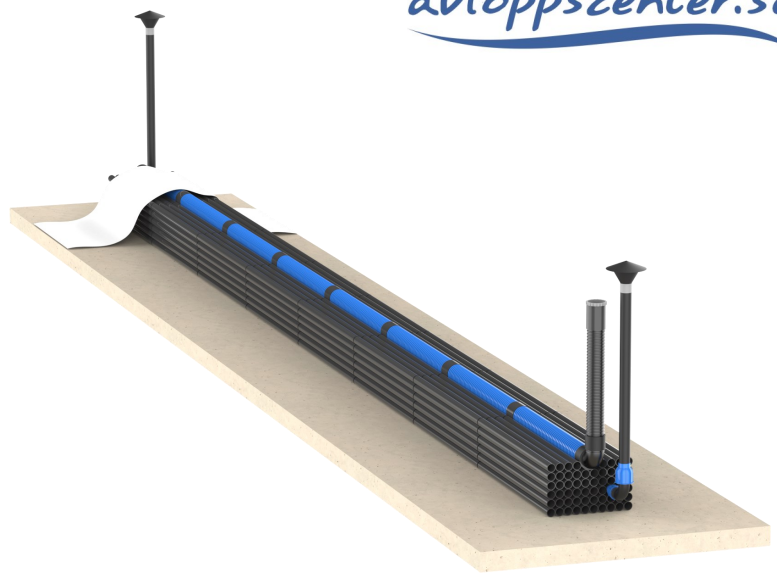


AC Biomodule package

Choose biomodule with spreader plates if you want to reduce on gravel, length and height.



AC biomodule are made of a carrier material that has been used and tested for many years in various types of treatment plants and is used by several suppliers.

A natural bio skin is formed on the tubular carrier material which breaks down the pollutants and nitrogen in the wastewater.

The construction of the biomodules means that the bacterial culture that lives in the bio skin receives optimal oxygenation, and that reduces the risk of clogging.

No distribution well is needed when using only one spreader line.

Benefits with AC Biomodule

- Purification Functions are optimized through a very good oxygenation in the patented modules.
- The pollutant in the wastewater breaks down by the bioskin in the tubular modules.
- Wastewater is distributed and spread over a larger surface than in an
- The area is reduced by 40% compared to a traditional infiltration.

Benefits with AC Biomodule and spreader plates

- Water is spread over a much bigger area using the spreader plates
- Reduces the area of the bed with additional 11%.
- Gravel as a spreading layer is omitted.

Before installation and application

Preliminary investigation

To make a good preliminary investigation is the first step important towards a properly designed and well-functioning facility.

Among other things the inspection covers, the terrain, the nature of the land, groundwater level and drinking water sources.

With the help of this survey, you can choose the correct location of the facility and whether it should be an infiltration or soil bed.

Life span

A properly installed infiltration or soil bed has a lifespan of at least 20–30 years provided that the sludge separator is effective and does not release sludge in the subsequent bed.

Sludge stop filter in the sludge separator or sludge stop well is a good investment in many cases if the sludge separator is not optimal or if you have large flows.

Land Slope and Topography

When choosing the location of the infiltration or soil bed, you must consider the slope of the ground and topography.

You want to place the bed so that the purified wastewater is spread and diverted in the best way in the ground and so that meltwater and rainwater enters the bed as little as possible.

For the purified wastewater to be diverted in the best way, the bed must be laid across the direction of how it flows which is usually the same direction as the slope of the ground.

External water can not be led to the bed

- Only water that comes from the house's drains may be directed to the sludge separator and the bed.
- Leakage with old pipes is a common problem and cannot occur.
- Backwash from drinking water filters can never be directed to the drain.

Dimensions

The tables on the different packages indicate the size of the beds based on the number of households for the different types of beds that can be used.

For dimensioning of larger facilities, contact us and we will help you.

A facility for a household is always dimensioned for 5 people (5 PE, person equivalents)

Dimensioning volume is 150 liters per person at BDT + WC

The design of the bed can be changed, if the surface is the same, the length can be halved but then the width must be doubled.

Before installation and application

Cutoff drainage

A bed cannot be supplied with water other than sludge-separated water. Also not external water from surrounding land for example, rainwater that can leak into the facility.

A cut-off drainage is installed upstream of the bed. The drainage can be open as a ditch or hidden as covered drainage.

It is important that the drainage is dug deep enough.

It must be deeper than the bottom of the infiltration / soil bed.

Note that the minimum distance between the cut-off drainage and the bed is 2 meters.

