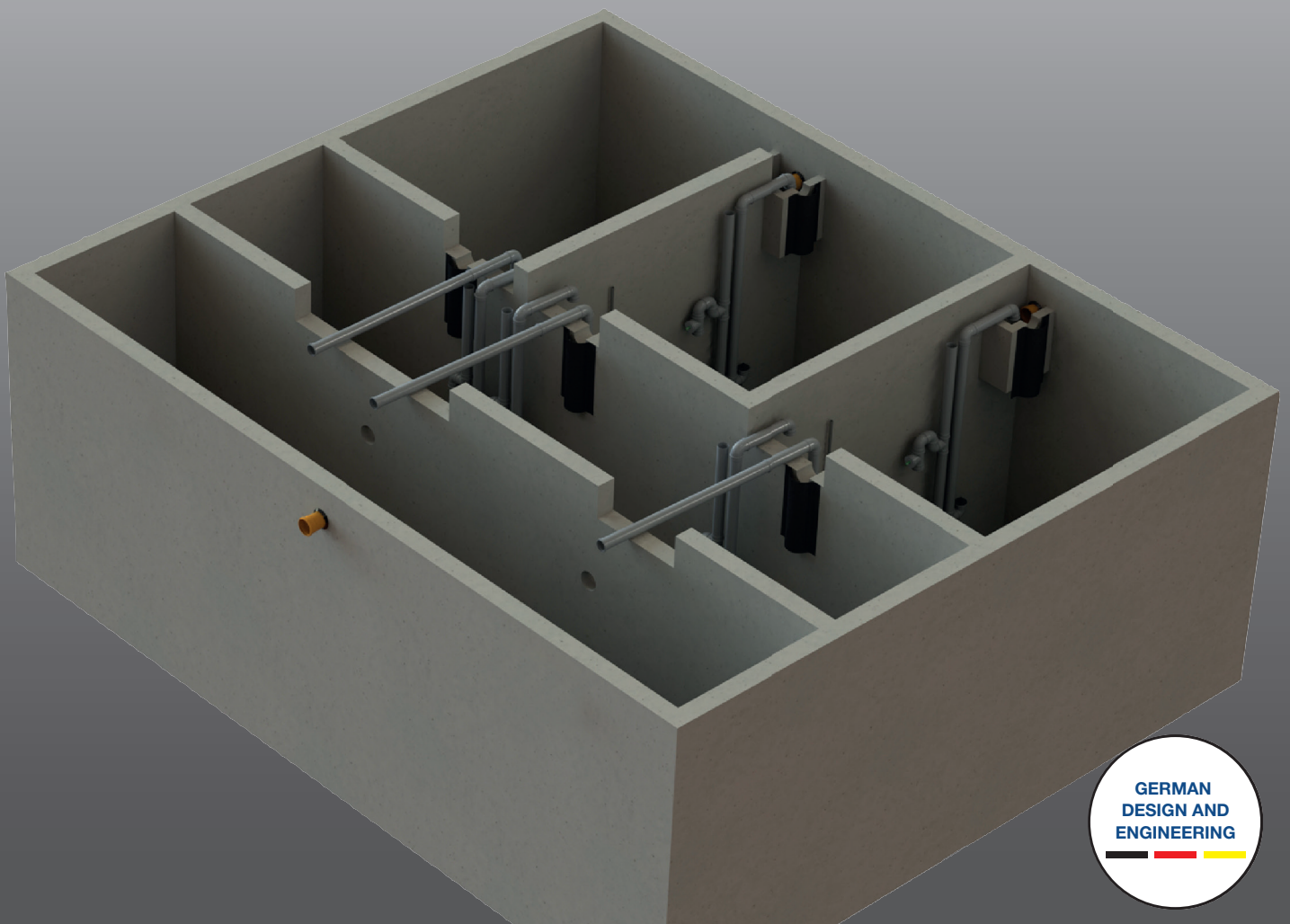


Assembly instructions

for wastewater treatment plants from 50 PE

We provide clean water



GERMAN
DESIGN AND
ENGINEERING



No mechanical parts
in the wastewater



No pumps
in the wastewater



No electrical parts
in the wastewater

Important:

- All safety instructions must be observed!
- Keep for future reference
- This document is only a general guidance. In individual cases, parts or situations of installation can differ. Please contact GRAF if any questions or obscurities occur.

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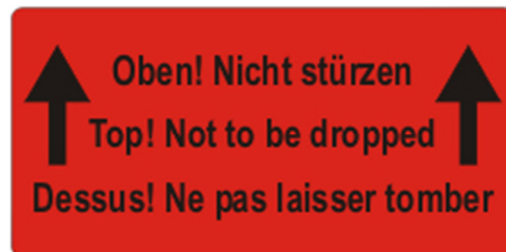
1. Product description

1.1. Application

The retrofit kit consists of the mechanical equipment and installation components for an existing septic tank. It is used to equip the septic tank as a fully biological wastewater treatment plant. For the mechanical equipment there is an additional set of installation instructions.

1.2. Transport

The retrofit kits are delivered in cardboard packaging. Where necessary, advice on handling the packaged products is located on the cartons. To avoid damage these should be observed both in transportation, as well as during storage! Any evidence of non-compliance will void warranty claims.



Notice on the packaging

1.3. Checking the delivery / scope of supply

All parts must be checked immediately after delivery for completeness against the delivery note and for any transport damage. Subsequent complaints will not be accepted by us. Damaged parts must not be installed.

The supplied retrofit kit consists of the following components:

- Mechanical equipment for indoor or outdoor installation with GRAF control unit
- Charging pump, marked red
- Clear water pump, marked black
- Excess sludge lifter, marked black
- Membrane aerators (pipe or disc) in EPDM, finely perforated
- Air distribution / stainless steel piping
- Mounting accessories
- Black PE baffle
- Sampler (optional)
- Air Hoses (optional)
- UV module (optional)

1.4. Storage

The storage location of the retrofit kit should be cool, dry and protected from harmful environmental (e.g. UV light) and external influences.

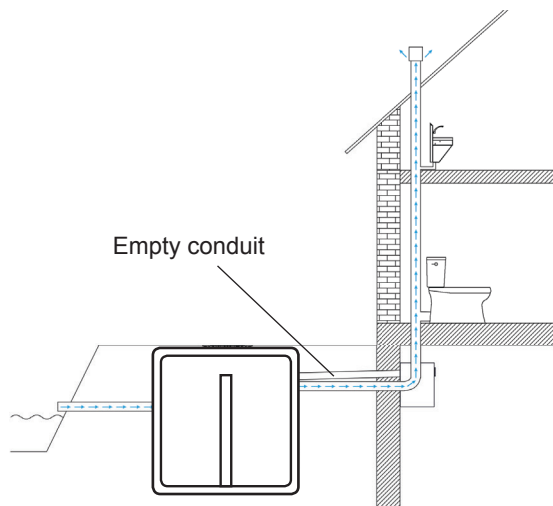
2. Preparing the septic tank

2.1. General Information

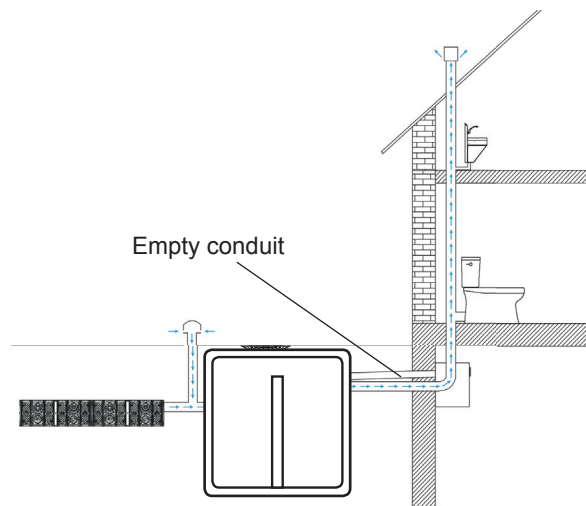
- The septic tanks must be durable, stable and watertight. They must also be accessible for the installation of the retrofit kit, and later for inspection, maintenance and sludge removal.
- Recommended concrete grades C35 / 45, exposure classes XC 2, 2 XD, XF 3, XA 1, XM 2, wz max. 0.5
- Bitumen should not be used for the purposes of sealing the system because of its biological toxicity
- Preparatory tasks on the septic tank are very important for durable and safe operation of the system. Please, therefore, make sure you work conscientiously.

2.2. Ventilation of the wastewater treatment plant

All chambers/containers must be vented so that the air blown from the air compressor together with existing sewage gases can escape without damage. This is normally done via the inlet pipe of the waste water treatment plant, which is vented through the roof. In addition, further ventilation of the system should be possible via the manhole cover or wastewater treatment plant outlet, so that a natural ventilation results (chimney effect). The height difference should be at least 3 m - the bigger the better. If necessary, additional air ducts or vents are to be arranged. The function of the venting can be tested with the aid of a smoke cartridge.



Venting with free flow



Venting with soakaway or no free flow

2.3. Containers with dividing walls

- Dividing walls between pre-clarification and SBR chamber must be watertight. Any possible holes or slots must be permanently sealed shut.
- Dividing walls should be above the maximum water level (ideally: 20 cm above the bottom of the discharge pipe).
- Immersed passages between chambers operated in parallel or containers should be DN150 - DN200 (ideally: With the upper edge of the opening 10 cm below the minimum water level)

2.4. Emergency overflow

An emergency overflow must be provided in the dividing wall between sludge storage/buffer and SBR chamber above the highest water level (ideally: The bottom of the emergency overflow should be 10 cm higher than bottom of the discharge pipe). With hydraulic overload of the system, water should only be able to overflow at this point from the buffer into the SBR chamber. Spill over of the water on top of the dividing wall must be avoided.

2.5. Empty conduit

Empty conduits should be laid from the installation location of the control cabinet to the wastewater treatment plant container with a gradient from the cabinet .

