Small scale sewage treatment system with membrane bioreactor technology

BUSSE GT

water for the next generation

Waste water treatment and recycling for decentralized areas

The modular design makes our system suitable for larger developments such us hotels, camp grounds or office buildings with up to 500 inhabitants.

Plant type GT 220, installed in a cellar

BUSSE GT turns domestic waste water into *reusable water*

The BUSSE GT Domestic Sewage Treatment System uses Membrane Bioreactor (MBR) Technology, currently the most advanced method of waste water treatment and is the first system with this type of technology in the US that has been certified by NSF International.

Fig. 1:
Complete solution for single and shared occupancy houses with a cellar

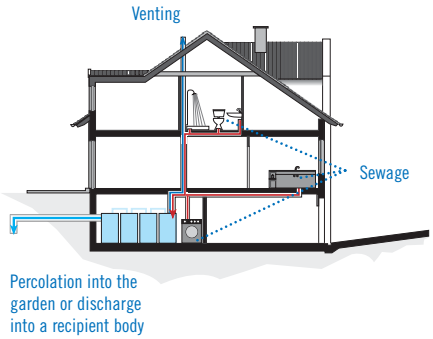
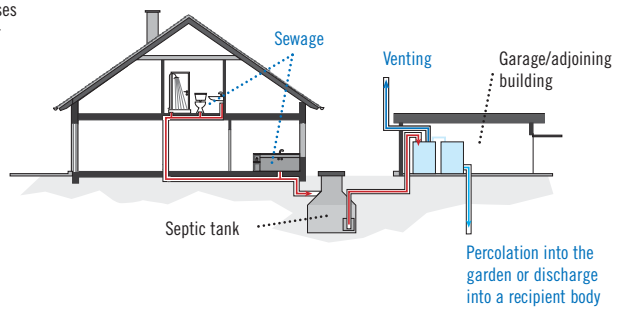


Fig. 2:
Complete solution for single and shared occupancy houses without a cellar



MBR Technology even eliminates bacteria and germs. It restores waste water to a hygienic condition fit for use as re-use water, for example, watering the garden or flushing toilets. In this way the consumption of drinking water in a household can be reduced by at least one third.

The BUSSE GT system ensures that the discharged water is cleaner than the law requires. Thus, water treated by the BUSSE GT system may be discharged in sensitive areas and water protection zones.

Since MBR technology consist of biological treatment and Membrane filtration in one process no additional treatment processes such as sand filters or other clarifiers are needed.

Other advantages of this new compact product are the small foot print and the fact that it can be installed without expensive earthmoving work.

The BUSSE GT system which consists of safety tanks can be installed in a few hours and is immediately ready for operation.

MBR module for underground installation

This system type has been developed for the waste water treatment of bigger installations such as hotels, restaurants, camp sites, office buildings and small compounds up to 100 inhabitants.
The system consists of an MBR module which is made out of polyethylene and has to be installed partly below ground.
A pumping station with aerated coarse matter separator is part of the system. This pumping unit has to be installed in an existing waste water holding tank.

System for seminar centres

This System for 50 inhabitants is installed at an automobile club and seminar center in Germany. The effluent from the system is used for watering the test driving field. The MBR stage of the system is installed in the basement of the building.
A water holding tank next to the building is used as a pre-cleaning chamber.

System for camping sites

The system for 40 inhabitants treats the waste water of a camping ground with 80 campsites.
In the winter time only the owner of the property and his family of four live at the site.
This example demonstrates one of the most important advantages of the MBR technology.
Even when the capacity of waste water entering the system varies widely because of the seasons the system works without interruption and has the same stable degradation performance throughout the whole year.

Examples/References

Container plant

The modular structure makes the Busse MBR systems fit for installation in a container as a mobile solution for waste water recycling at any place in the world. Turn-key MBR system can be delivered in all sizes from 4 to 100 inhabitants. A water holding tank next to the building is used as a pre-cleaning chamber.

System for hotels and resorts

The high degradation performance of the Busse membrane technology allows the system to treat waste water even in areas with the highest standards for environmental protection.
This example shows a Busse MBR system installed at a hotel on an island in a nature reserve. The filtrate of the system is percolated into the lake surrounding the hotel resort.

System for hotels and resorts

This system for 65 inhabitants is installed at a luxury hotel resort in Greece near the city of Sparta. The effluent is used for gardening and refilling the swimming pool. A pumping station with aerated coarse matter is part of the system and is installed in an existing waste water holding tank outside. The MBR stage of the system is installed in a basement room of the hotel.

System for ships and floating homes

Due to its compact and modular structure the Busse MBR system can also be adapted for installation on house boats, theatres, museums and restaurant ships, river boats as well as larger yachts. The effluent of the system can be re-used for flushing the toilets, cleaning the deck or can be discharged directly into the surrounding waters.