Location of the facility

The sludge separator does not have to be near the bed. It normally works to pump from the sludge separator to the bed.

When choosing the location of the infiltration or soil bed, the soil must be considered to the slope and topography.

You want to place the bed so that the purified wastewater is spread and diverted in the best way in the ground and so that the meltwater and rainwater encumber the bed as little as possible.

Please note that you must also consider the groundwater level, boreholes and drinking water sources.

sewage system must be designed as follows

- The sewage plant must be constructed so it is accessible for maintenance, control, service and emptying of sewage fractions.
- Infiltrations and soil beds must be equipped with groundwater pipes that enable control of the groundwater level in direct connection to the infiltration bed.
- The facility must be placed so that it does not risk being damaged by grazing livestock, roots from vegetation or vehicles etc. Infiltration beds can't be loaded with vehicles (riding lawnmower is ok).

Conditions

It is always good to consult with the municipality's environmental and health protection office about the choice of location and facility type.

In connection with the application, an assessment is made of the planned facility and its location.

Before installation and application

Sample pits

There are two different types of test pits.

One that is deeper than 2 meters should always be done, and one that is shallower if you think you can do an infiltration.

By digging test pits in the ground where the infiltration or soil bed is supposed to lie, you get information about the land's soil type and distance to groundwater or mountains.

With the help of the soil type (grain size), the soil's infiltration capacity can then be tested (permeability).

In the case of a soil bed, you only need to know the distance to groundwater/bedrock. If you instead intend to make one infiltration bed, you also need to examine the permeability, to see if the ground can receive the purified water or not. This is done with the help of a percolation test.

If the ground conditions vary a lot, several test pits should be dug to find the worst value, so that you can ensure a long life span and good function.

The requirements for test pits vary on every municipality. Therefore, find out what applies in your municipality.

Measure the depth to the water table

The groundwater level in relation to the ground surface is very important information in order to make the right choice of sewage solution.

Measure the distance from the ground surface to the groundwater table in the test pit. If you encountered solid bedrock before the groundwater, you measure the distance between them instead.

Leave the test pit open for 2-3 days so that the water has time to drain.

ATTENTION! Ensure that animals or people cannot fall into the pit. Ensure that the pit is not filled with rainwater during the measurement.

The groundwater level can vary during the year. To get a fair result, you should measure one period of high groundwater. This is usually in the spring after the snow has melted and before the vegetation has started. Alternatively in the autumn.

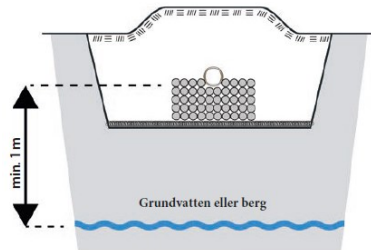
You should also check how the groundwater level compares to the normal level. This can be seen on SGU's website www.sgu.se

Before installation and application

Protective distance to groundwater or mountains

Infiltration of wastewater into the ground (also applies to soil beds that do not have a waterproofing layer), the distance between the bed's spreader pipe and groundwater, or mountains, must always be at least 1 meter.

If this cannot be achieved, an elevated infiltration or a soil bed with a waterproof layer (rubber cloth) can be placed under the bed.



Protective distance to water sources

Possible sources of drinking water within a radius of approx. 100-200 meters of the intended facility must be considered, including wells that are not in use.

This differs in municipalities, so ask what applies to your municipality.

The following ground rules should be followed:

1. The facility is placed downstream in the groundwater stream, counted from the water source.
2. The level of the groundwater surface in the water source must be at a higher level than the groundwater under the facility.

The horizontal protection distance should be so long that it takes the groundwater 2-3 months to transport. The transport time depends on the slope of the ground and the type of soil that contains in the ground.

If you are unsure, it is best to use a protective distance of 50 meters, which is usually enough.

If you still must put the sewage system within a closer distance or upstream the drinking water source, a thorough geohydrological investigation must be done.

If necessary, you can make a dense soil bed with rubber cloth and divert the purified water to a better place.

Infiltration or Soil bed, which should I choose?

The choice between infiltration or soil bed depends above all on the permeability of the soil (LTAR) and the distance that can be obtained from the spreader pipe of the bed down to groundwater or rock. If the level is below the protective distance of 1 meter, an elevated infiltration with extra soil bed sand is added so that you reach 1-meter protective distance.



Soil analysis with percolation test to get the important LTAR value

Different soil types works differently to infiltration. If the ground consists of fine soils the ground can be too dense to infiltrate, for example in clay. If the ground consists of very coarse soils, it is advisable to have an enhanced infiltration so that the water does not pass through the ground too quickly.