- As far as possible lay in a straight line - for bends use a maximum of 30° connecting pieces
- An internal pull wire is recommended
- Draw a maximum 6 hoses through an empty conduit
- Air hose should be a maximum length of 20 m; if distances longer, please consult the GRAF Engineering Department
- **The empty conduit must have an air-tight seal at the control cabinet, e.g. with expanding foam** (See installation instructions for the cabinet!)

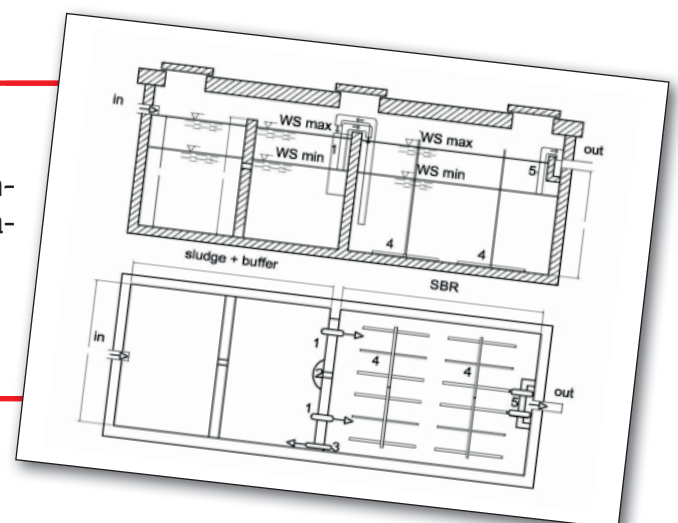
Assembly instructions for wastewater treatment plants from 50 PE

3. Installation steps



Attention:

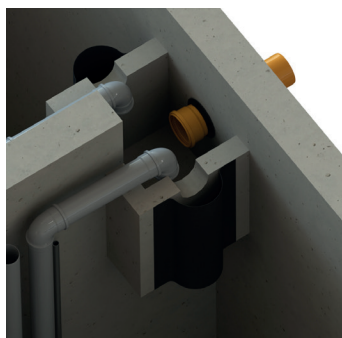
Check that the actual tank dimensions correspond to the wastewater treatment calculation.



Assemblies:



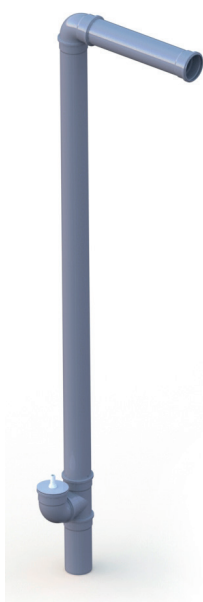
① Baffle from page 10



② Sampler from page 11



③ Aerator unit from page 14



④ Air-lifter from page 22

3.1. Overview of components for rectangular tanks



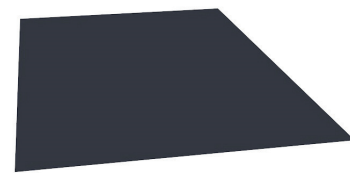
No.	Designation	Material	Number of pieces with rectangular tank with PE												
			75	100	125	150	175	200	250	300	350	400	450	500	
			Number of pieces with rectangular tank with m³/day												
			11	15	19	23	26	30	38	45	52	60	68	75	
1	Charging pump DN70	PVC	1	-	-	-	-	-	-	-	-	-	-	-	
	Charging pump DN100		-	1	1	1	1	1	2	2	2	2	-	-	
	Charging pump DN125		-	-	-	-	-	-	-	-	-	-	2	2	
2	Discharge lifter DN70	PVC	1	-	-	-	-	-	-	-	-	-	-	-	
	Discharge lifter DN100		-	1	1	1	1	1	2	2	2	2	-	-	
	Discharge lifter DN125		-	-	-	-	-	-	-	-	-	-	2	2	
3	Excess sludge lifter DN70	PVC	1	-	-	-	-	-	-	-	-	-	-	-	
	Excess sludge lifter DN100		-	1	1	1	1	1	2	2	2	2	-	-	
	Excess sludge lifter DN125		-	-	-	-	-	-	-	-	-	-	2	2	
4	Bolts 3.5 x 6.5mm	SS	10	-	-	-	-	-	-	-	-	-	-	-	
	Bolts 3.5 x 9.5mm		-	10	10	10	10	10	20	20	20	20	20	20	
5	Membrane tube EMR 15 805 mm	PVC/EPDM	8	-	-	16	16	-	-	-	32	-	-	-	
	Membrane tube EMR 20 1055 mm		-	8	8	-	-	16	24	24	-	32	32	32	
6	Aerator beams Universal 1900-8-2x1“	SS	1	1	1	2	2	2	3	3	4	4	4	4	
7	Plugs 1" hexagonal	SS	1	1	1	2	2	2	3	3	4	4	4	4	
8	Downpipe 1" 350mm	SS	1	1	1	2	2	2	3	3	4	4	4	4	
9	Downpipe 1" 1000 mm	SS	1	1	1	2	2	2	-	-	-	-	-	-	
10	Downpipe 1" 1500 mm	SS	1	1	1	2	2	2	6	6	8	8	8	8	
11	Hose nozzle 1" 25 mm	SS	1	1	1	2	2	2	3	3	4	4	4	4	
12	Sleeve 1"	SS	1	1	1	2	2	2	3	3	4	4	4	4	
13	Angle 90°	SS	2	2	2	4	4	4	6	6	8	8	8	8	
14	Pipe bracket DN50	PE	10	10	10	10	10	10	15	15	20	20	20	20	
15	Threaded pipe bracket M8 72-76 mm	SS	13	-	-	-	-	-	-	-	-	-	-	-	
	Threaded pipe bracket M8 108-116 mm		-	16	16	16	16	16	32	32	32	32	-	-	
	Threaded pipe bracket M8 124-132 mm		-	-	-	-	-	-	-	-	-	-	32	32	
16	Threaded pipe bracket M8 25-28 mm	SS	2	2	2	6	6	6	10	10	10	10	10	10	
17	Anchor fixing bolt M8-15/80	SS	16	22	22	24	24	24	48	48	48	48	48	48	
18	Hammer fixings M6 x 40 FK countersunk	SS/PA	16	22	22	30	30	30	60	60	60	60	60	60	
19	Bolt M8 x 80	SS	5	6	6	10	10	10	14	14	20	20	20	20	
20	Fixing plug 10 x 50	PA	5	6	6	10	10	10	14	14	20	20	20	20	
21	Hose clamp W4 25-40/9	SS	12	12	12	12	12	12	24	24	24	24	24	24	
22	Cable tie 280/4.5 mm	PA	20	20	20	50	50	50	75	75	100	100	100	100	
23	Teflon tape	PTFE	2	2	2	2	2	2	3	3	4	4	4	4	
24	Black film	HDPE	2	2	2	2	2	2	4	4	4	4	4	4	

3.2 Installing baffle

The emergency overflow in the dividing walls must be protected against overflow of floating sludge from the primary into the biological clarification.



Parts required:

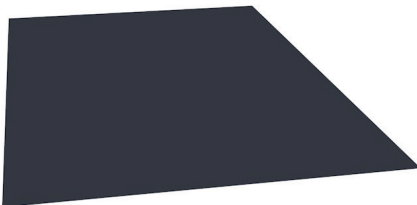


1x

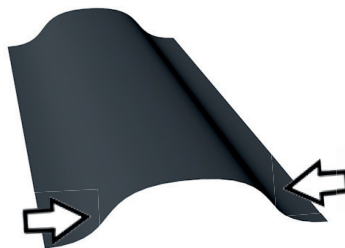


6x

①



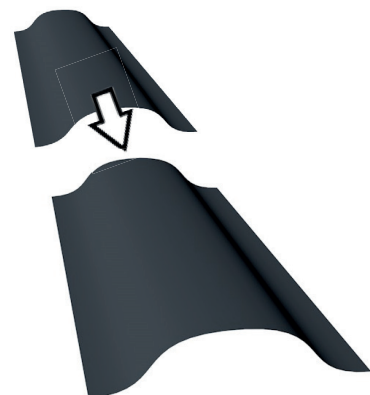
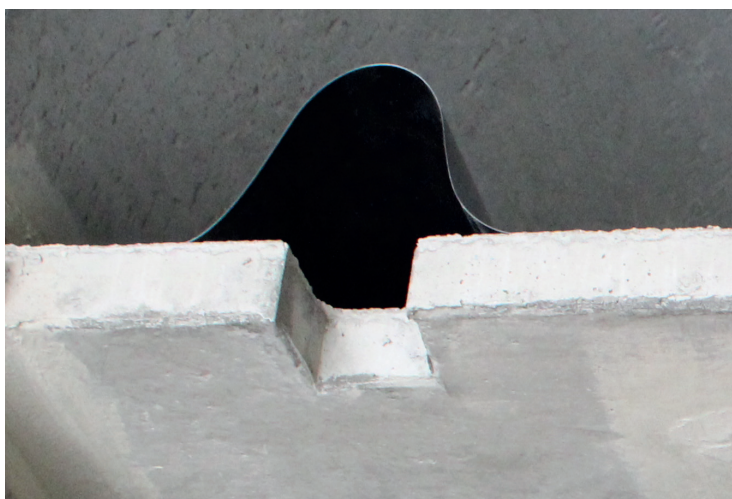
②



Fixing the film with six hammer fixings in the middle wall. The film must be curved in a Ω -form.

As far as possible the film should be level with the upper edge of the dividing wall and extend below the minimum water level.

If the length of a film is not enough, it can be extended with further pieces of film.

