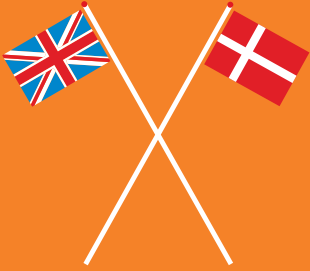


BIOKUBE



Biological cleaning of sewage water



BioKube

For 5-30 Persons

W 200 cm.

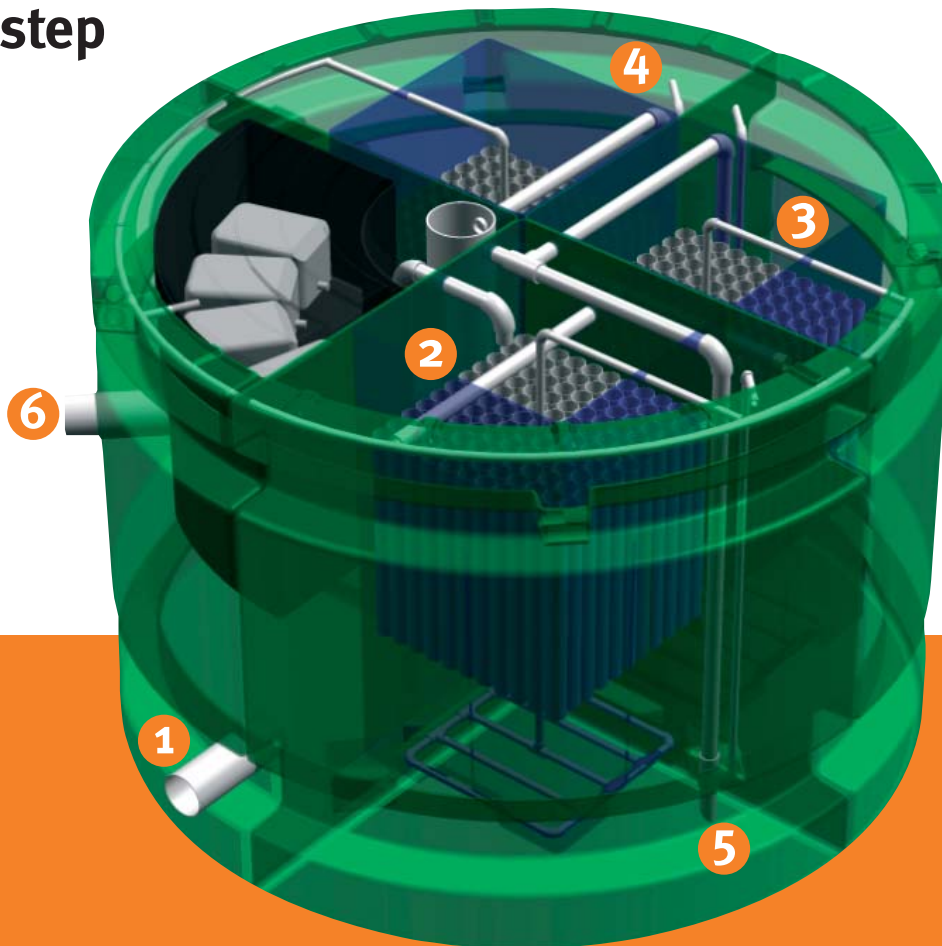
H 145 cm.

Weight 300 kg.



Purified water from a BioKube AWTS is clean and free from bacteria to a degree, which makes it possible to reuse the water for irrigation, livestock, etc.

The BioKube AWTS step by step



Break down of Hydrogen Sulphide (1)

First it is important to prevent Hydrogen Sulphide (H_2S) from reaching the AWTS (Advanced Wastewater Treatment System), as this will damage or at best hamper the bacteria needed for the cleaning process in the first cleaning chamber. H_2S is always produced by bacteria living in sewage water deficient in oxygen, which is the case in a pre-settlement tank. The unique process in the BioKube AWTS (patent pending) makes it possible for us to break down the Hydrogen Sulphide in the pre-settlement tank, thus preventing it from reaching the AWTS. The fact that our patented method eliminates H_2S already in the pre-settlement tank, reduces the bad smell of Hydrogen Sulphide in the wastewater cleaning system to an absolute minimum.