With a percolation test, you can easily determine the permeability of the soil.

The result of a percolation test is an LTAR value. (Long Term Acceptance Rate / Long-term load value).

Ground bed, LTAR less than 15

Soil bed is used if the soil consists of dense masses (LTAR < 15) that it cannot absorb the water that it is charged with or if the groundwater level is so high that the protective distance of 1 meter between the spreader pipe and the highest groundwater level cannot be achieved.

Simple Infiltration, LTAR 15-50

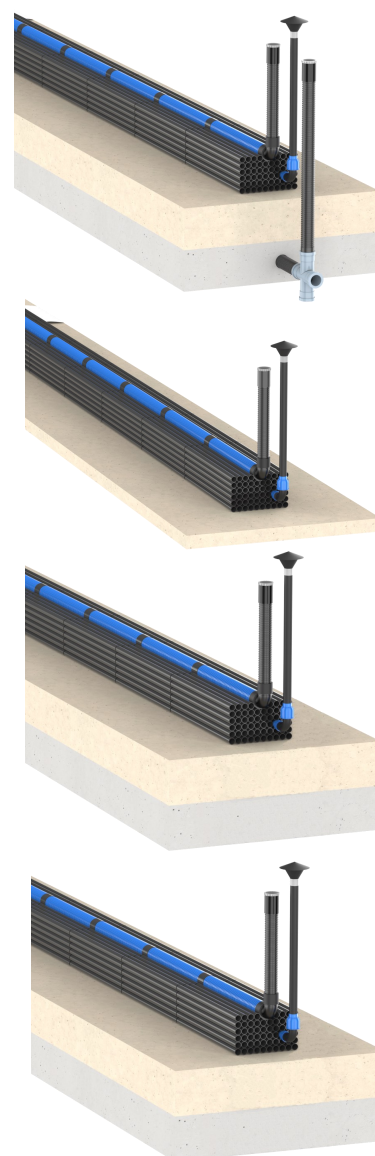
This variant can be used if a percolation test gives an LTAR value between 15 and 50 and if the distance between the bed's spreader pipe is at least 1 meter.

Increased infiltration, high groundwater or rock, LTAR 15-50

If the highest level of the ground water is so high that the protective distance of 1 meter between the bed's spreader pipe and ground water or mountain cannot be obtained, an elevated infiltration with extra soil bed sand is added so that the protective distance of 1 meter is reached.

Increased infiltration, LTAR greater than 50

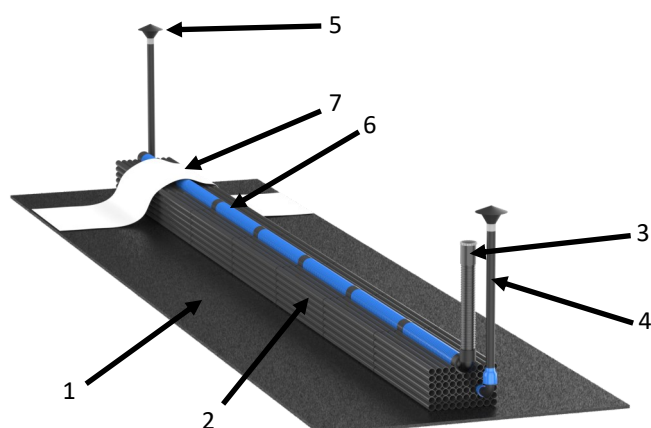
If the masses in the soil have too high permeability, and if the percolation test gives an LTAR value higher than 50, the water will flow through too quickly. Then you can make an enhanced infiltration with soil bed sand of 400 mm.



Simple Infiltration, LTAR 15-50

This variant can be used if a percolation test gives an LTAR value between 15 and 50 and if the distance between the spreader tubes of the bed is at least 1 meter.