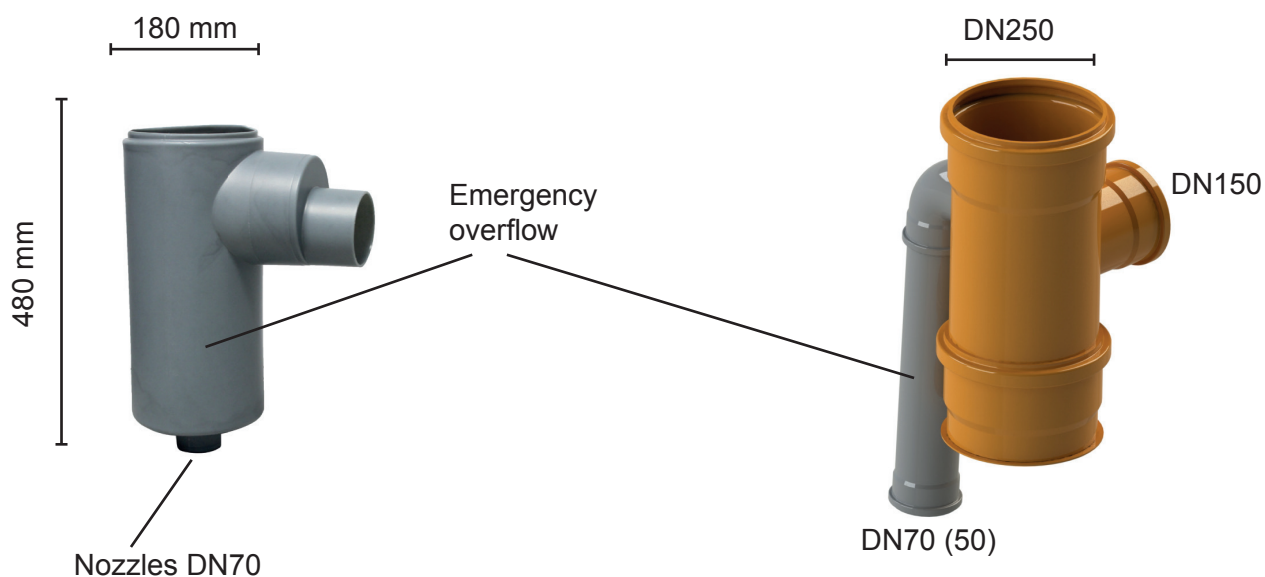


3.3. Sampling

A small amount of biologically treated water should be retained in the sampler in order to scoop out a sample.

There are several ways to design a sampler:

- Integrated plastic sampler (available as accessory)



Sampler for plants with clear water pump DN50 or DN70

Sampler for plants with clear water pump DN100

- Integrated concrete sampler



In rectangular concrete tanks a sampling container is often formed directly with concrete.

- Downstream sampling shaft made of plastic or concrete

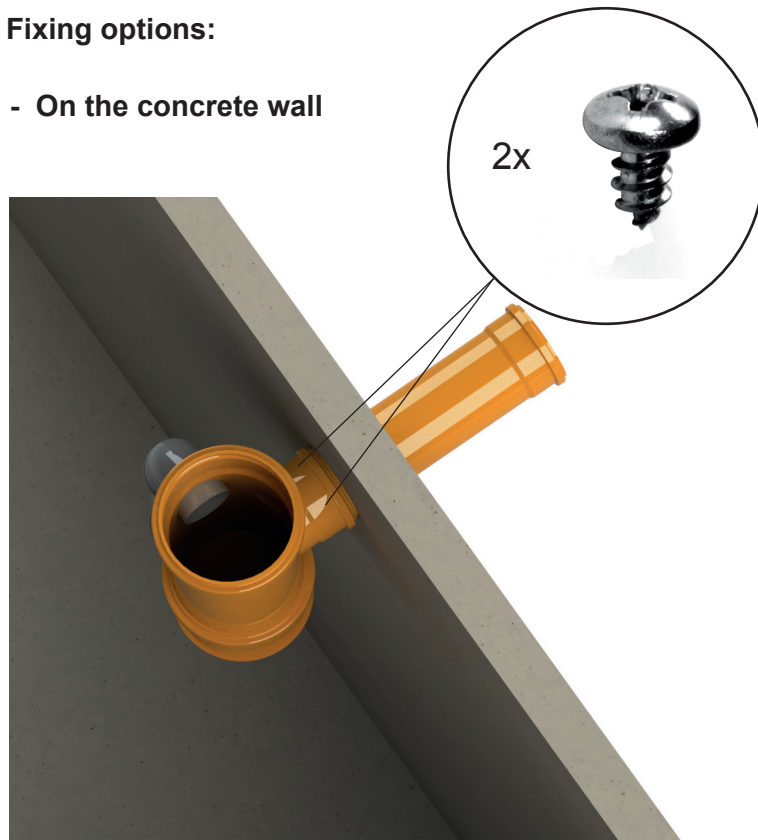
Alternatively, a separate sampling shaft can also be arranged outside of the treatment container.

3.3.1. Installation with integrated plastic sampler

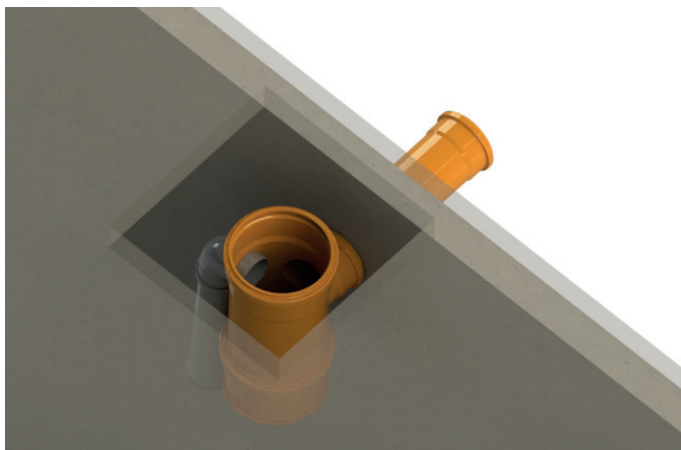
The GRAF sampler is placed in the SBR chamber. It must be arranged so that it is clearly visible from the shaft opening and easily accessible to scoop out a sample. In addition, it must be within reach of the clear water pump. To contain the weight of the filled sampler it must be fixed in the container.

Fixing options:

- On the concrete wall



Attach the sampler at the outlet and secure with two 3.5 x 6.5 mm bolts



The sampler must be easily accessible through the shaft (shown with semi-transparent tank cover)

Parts required:



1x



2x

Alternative:



* The sampler can also be included as a mirror version. This has no effect on the function.



- With supporting foot



Fastening on the container floor is effected by means of a support stand made out of PVC-HT pipe DN70

Parts required:



1x



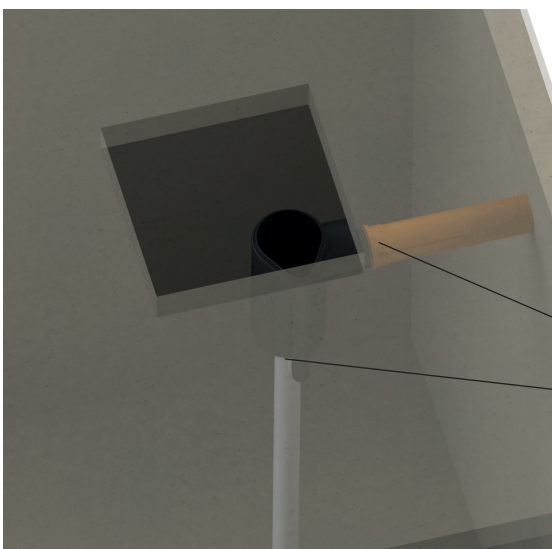
1x*



2x

* The sampler can also be incorporated as a mirror version.

This has no effect on the function.



The sampler must be easily accessible through the shaft (shown with semi-transparent tank cover)

2x



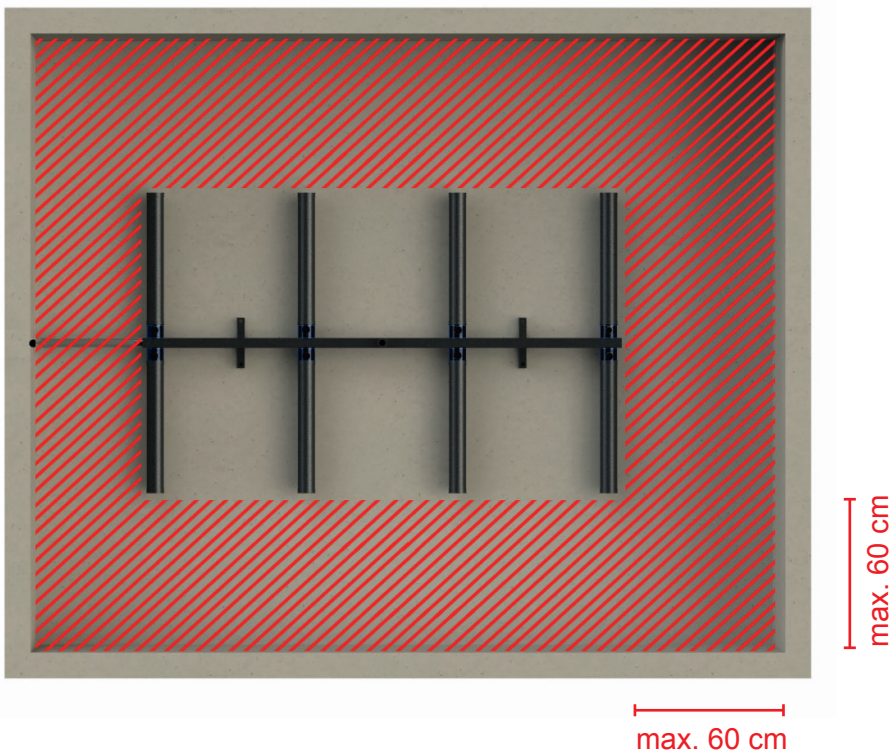
Secure connections with self-drilling screws



3.4. Installation of the aeration unit

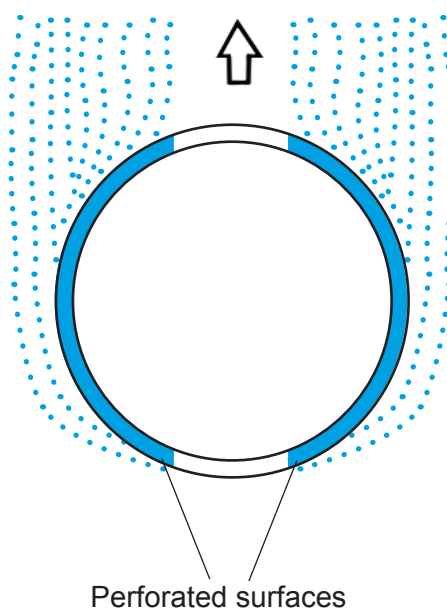
3.4.1. Advice and tips

- Alignment of the beam



To ensure a complete ventilation of the tank, the placement and distribution of the membrane tubes are crucial. The floor space not covered by the membrane aerators (wall or between the aeration unit) should not be greater than 60 cm.