System for historic buildings

Historic buildings often present a challenge when it comes to integrating waste water treatment systems into the existing structure.
Due to its small footprint and modular structure the Busse MBR system can be easily adapted to fit into the existing structures and treats the waste water at site with the possibility of immediate re-use within the building.

System for demonstration centres

A Busse MBR system for 25 inhabitants equivalents recycles the waste water of the visitors of the Education and Demonstration Center for Solar Energy in Germany. The effluent from the system is re-used for flushing the toilets and watering the exotic plants in the tropical hall of the center.

How it works

The BUSSE GT Small Size Sewage Treatment System consists of two treatment steps, namely pre-treatment ① and aeration ②. In the pretreatment step, which also serves as waste water storage, biologically degradable coarse material such as, e.g., faeces, toilet paper, are dissolved and the non-degradable materials are separated from the waste water by an aerated sieve ③. A pump ④ pumps the pretreated water, from which the coarse material has been separated, to the aeration section. In this step the organic matter in the waste water is degraded biologically by microorganisms and oxygen ⑤. In addition to this, the treated waste water passes through microfiltration membranes ⑥ (ultra fine filter with 0.4 µm pore size). These membrane filters eliminate suspended material, even bacteria and germs, ensuring that only completely clear, odorless, hygienically harmless water (filtrate) leaves the system.

The BUSSE GT system was tested by NSF International according to standards 40 and 245 and is the first system using membrane bioreactor technology that has been certified by the NSF. The detailed test results are shown on the opposite page.

The BUSSE GT system has also been tested by the University of Hannover and the Technical University in Berlin and the water from the system in regular use is significantly better than the limits set by DIBt Berlin* (Z-55.3-60) and the applicable law. In 2008 the BUSSE GT system has successfully surpassed the certification by Institute PIA in Aachen according to the EU-Norm for decentralized waste water treatment. The BUSSE GT fulfills all degradation classes for water treatment set by European law, such as carbon removal, nitrification, de-nitrification, phosphorous removal and water hygienisation.