- Spreading mat or spreading layer of gravel 100mm, 8-16 or 16-32 mm
- Biomodules (550x1100x275 mm)
- Cleaning cap, 110 mm
- Ventilation pipe, 50 mm, 2 pcs
- Ventilation hood, 2 pcs
- Spreader pipe, blue
- Fiber cloth



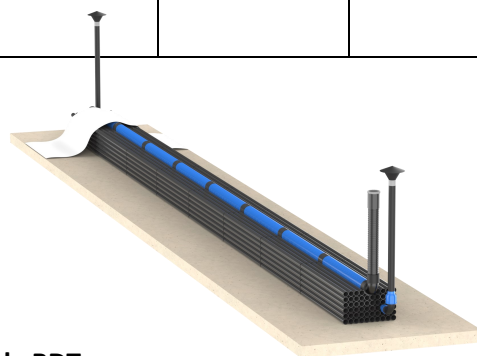
Infiltrations with spreader plates

BDT+WC

Number of households	Area of the bed	Length x width	Number of package
1	16 m ²	8x2 meter	1 st
2	32 m ²	8x4 meter	2 st
3-4	48 m ²	14x4 meter	3 st

Only BDT

Area of the bed	Length x width	Number of packages
11 m ²	5,5x2 meter	1 st
22 m ²	11x2 meter	2 st
33 m ²	8,25x4 meter	3 st



Infiltrations without spreader plates

BDT+WC

Number of households	Area of the bed	Length x width	Number of packages
1	18 m ²	9x2 meter	1 st
2	36 m ²	18x2 meter	2 st
3-4	54 m ²	18x4 meter	3 st

Only BDT

Area of the bed	Length x width	Number of packages
14 m ²	7x2 meter	1 st
28 m ²	14x2 meter	2 st
42 m ²	10,5x4 meter	3 st

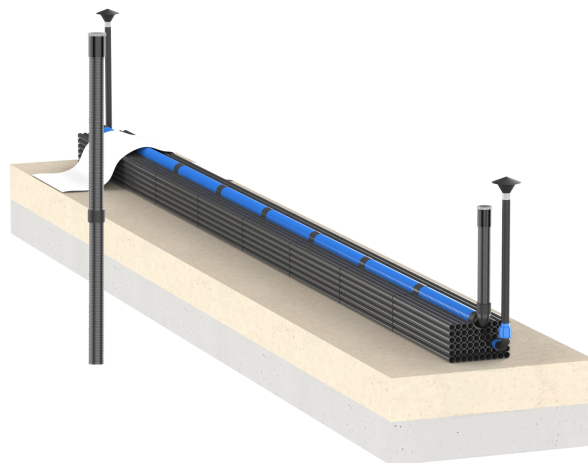
The design of the bed can be changed, as long as the area is the same.

Each string is 2 meters wide, maximum length of a string by default is 15 meters otherwise pumping is required.

Increased infiltration, high groundwater or Mountain, LTAR 15-50

If the highest level of the groundwater is high so the protective distance of 1 meter between the bed's spreader pipe and groundwater or rock cannot be obtained, an elevated infiltration with extra ground bed sand is added so that the protective distance of 1 meter is reached.

1. Sand 0.2-8 mm, so the protective distance of 1 meter is reached
2. Spreading mat or spreading layer of gravel 100mm, 8-16 or 16-32 mm
3. Biomodules (550x1100x275 mm)
4. Cleaning cap, 110 mm
5. Ventilation pipe, 50 mm, 2 pcs
6. Ventilation hood, 2 pcs
7. Spreader pipe, blue
8. Fiber cloth



Infiltrations with spreader plates

BDT+WC			Only BDT			
Number of households	Area of the bed	Length x width	Number of packages	Area of the bed	Length x width	Number of packages
1	16 m ²	8x2 meter	1 st	11 m ²	5,5x2 meter	1 st
2	32 m ²	8x4 meter	2 st	22 m ²	11x2 meter	2 st
3-4	48 m ²	14x4 meter	3 st	33 m ²	8,25x4 meter	3 st

Infiltrations without spreader plates

BDT+WC			Only BDT			
Number of households	Area of the bed	Length x width	Number of packages	Area of the bed	Length x width	Number of packages
1	18 m ²	9x2 meter	1 st	14 m ²	7x2 meter	1 st
2	36 m ²	18x2 meter	2 st	28 m ²	14x2 meter	2 st
3-4	54 m ²	18x4 meter	3 st	42 m ²	10,5x4 meter	3 st