- Membrane tubes



- Wind stainless steel threads with ample Teflon tape
- Cover unused connections with a cap
- Screw membrane tubes hand-tight
- Non-perforated surfaces must be aligned upwards and downwards
- Do not install damaged membrane tubes
- Screw membrane tubes last of all to avoid risk of damage
- The storage till installation/commissioning should not exceed 1 year. Protect from sunlight!

3.4.2. Aerator unit in rectangular container

It is recommended to correctly determine the components directly in the tank and assemble the aerator unit there.



①

- Seal
- Screw



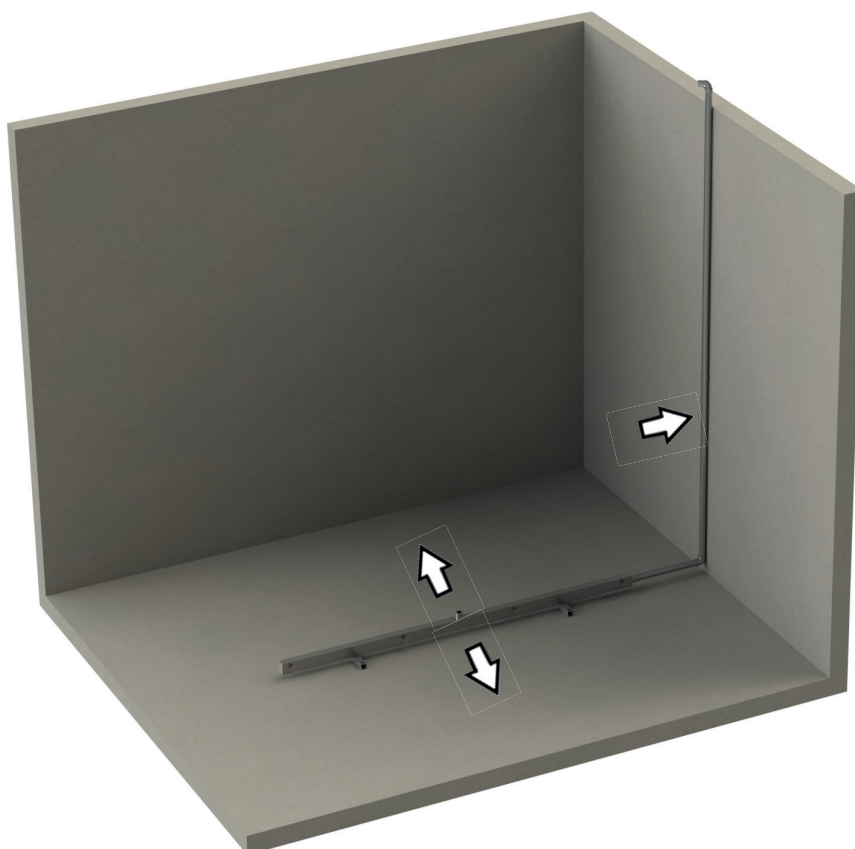
②

Before aerator beams and downpipe are fixed, they must be properly positioned.

- The vertical downpipe must be situated on the wall
- The aerator beams must be positioned as shown in the plan



Information is valid in each case for one aeration unit



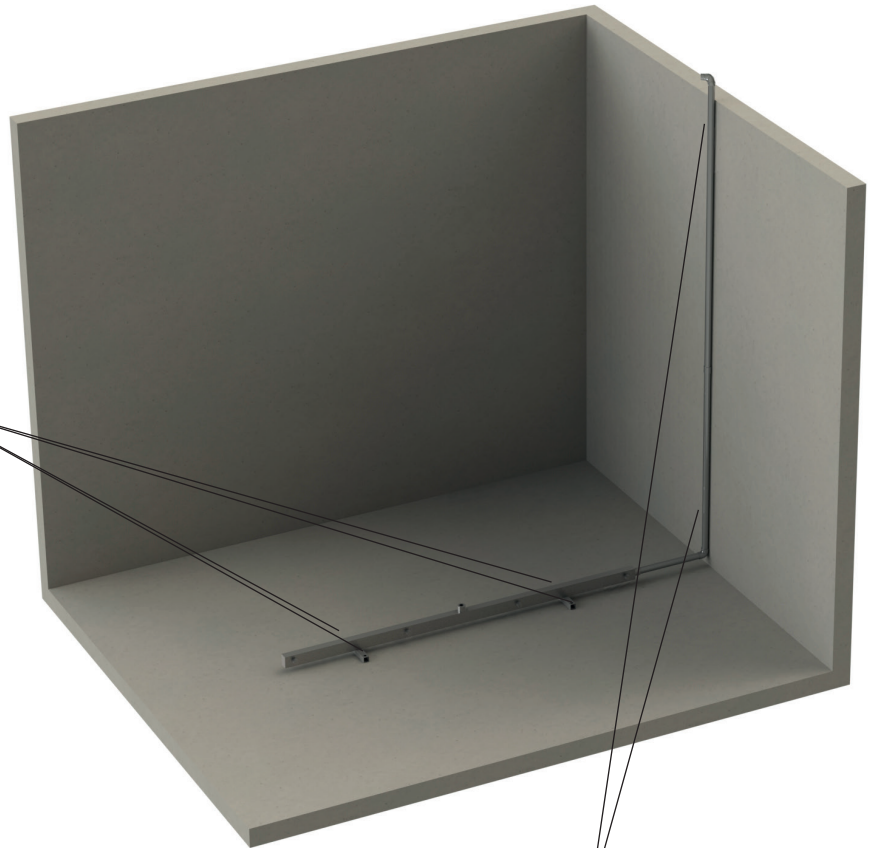
Assembly instructions for wastewater treatment plants from 50 PE

③

Fixing aerator beams and downpipe



Fixing the beam on the tank floor through the holes on the four feet with M8 x 80 bolts and 10 x 50 fixing plugs. Drill fixing holes for this (Ø10mm).



Fixing the downpipe on the tank wall with the help of hammer anchors and pipe brackets.

Instructions for fixing hammer anchors

- Drill a hole (Ø8mm) with a depth of about 40mm
- Clean the drilled hole
- Strike hammer anchor in concrete
- Tighten the nut

④

Screwing on the membrane tube aerators

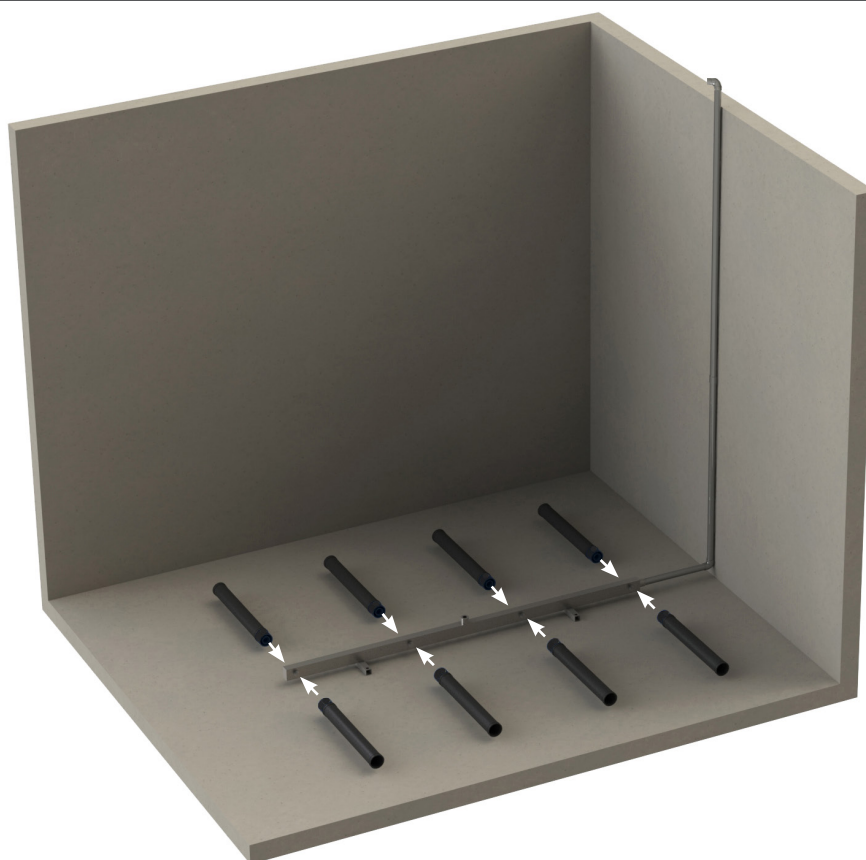
Attention:

The membrane surface is sensitive and must not be damaged. Be careful with sharp tools.