Break down of organic material (2)

The wastewater is pumped from the pre-settlement-tank (septic tank) into the first AWTS cleaning chamber at precisely timed intervals. One of the keys to our unique and stable cleaning process is based on our precise control of the inflow of the sewage water to be cleaned. The wastewater flows through the biofilter blocks, where the heterotrophic bacteria break down the organic material in the wastewater. From here the wastewater is led through a clarification chamber, where the wastewater moves

slowly, and the sludge settles through gravitation. From this chamber the water flows into the second section, where this process repeats itself. (3)

Break down of ammonium/ammonia nitrogen (nitrification) (4)

From the clarification chamber of the second section, the water gravitates into the third section. Here we find the autotrophy microorganisms, which break down the ammonium/ammonia nitrogen. This process is called nitrification. From the clarification chamber of the third section, the treated water is discharged back into nature as cleaned. The water is now so clean, that it can be led directly into a lake or stream. You can also use it for irrigation or similar purposes.

Removal of sludge (5)

The sludge, which settles in each section, is pumped back to the pre-settlement tank (septic tank) several times a day. From the pre-settlement tank the sludge should be removed once or twice a year in order to prevent any clogging.

Removal of Phosphorus (6)

The BioKube AWTS can be equipped with a phosphorus precipitation kit, if it is required that the system removes phosphorus. Phosphorus is removed by adding an Aluminum chloride to the sludge, as it is

returned to the pre-settlement tank thereby creating non-dissolvable salt, which stays in the pre-settlement tank until it is emptied once or twice a year.

Reuse of the purified water

Normally the cleaned water is led to a stream or lake. However, the water is as clean and free from bacteria, that it can be used for irrigation or water for livestock, and it even meets the standards for bath water. You can use it as you would use flood-water. If the cleaned water is used in a sprinkler system, we recommend total removal of pathogenic bacteria through ultra-violet radiation. As the pathogenic bacteria are very low in number, you do not need to add chlorine or other chemicals.

Biokube's outlet values are below:

BOD₅ < 10 mg/ltr
NH₄ < 5 mg/ltr
COD < 75 mg/ltr
E-coli < 100/100 ml
P < 1,5 mg/ml

Description of the BioKube AWTS

The BioKube AWTS is designed for biological treatment of household (domestic) sewage water. This includes water coming from the kitchen, bath and toilet.

We clean all domestic sewagewater gray and black.

The challenge

Less than 2 pct of the world's known water resources can be used as drinking water. It is therefore important that we help protect these resources from any pollution, such as wastewater. Due to shortage of water in many areas, the cleaned sewage water can be reused.

BioKube has developed simple, yet highly effective methods (patent pending), which can be used to clean domestic wastewater. Our cleaning process is unique in its stability of the cleaning process. Our system does not suffer, even if the house stays unused for longer periods of time. Our AWTS is approved and certified in accordance with the CEN norm prEN 12566-3

Using "flexibility" as the keyword, BioKube has developed a range of systems which can be upgraded for future increased demands on outlet values, or be expanded in order to connect neighbouring houses.

World class performance

Based in Denmark, BioKube has to comply with some of the strictest rules within environmental legislations. The Danish legislation in the environmental area is considered visionary in its consideration of the protection of the groundwater. It is among the strictest regulations worldwide.

Sewage water is increasingly complicated

In order to maintain or restore optimal conditions in our waters (streams) we have to reduce nutrients, chemicals and foreign compounds to the environment, which today are discharged with wastewater from the households. The composition of the household wastewater is now more complex than 10 years ago. During the last decade the water consumption per person has dropped significantly. But the low wastewater flow results in a higher concentration of

chemicals used for cleaning in the households. The combination of less wastewater with a higher concentration of chemicals and environmentally foreign compounds, demands an intensified treatment process. BioKube AWTS is designed to handle such an advanced wastewater treatment process.

We use natural bacteria

A BioKube AWTS is designed so that it employs natural principles for treating the wastewater. In nature, our water streams treat the wastewater. This happens as the water moves and thus is aerated, and thereby is provided with oxygen. The oxygen is used by the microorganisms, which live on stones and plants in the stream. This enhances the conditions for the microbiology to break down the pollution, which may be in the water.