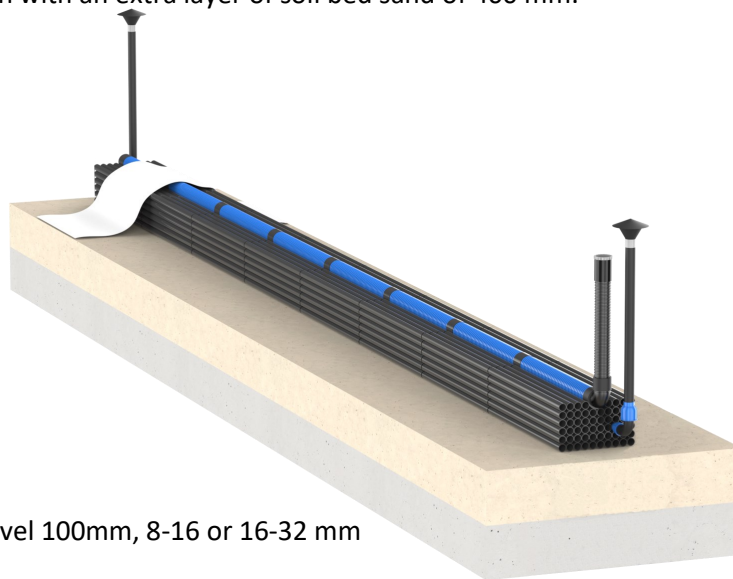
The design of the bed can be changed, as long as the area is the same.

Each string is 2 meters wide, maximum length of a string by default is 15 meters otherwise pumping is required.

Increased infiltration, LTAR greater than 50

If the percolation test gives an LTAR value higher than 50, the water will flow down through the bed too quickly, impairing purification.

Then you need to make an enhanced infiltration with an extra layer of soil bed sand of 400 mm.



1. Sand 0.2-8 mm, 400 mm high
2. Spreading mat or spreading layer of gravel 100mm, 8-16 or 16-32 mm
3. Biomodules (550x1100x275 mm)
4. Cleaning cap, 110 mm
5. Ventilation pipe, 50 mm, 2 pcs
6. Ventilation hood, 2 pcs
7. Spreader pipe, blue
8. Fiber cloth

Infiltration with spreader plates

BDT+WC			Only BDT			
Number of households	Area of the bed	Length x width	Number of households	Area of the bed	Length x width	Number of packages
1	16 m ²	8x2 meter	1 st	11 m ²	5,5x2 meter	1 st
2	32 m ²	8x4 meter	2 st	22 m ²	11x2 meter	2 st
3-4	48 m ²	14x4 meter	3 st	33 m ²	8,25x4 meter	3 st

Infiltration without spreader plates

BDT+WC			Only BDT			
Number of households	Area of the bed	Length x width	Number of households	Area of the bed	Length x Width	Number of packages
1	18 m ²	9x2 meter	1 st	14 m ²	7x2 meter	1 st
2	36 m ²	18x2 meter	2 st	28 m ²	14x2 meter	2 st
3-4	54 m ²	18x4 meter	3 st	42 m ²	10,5x4 meter	3 st

The design of the bed can be changed, as long as the area is the same.

Each string is 2 meters wide, maximum length of a string by default is 15 meters otherwise pumping is required.

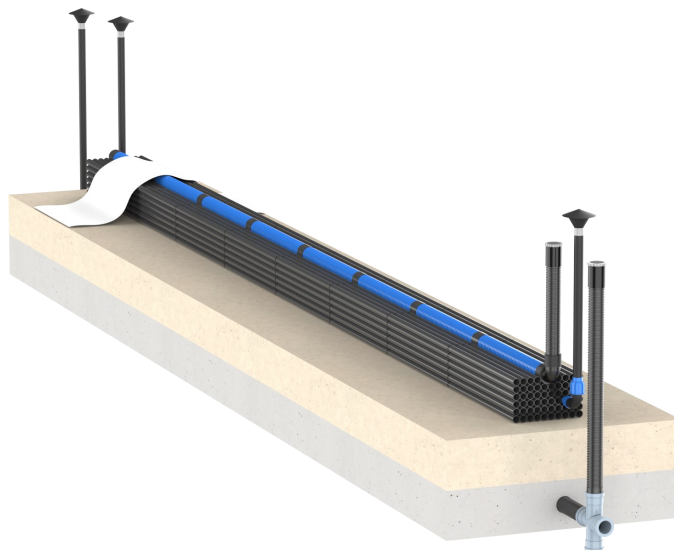
Vertical Ground bed, LTAR less than 15

Vertical soil bed is used if the soil consists of dense masses (LTAR < 15) that it cannot absorb the water it is encumbered with, or the groundwater level is so high that the protective distance of 1 meter between the spreader pipe and the highest groundwater level cannot be achieved.

Then you must use a waterproofing layer (tight rubber cloth) under the soil bed. A sealing layer may also be required if it's a particularly sensitive recipient, and the possibility of sampling must be ensured.

If the soil bed is not completely dense and the soil underneath has a relatively high permeability, it may happen that the water can't reach the sampling well after the bed.