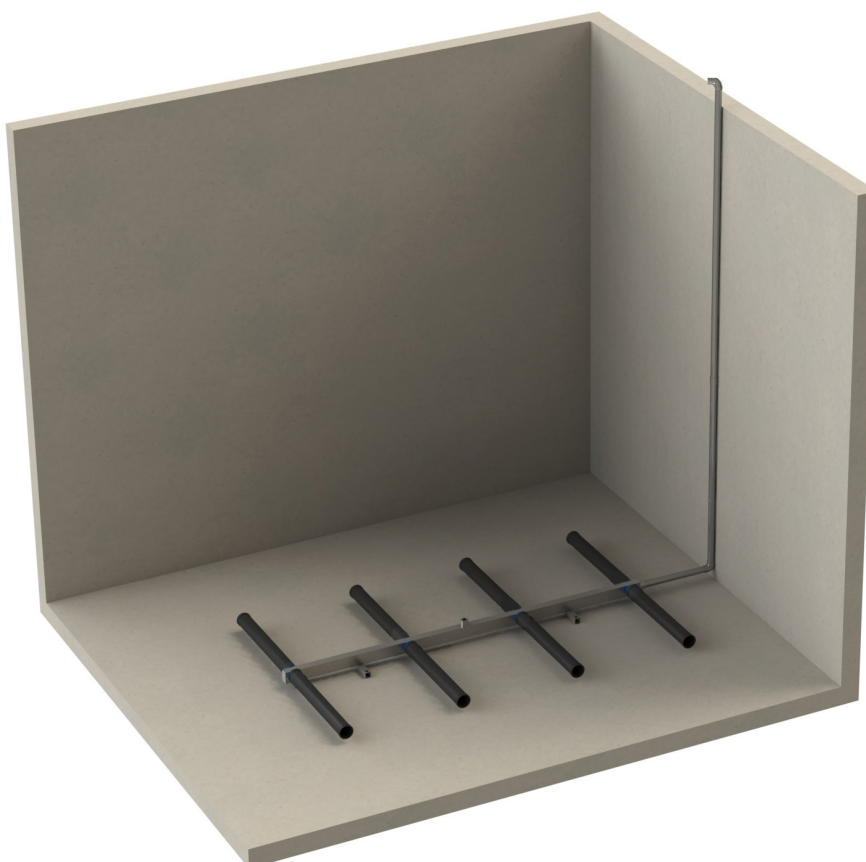
Tip:

Screwing on the membrane tubes may also be carried out after mounting the lifter.

This prevents the membrane from being a tripping hazard and thereby from potentially being damaged.

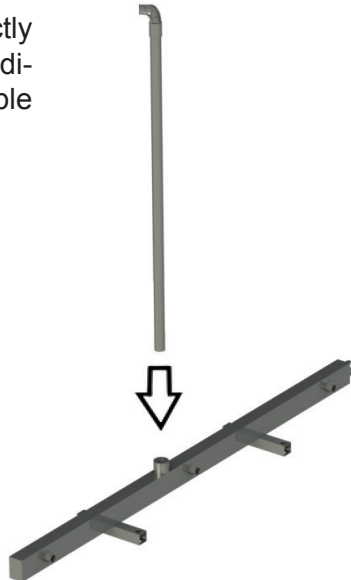


Pre-assembled aerator unit in the square tank



3.4.3. Aerator unit in round container

It is recommended to correctly determine the components directly in the tank and assemble the aerator unit there.



Information is valid in each case for one aerator unit

①

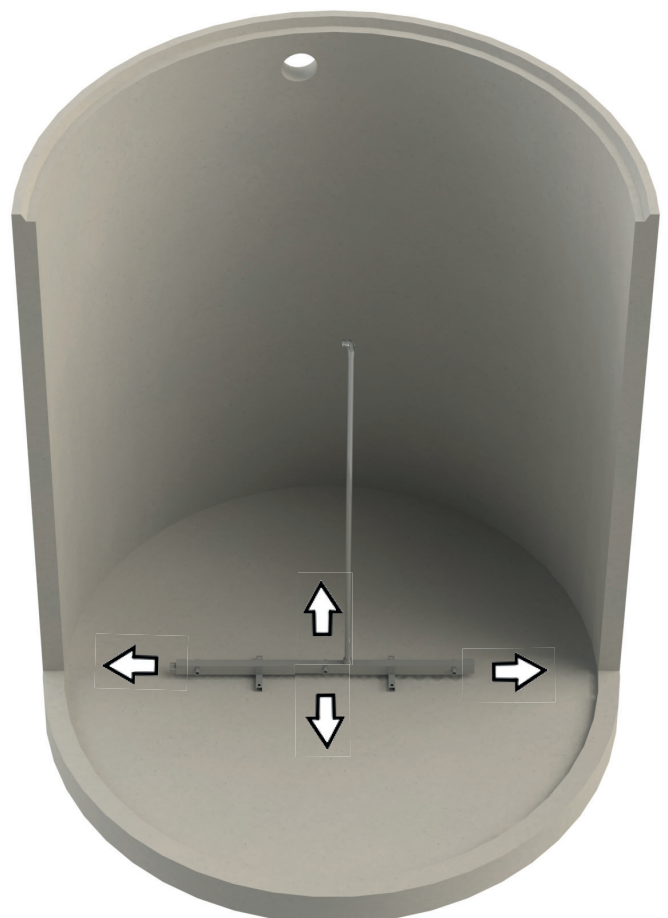
- Seal threads with Teflon tape
- Screw on the stainless steel pipe



②

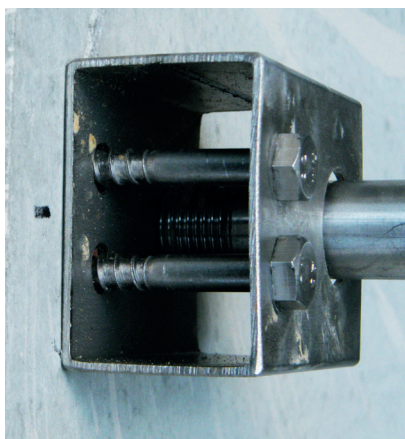
The aerator beams and down-pipe must be properly aligned before they are fixed.

The aerator beams should be placed as centrally as possible.



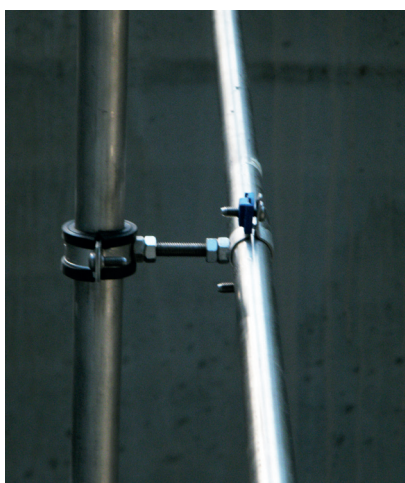
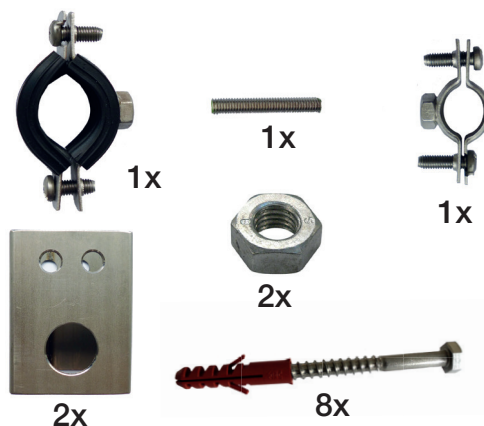
3

Fixing the downpipe with the help of a cross member.

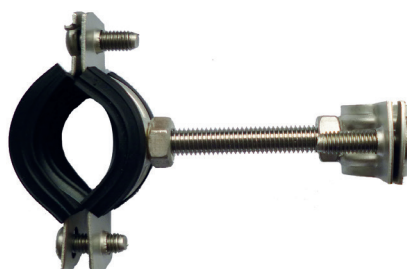


The cross member is attached with mounting brackets as high as possible on the tank wall. The mounting brackets are fixed with M8 x 80 bolts.

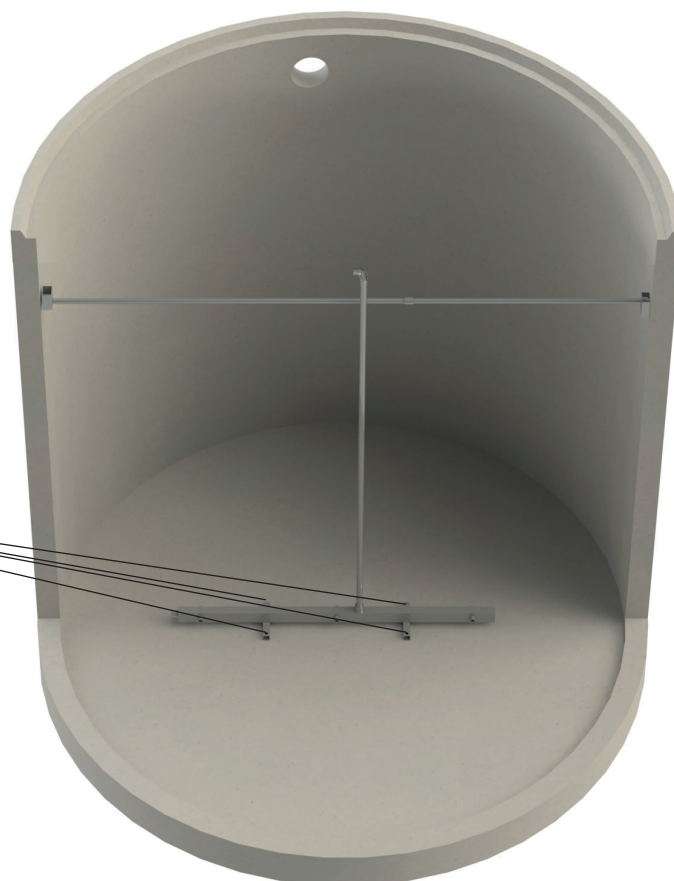
Parts required:



Fix the vertical vent pipe and the cross member with pipe brackets.