No add-ons to nature

The BioKube AWTS has optimized the process, so that the concentration of microorganisms, oxygen and nutrients always are in an optimal balance. A BioKube AWTS takes the normal irregularities of the flow of wastewater from an individual or few households into account, e.g. high flows in the morning and in the evening, or no inflow of wastewater at all because the family is on vacation. Irregular flows of wastewater result in a great strain on the microorganisms during the cleansing process. BioKube's process control unit (patent pending) balances out the flow of the wastewater over 24 hours. This is done by pumping the wastewater from the inlet-well in small quantities and regular intervals into the AWTS. The micro-organisms are therefore offered optimal operating conditions, and treat the wastewater more efficiently than in any other solutions.

The process control (patent pending) has the following benefits:

- (1) The wastewater is treated more efficiently than by any other method
- (2) Phosphorus is removed
- (3) Formation of H₂S in the pre settlement tank is prevented
- (4) Load-swings from individual households are anticipated and are balanced out over 24-hours, so that the treatment of the wastewater becomes safer and more stable.
- (5) The operation of the system can be programmed to the needs of the individual user.
- (6) The BioKube AWTS can be remote controlled (via GSM) and are able to call for service if needed (additional software package).
- (7) Nitrate is broken down during the treatment of the wastewater, preventing this from reaching the groundwater.
- (8) The purified wastewater can be reused for irrigation.
- (9) No moving parts, i.e. drum-filters. Therefore service is reduced to a minimum.

Technical Equipment

The BioKube AWTS is supplied with a box containing all electronic devices. It can be placed on ground surface (15PE-30PE systems) or placed in the first section (5PE-10PE systems). The box contains 3 or 4 low-energy air blowers, 3-way magnet valves, dosing pump and chemicals for phosphorus treatment and the microprocessor control unit. There are no moving parts and the need for service is extremely low. A yearly check is normally fully satisfactory. The energy consumption is extremely low, only 740 Watt.





BIOKUBE

Reuse of cleaned sewage water

How do we achieve our results?

Our ability to clean sewage water more efficient than other systems is the total control over the natural bacteria, which are the basis for cleaning sewage water. We treat the bacteria like you do domestic household animals.

It's actually quite simple: provide optimal feeding and living conditions and they will perform in the best possible way!

We control the incoming sewage water

Sewage water provides food for our bacteria, and with computer-controlled pumps we secure sufficient sewage water at exact timed intervals. We also recirculate to the pre-settlement tank at regular intervals in order to secure food for the bacteria through periods of i.e. vacation. By means of our patented process we also break down the poisonous H₂S in the pre-settlement tank.

How clean is the cleaned sewagewater?

The BioKube AWTS is certified and approved in accordance to the CEN norm for prefabricated wastewater systems prEN 12566-3 with the following maximum outlet values:

BOD₅ < 10 mg/ltr

NH₄ < 5 mg/ltr

COD < 75 mg/ltr

P < 1,5 mg/ml

E-coli < 100/100 ml

How do we remove dangerous bacteria?

The BioKube AWTS contains more water than compatible systems. This gives us the possibility to treat the sewage water for a longer period of time (approx. for one week). This has the effect, that there basically is not enough food for E-coli or other dangerous bacteria to survive. As the bacteria living on the bio blocks are quite aggressive, they will eliminate most of the E-coli before they reach the last cleaning section, which provides poor living conditions for E-coli bacteria.

The number of E-coli in the cleaned sewage water is below 100/100 ml.

For safety: Ultra-violet treatment

Even though the sewage water is clean enough for irrigation or swimming, we recommend treatment of the outgoing water with ultra-violet rays, if you wish to reuse the cleaned water for airborne irrigation with sprinklers. We recommend this precaution, because bacteria entering the body through the lungs are much more harmful than bacteria entering the body through the mouth. Ultra-violet light completely eliminates all harmful bacteria and is a much better solution than the use of chemicals, such as chlorine.

The price for an Ultra-Violet treatment equipment for a BioKube AWTS is approx. 300 €, and the energy consumption is below 50 watt.



BIOKUBE

Systems for industrial waste water

We clean industrial wastewater

A BioKube AWTS is designed to treat industrial wastewater as well. Waste water from the food industry contains a heavy load of organic material, but causes no difficulties for the system.

BioKube AWTS large systems

A typical daily outlet of sewage water from a production facility within the food industry amounts to 300 m³. The largest BioKube-system we have constructed so far, is designed to treat 3.000 m³ pr. day.

BioKube large systems for recycling water

One of the larger systems under construction is designed for a golf course in southern France. They need a system, which can both clean sewage-water from their resort hotel, but also make it possible for them to reuse the water for watering especially the greens on the golf course. No problem! - see above.



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