1. Drainage layer 200 mm of gravel 8-16 or 16-32 mm
2. Sand 0.2-8 mm, so that the protective distance of 1 meter is reached
3. Spreading mat or spreading layer of gravel 100mm, 8-16 or 16-32 mm
4. Biomodules (550x1100x275 mm)
5. Cleaning cap, 110 mm
6. Ventilation pipe, 50 mm, 2 pcs
7. Ventilation hood, 2 pcs
8. Spreader pipe, blue
9. Fiber cloth



Vertical soil bed and spreader plates

BDT+WC			Only BDT			
Number of households	Area of the bed	Length x Width	Number of packages	Area of the bed	Length x Width	Number of packages
1	16 m ²	8x2 meter	1 st	11 m ²	5,5x2 meter	1 st
2	32 m ²	8x4 meter	2 st	22 m ²	11x2 meter	2 st
3-4	48 m ²	14x4 meter	3 st	33 m ²	8,25x4 meter	3 st

Vertical soil bed without spreader plates

BDT+WC			Only BDT			
Number of households	Area of the bed	Length x width	Number of packages	Area of the bed	Length x Width	Number of packages
1	18 m ²	9x2 meter	1 st	14 m ²	7x2 meter	1 st
2	36 m ²	18x2 meter	2 st	28 m ²	14x2 meter	2 st
3-4	54 m ²	18x4 meter	3 st	42 m ²	10,5x4 meter	3 st

The design of the bed can be changed, as long as the area is the same.

Each string is 2 meters wide, maximum length of a string by default is 15 meters otherwise pumping is required.

Horizontal Groundbed, LTAR less than 15

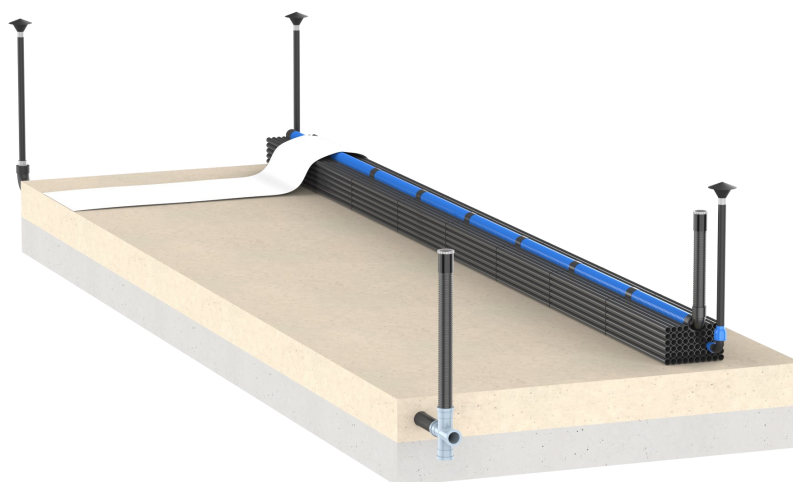
Horizontal soil bed is also used if the soil consists of dense masses (LTAR < 15) but you want a higher emission point from the bed.

An advantage of a horizontal soil bed is that you can maximize the infiltration surface against the underlying soil.

A horizontal soil bed requires 50% more surface area than a vertical soil bed.

A horizontal soil bed can also be sealed with a waterproofing layer just like a vertical soil bed.

1. Drainage layer 200 mm of gravel 8-16 or 16-32 mm
2. Sand 0.2-8 mm, so that the protective distance of 1 meter is reached
3. Spreading mat or spreading layer of gravel 100mm, 8-16 or 16-32 mm
4. Biomodules (550x1100x275 mm)
5. Cleaning cap, 110 mm
6. Ventilation pipe, 50 mm, 2 pcs
7. Ventilation hood, 2 pcs
8. Spreader pipe, blue
9. Fiber cloth



Horizontal groundbed and spreader plates

BDT+WC			Only BDT			
Number of households	Are of the bed	Length x width	Number of packages	Area of the bed	Length x width	Number of packages
1	24 m ²	8x3 meter	1 st	16,5 m ²	5,5x3 meter	1 st
2	48 m ²	8x6 meter	2 st	33 m ²	11x3 meter	2 st
3-4	72 m ²	12x6 meter	3 st	49,5 m ²	8,25x6 meter	3 st

Horizontal groundbed without spreader plates

BDT+WC			Only BDT			
Number of households	Area of the bed	Length x width	Number of packages	Area of the bed	Length x width	Number of packages
1	27 m ²	9x3 meter	1 st	21 m ²	7x3 meter	1 st
2	54 m ²	9x6 meter	2 st	42 m ²	14x3 meter	2 st
3-4	81 m ²	13,5x6 meter	3 st	63 m ²	10,5x6 meter	3 st

The design of the bed can be changed, if the area is the same.