Fixing the beam on the tank floor through the holes on the four feet with M8 x 80 bolts and 10 x 50 fixing plugs. For this drill a hole (Ø10mm).



④

Screwing on the membrane tube aerators.

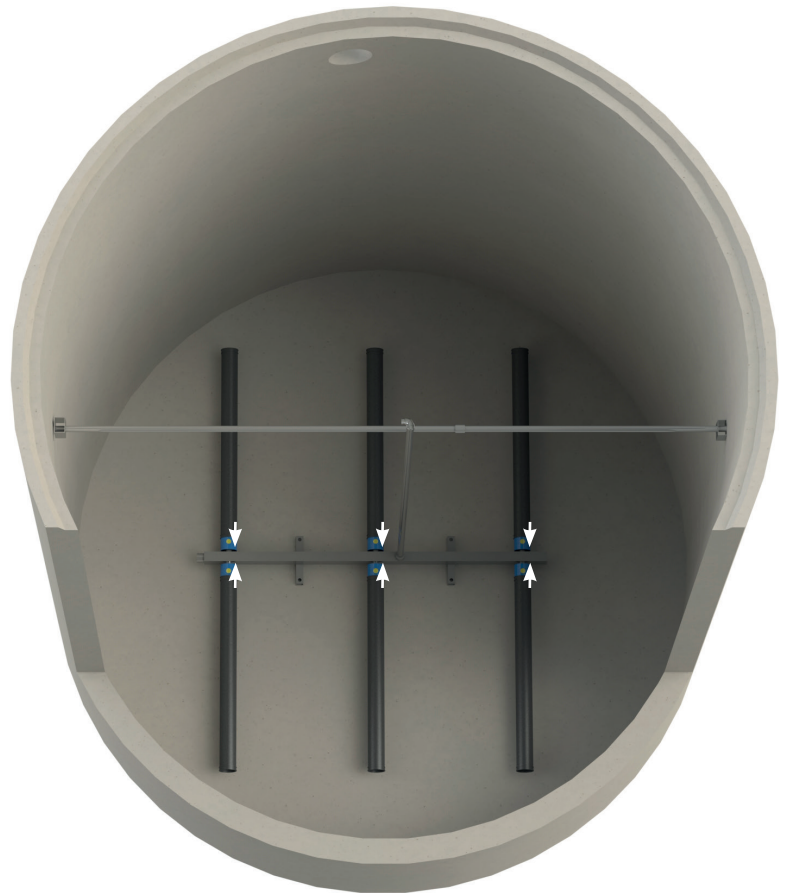
Attention:

The membrane surface is sensitive and must not be damaged. Be careful with sharp tools.

Tip:

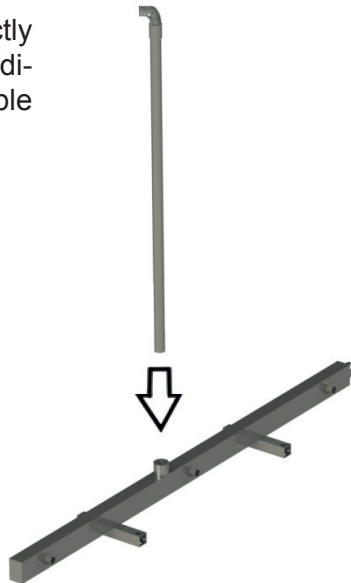
Screwing on the membrane tubes may also be carried out after mounting the lifter.

This prevents the membrane from being a tripping hazard and thereby from potentially being damaged.



3.4.4. Aerator unit in round container with dividing wall

It is recommended to correctly determine the components directly in the tank and assemble the aerator unit there.



①

- Seal threads with Teflon tape
- Screw on the stainless steel pipe
- Close unused openings on the beam (Side oriented towards the dividing wall)



Parts required:

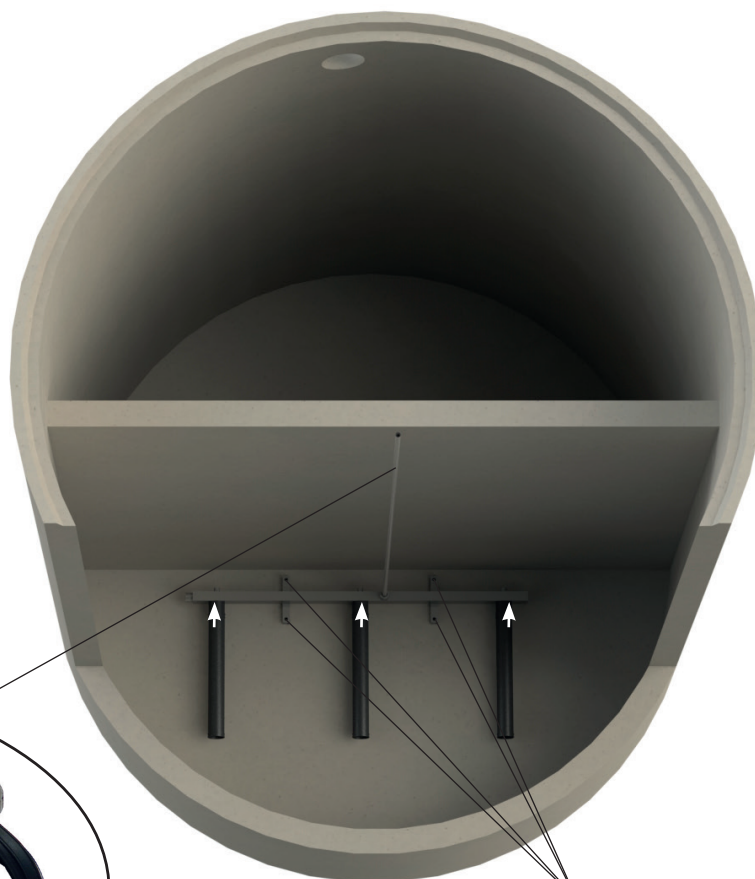
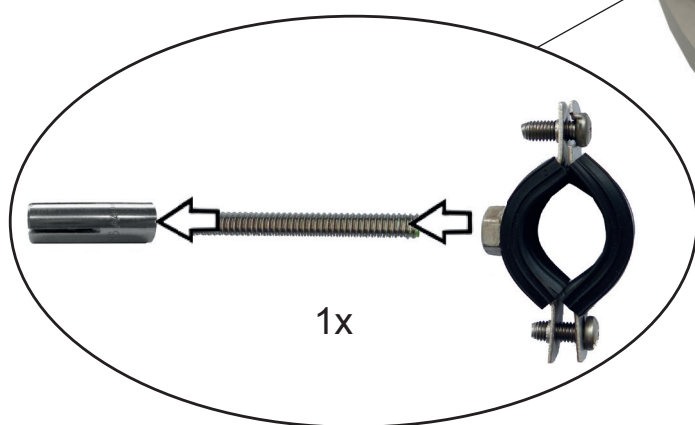


②

Fixing the downpipe on the dividing wall.

Due to the foot of the aerator beam, the distance between the down pipe and the dividing wall is too large for fixing with anchor bolts.

Fixing should be performed with an M8 impact fixing on the wall. The pipe brackets can then be fixed with a threaded bar at the appropriate distance.



Fixing the beam on the tank floor through the holes on the four feet with M8 x 80 bolts and 10 x 50 fixing plugs. Drill fixing holes for this (Ø10mm).

③

Screwing on the membrane tube aerators.

Attention:

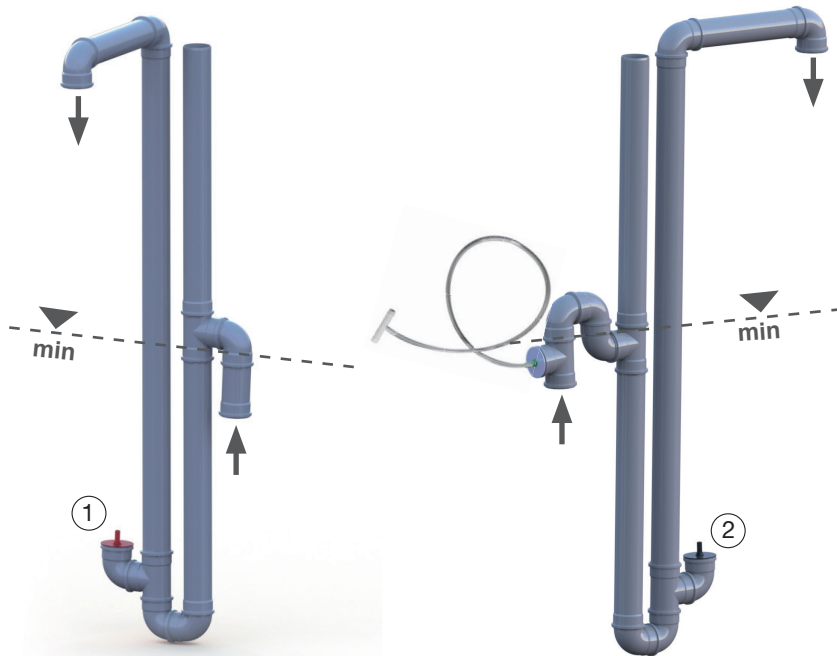
The membrane surface is sensitive and must not be damaged. Be careful with sharp tools.

Tip:

Screwing on the membrane tubes may also be carried out after mounting the lifter.

This prevents the membrane from being a tripping hazard and thereby from potentially being damaged.

3.5. Installation of the lifts



min = minimum water level

Charging pump

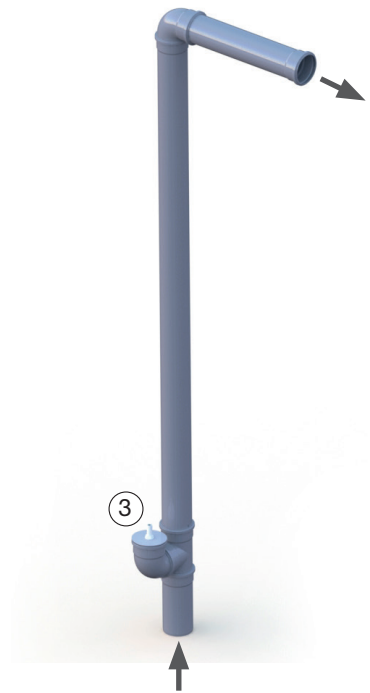
The charging pump conveys the pre-clarified wastewater into the SBR chamber.

The charging pump has a **red (1)** hose connection.

Clear water pump

The clear water pump conveys the clarified water into the discharge.

The clear water pump has a **black (2)** hose connection. A smaller connection for the air barriers is located in the inlet area



Excess sludge lifter

The excess sludge lifter conveys the activated sludge not required from the SBR chamber back into the pre-clarification.

The excess sludge lifter has a **white (3)** hose connection.



Attention:

If the actual tank dimensions vary from the pre-planned dimensions, adjustment to the lifter lengths may be required. This should be carried out in consultation with a GRAF technician.

Positioning the pipe brackets

The pipe brackets are fixed to the concrete with the aid of a hammer anchor.

Instructions for fixing hammer anchors

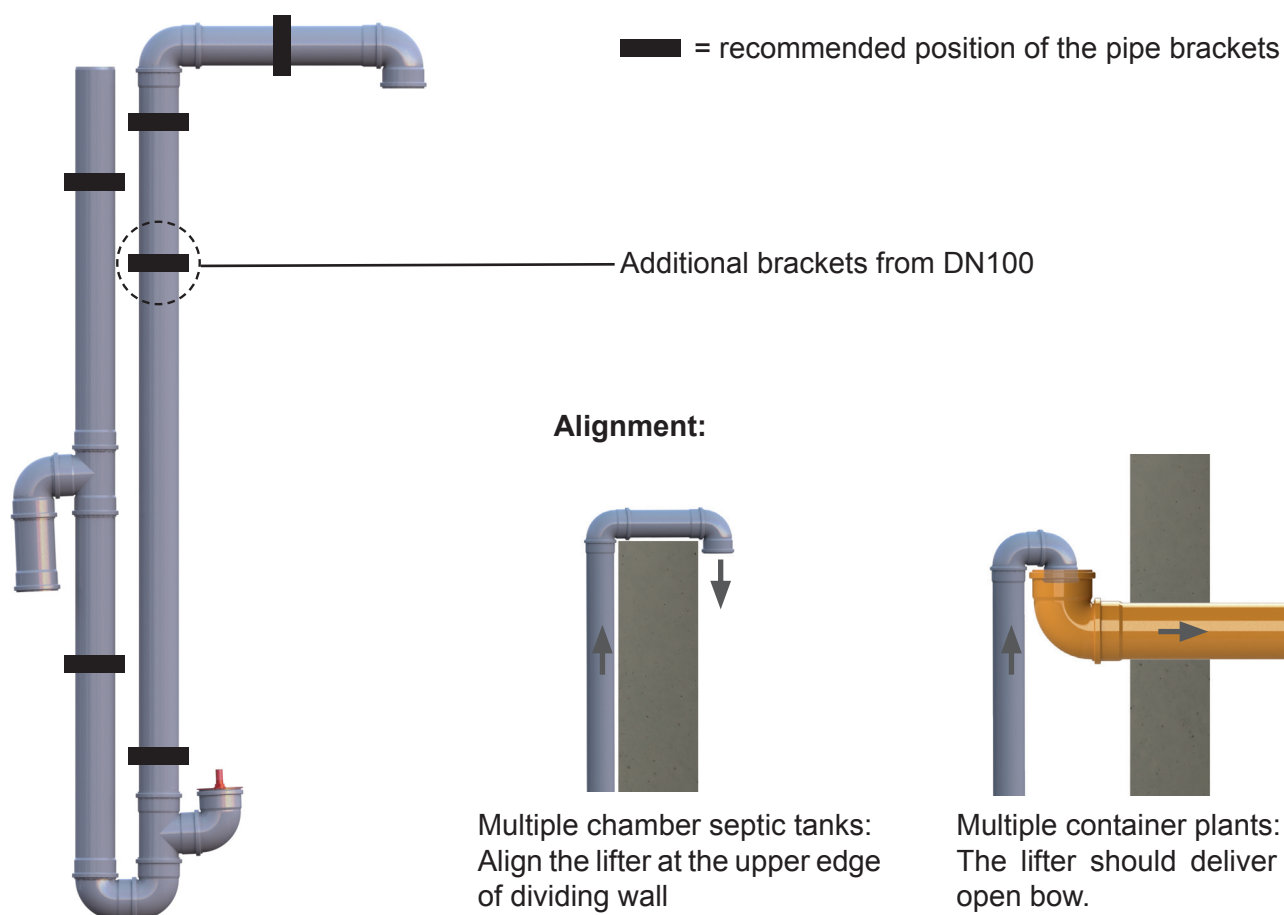
- Drill a hole (Ø8mm) with a depth of about 40mm
- Clean the drilled hole
- Strike hammer anchor in concrete
- Tighten the nut

Parts required:



Charging pump

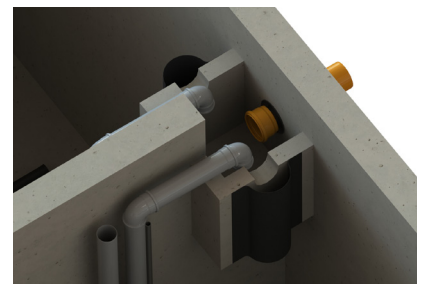
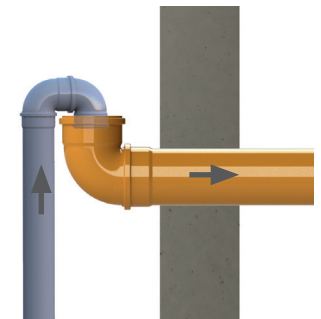
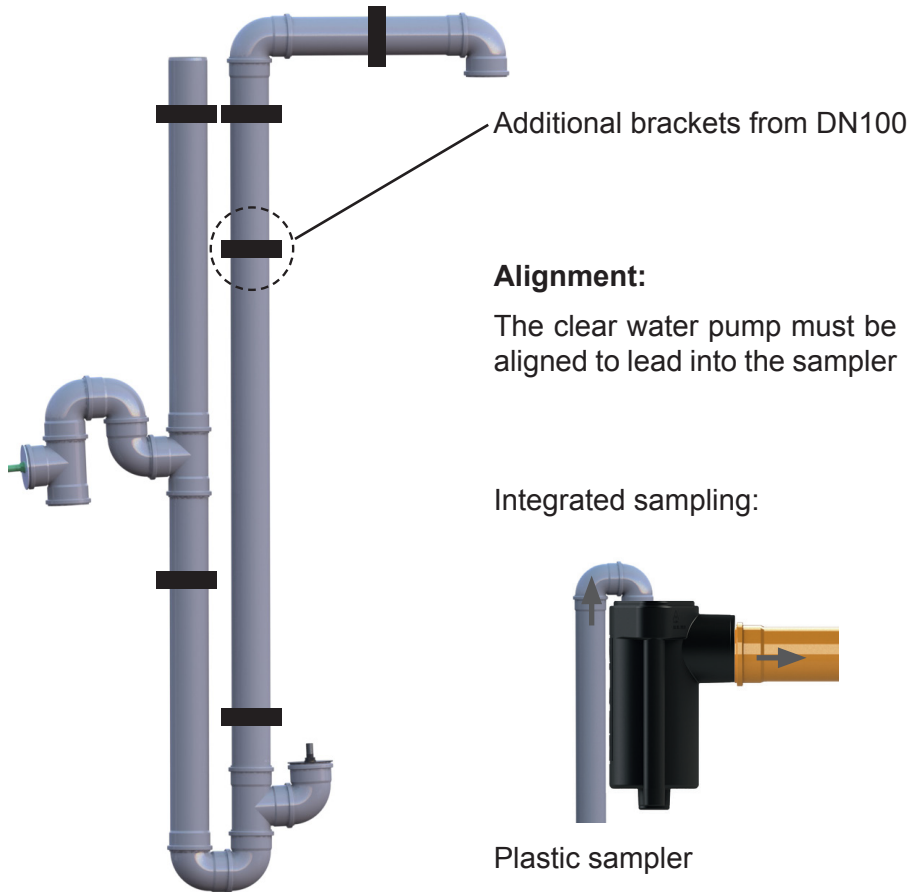
is mounted in the pre-clarification tank