Each string is 2 meters wide, maximum length of a string by default is 15 meters otherwise pumping is required.

Installation and excavation

Excavation

When excavating to the infiltration surface (the bottom of the bed you contract), a toothed bucket must be used. It is important not to block the soil's pores when excavating.

Self fall or pumping to the bed

- a. If the bed is connected to a self falling line, the bed must slope by 1-2 cm per meter from the inlet.
- b. If the bed relates to a pump line, the bed is placed completely flat.

The design of the bed can be changed, if the area is the same.

Each string is 2 meters wide, maximum length of a string by default is 15 meters otherwise pumping is re-

Spreader plates

The spreader plates are laid out over the bed's surface, if it is a horizontal ground bed there is no need that the spreader plates reach the entire area of the bed. Be careful so you do not damage the spreader mat by external impact before refilling.

Biomodules

Merge all biomodules.

Two black 40 mm guide tubes of PEM hose are pushed into each module to hold the modules together.

- When using ground beds, the biomodules are always placed centered on the spreader plates or spreader surface
- Infiltration on flat ground and no slope, the biomodules are placed centered on the spreader plates.
- Infiltration on sloping ground, the biomodules are placed offset towards the higher ground. The side of the biomodules is then placed 50 cm from the outer edge of the spreading surface.

Installation and excavation

The spreader pipes

In the upper side of the biomodules there is a groove for the spreader tube.

NOTE very important that the diffuser holes of the spreader pipe are directed down into the modules (marking line up).

By default

Connect the incoming ground pipe into the spreader pipe. At the other end, a bend with a cover is placed for control and flushing.

The maximum length of the spreader pipe is 15 meters by default, otherwise pumping is required.

When pumping

40 mm PEM hose is suitable for most installations and the hose should be pushed about 50 cm into a ground pipe before the spreader pipe.

Turn the inlet of the reducer to 12 o'clock vertically towards the spreader pipe.

PEM hose, sleeve, reduction and bushing are accessories.



Volume when pumping

It is important for the function that an adequate amount of water is pumped into the spreader pipe.

The volume that is pumped can never exceed the total volume of the distribution lines.

We strongly recommend using a level alarm at the pump well, if the pump stops, the sludge separator can overflow, and sludge clogs the bed.

Installation and excavation

Ventilation

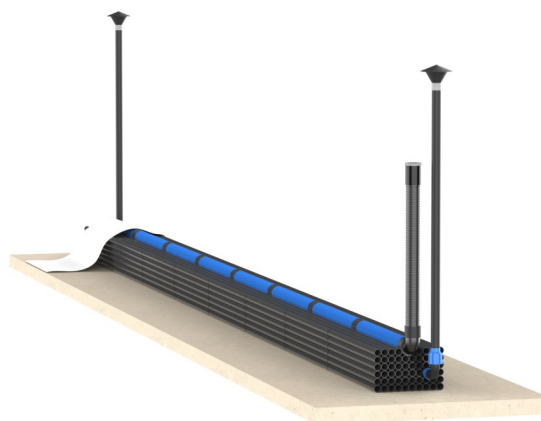
Oxygenation is very important for function.

At each end of the biomodule package shall ventilation pipes be installed, you wish to get

chimney effect with self-draft.

At the further end the short tube is inserted into the bottom row, the outermost tube of the line.

In the end where the water enters, the long pipe is inserted in the top row tube diagonally to the other tube.