Assembly instructions for wastewater treatment plants from 50 PE

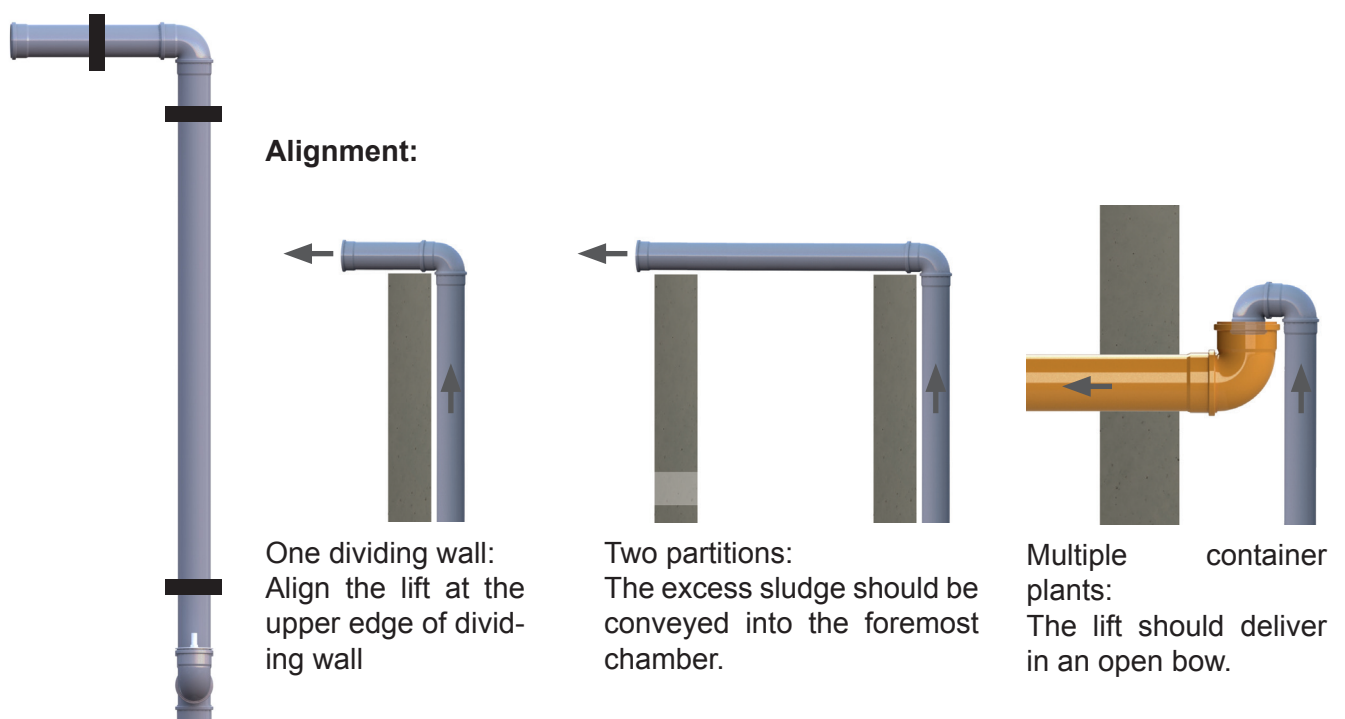
Clear water pump

is mounted in the SBR tank

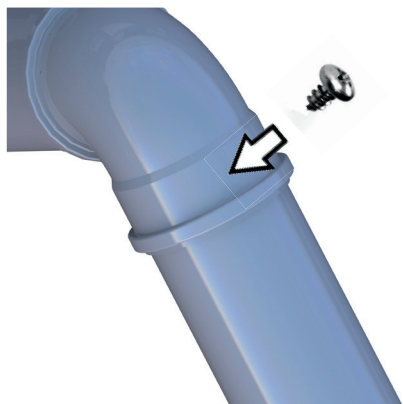


Excess sludge lifter

is mounted in the SBR tank



Secure pipe connections with self-drilling screws



Important!

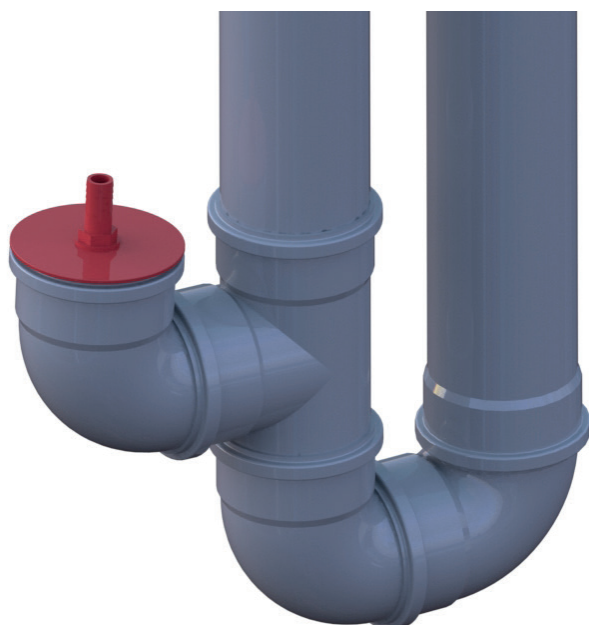
Parts required:



1x (from DN100 2x)

Tighten **all** loose pipe connections with the aid of the self-drilling screws.

3.6. Installation of the air tubes



Parts required:



2x



10x

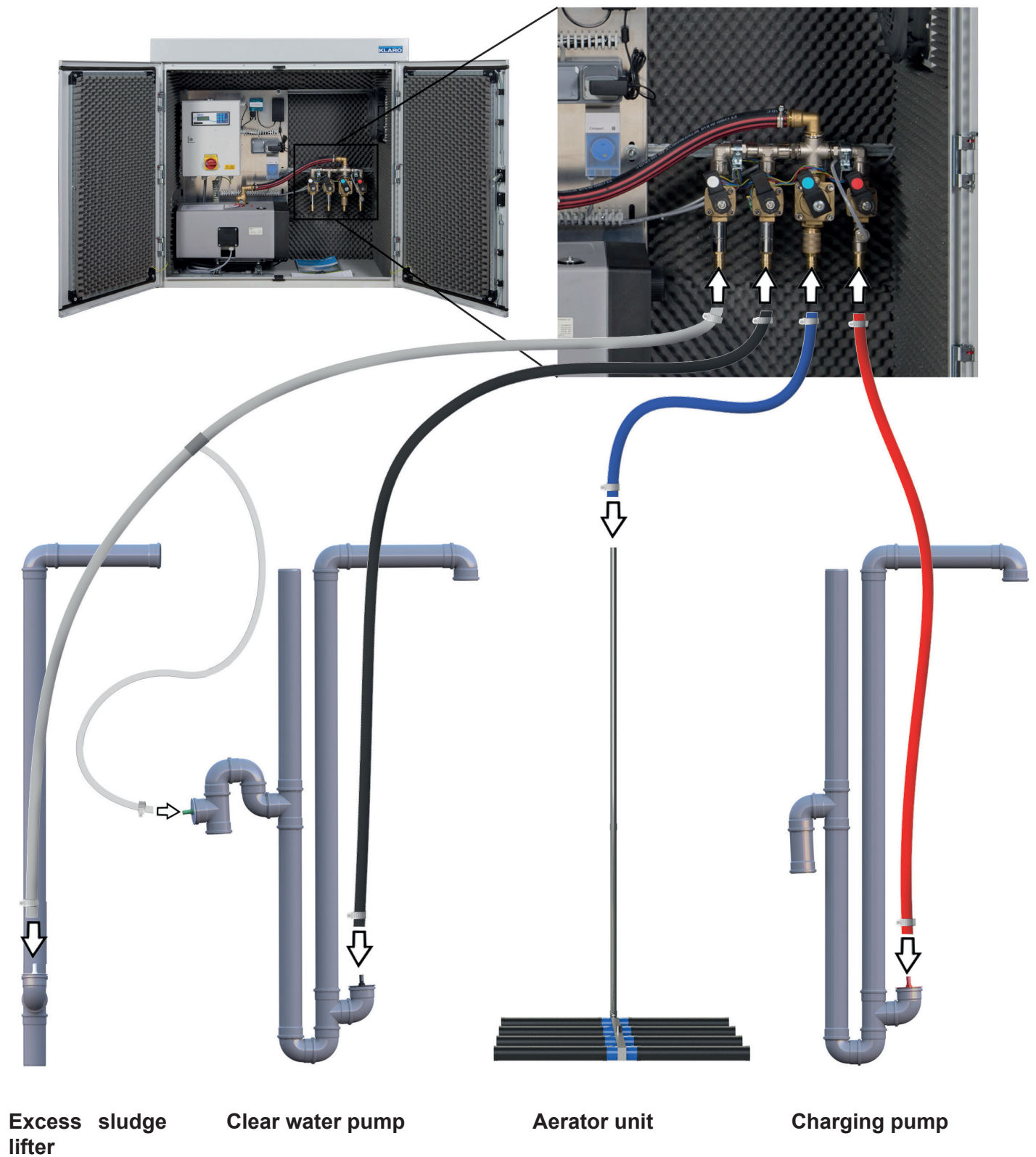


The air connections of the lifter are colour coded.

The same colours are found in the connections in the control cabinet.

Assembly instructions for wastewater treatment plants from 50 PE

a) Connecting the tubes



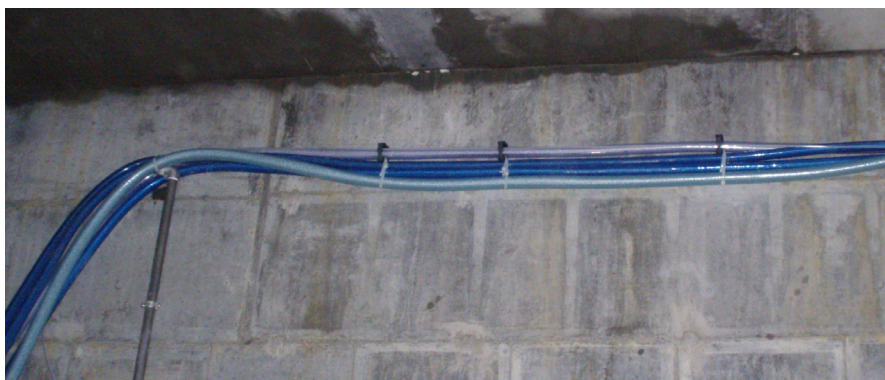
b) Bundling and fixing the tubes in the tank



Parts required:



The hoses can be bundled and fixed to the wall with the help of cable ties and plastic brackets.



4. Installation of the control cabinet

You will find a product description and technical data for your control cabinet in the assembly and original operating instructions included with the cabinet.

5. Commissioning the plant

After installing the retrofit kit, connecting the air hoses in the tank and installing the control cabinet, the entire system must be filled with fresh water. Only then the system can be put into operation. Information about commissioning can be found in the assembly and original operating instructions included with the control cabinet.



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