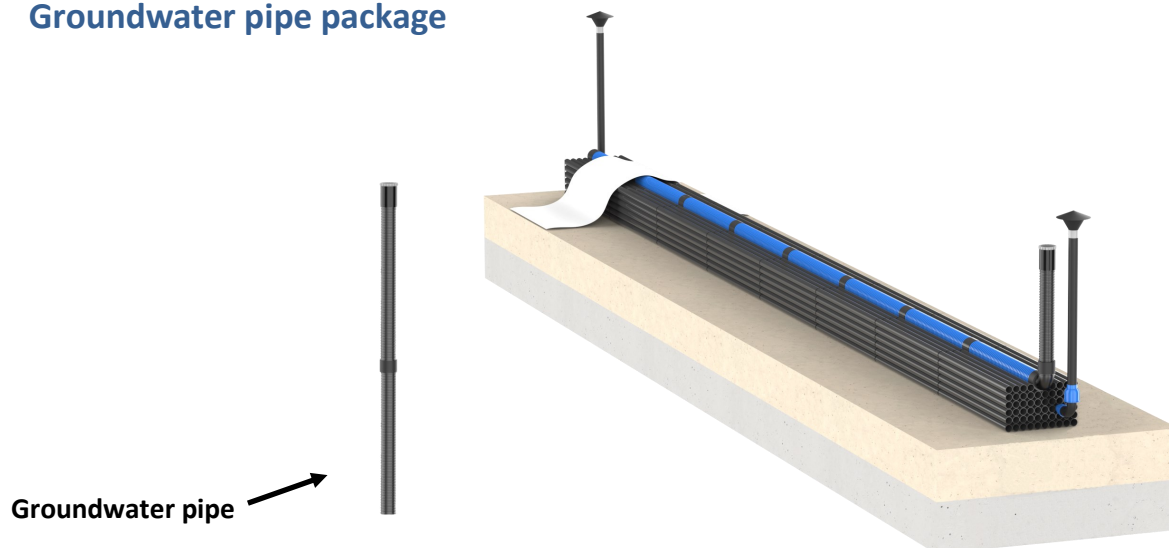
Fiber cloth

The entire bed is covered with the white fiber cloth, which is intended to prevent the backfill masses from penetrating into the plant.

Refill

1. Start by refilling on the sides of the modules.
2. Backfill around the biomodules with one bucket at a time on each side of the modules
3. Then spread lots over the entire bed
4. Refill a maximum of 70 cm of filling soil (alternatively use a pump or move the bed)
5. If there is a risk of freezing, insulate with ground boards (50-100 mm thick) closest to the spreader pipe and about. 50 cm above the sides of the bed.
6. When the bed is elevated, it is recommended that the pipe or PEM hose is isolated and placed at such a depth that there is no risk of freezing.
7. Make sure that all the ventilation pipes are straight for a nice result and that the control well cap on the spreader pipe is at the right level.

Groundwater pipe package



A new requirement is that the property owner or supervisory authority must be able to check that the infiltration or soil bed is not in the groundwater, for that the facility needs a so-called groundwater pipe that is included in the package.

In exceptional cases, when it can be proven that the distance to groundwater is so long that it is obvious that there is no risk of being affected by high levels, no groundwater pipe is required.

The latter can be considered fulfilled if the distance between the infiltration level and the groundwater level is bigger than 5 meters in gravel or bigger than 8 meters in moraine.

The bottom of the pipe should be at least 140 cm below the spreader pipe.

The pipe should be accessible and marked all year round and provided with a cover.

The filter part of the pipe is a 50cm drainage pipe and must be surrounded by washed macadam, coarser gravel or shingle.

The pipe should not be provided with a bottom, but a geotextile should be placed on top of the gravel surrounding the filter section before backfilling.

The pipe should be installed within a zone of 2-3 meters from the facility.

On a slope, the groundwater level is closer to the distribution pipe in the upstream part of the facility, therefore the groundwater pipe should ideally be placed upstream of the infiltration on slopes.

This is less important if the terrain is relatively flat.

Included in the package

2 storm water pipes black 110 mm, length 1 meter, with sleeve

1 drainage pipe 110 mm, 1 length 1 meter, with sleeve

1 threaded cleaning cap

1st Geotextile N1 1.25x10 meters

Materials and accessories that may be needed

The following materials may need to be procured separately depending on the type of bed and facility to be installed and local conditions.

- Sand 0.2-8 mm (Soil bed or reinforced / increased infiltration).
- Spreading layer of gravel 100 mm, 8-16 or 16-32 mm, not needed for packages with spreading plate
- Gravel/shingle for drainage layer eg 8-16 mm (for ground bed).
- Dense rubber cloth and penetrations in the case of a dense soil bed.
- Ground insulation boards to protect pipes and infiltration against freezing.
- VA pipe and hose for the wiring networks.
- Pump well, if there is no self fall in the system, is placed before the infiltration or after the soil bed.
- Alarm for pump well or sludge separator.
- Sludge filter or sludge filter well to secure against sludge escaping to the bed.
- Odor filter to remove odors instead of the ventilation hoods.
- Extra phosphorus purification with chemical precipitation to meet high environmental

Self-control once a year

Look down into the spreader pipe, there should not be water in the spreader or collection pipe near the soil bed, Minor odors may occur in the ventilation.

[illegible]