*Design qualification approval of DIBT Z-55.3-60 24-h-trial run

COD	≤75 mg/l
BOD_5	≤15 mg/l
NH_4-N	≤10 mg/l

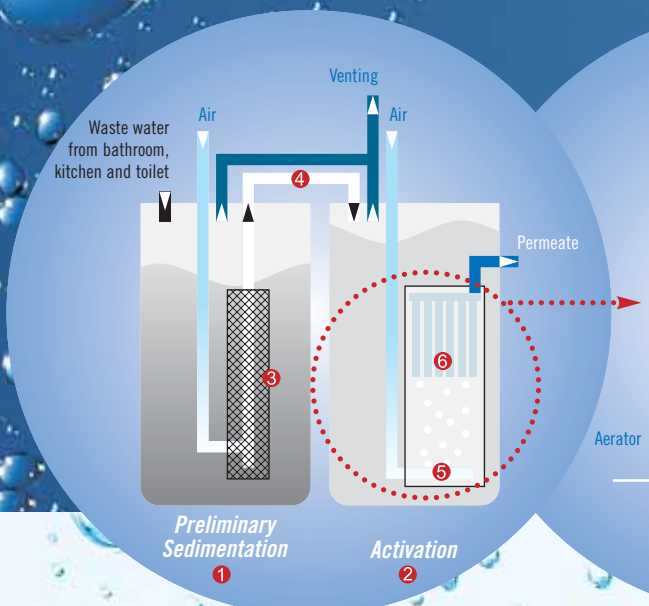


Fig. 3:
Diagram of the microfiltration technology

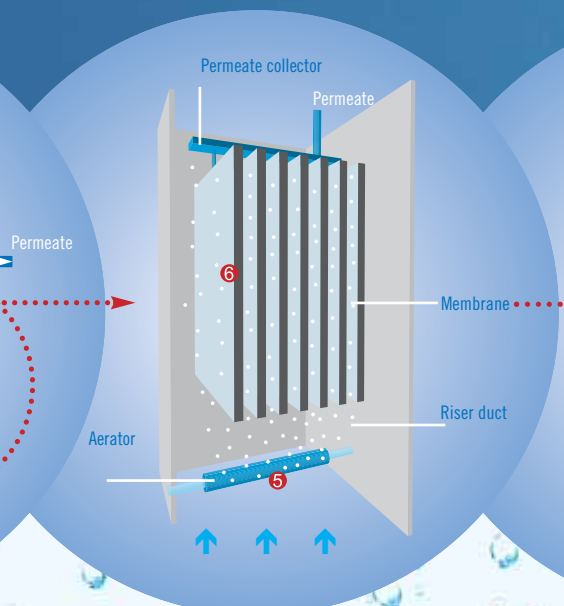


Fig. 4:
Functional diagram of the membrane module

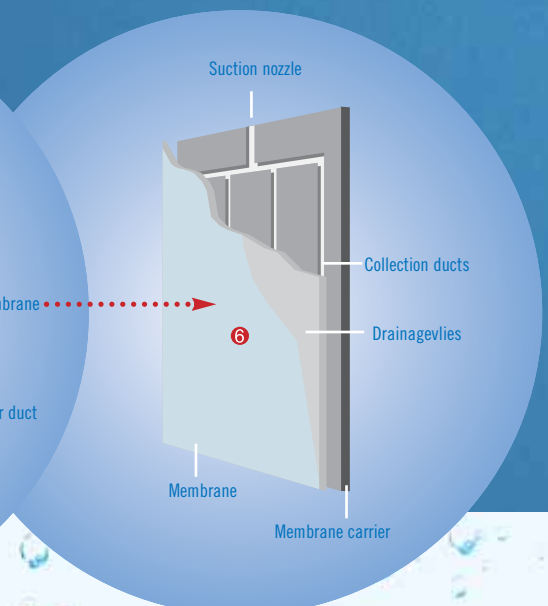
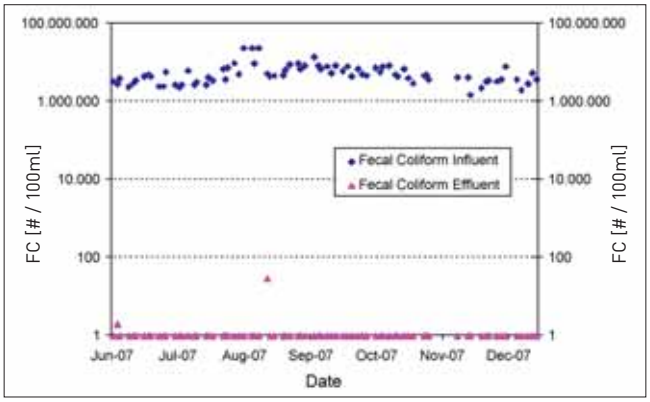


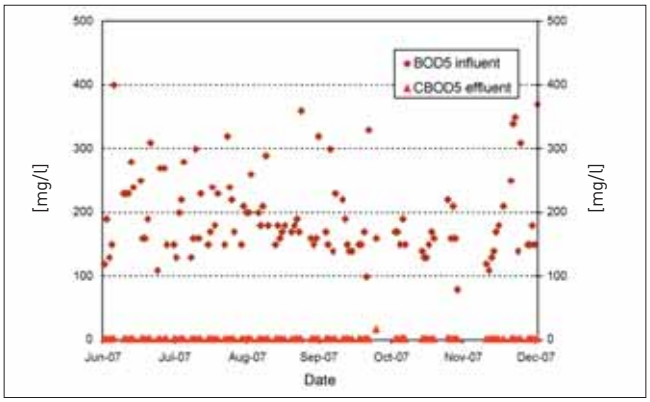
Fig. 5:
Sectional view of a membrane

Degradation Performance



The BUSSEGT has passed the certification process of NSF International Standard 40 and 245 for USA and North America in 2008.

The test results of the NSF international certification process show that the system elates over 95 % of the COD und over 95 % of BOD5.



It has also been proven during the certification process that the BUSSEGT system using microfiltration membranes can hold back all bacteria and viruses safely. The filtrate is fit for re-use without further treatment.

The production facility of company Busse Innovative Systems in Leipzig Germany has been certified by NSF International.

The performance evaluation for the NSF certification was conducted at the Massachusetts Alternative Septic System Test Center (MASSTC) located at Otis Air National Guard Base in Bourne, Massachusetts.

Advantages at a glance

- The BUSSE GT turns domestic waste water into reusable water for irrigation or flushing toilets
- In this way the consumption of drinking water in a household can be reduced by at least one third
- Water treated by the BUSSE GT system may be discharged in sensitive areas and water protection zones
- Since MBR technology consist of biological treatment and Membrane filtration in one process no additional treatment processes are needed, such as sand filters or other clarifiers

- Small foot print and the modular design allow an installation inside houses
- Use of the existing septic tanks would allow for other type of installation
- The BUSSE GT system can be installed in a few hours and is immediately ready for operation
- No expensive earthmoving working necessary
- The BUSSE GT requires little maintenance because the necessity of constant sludge removal is avoided
- The BUSSE GT is expandable due to its modular design
- Extremely quiet operation
- 2 year warranty with service contract included
- Extended service plan including lifetime membrane replacement guarantee available

Design qualification approval of "Deutsches Institut für Bautechnik DIBT"

Z-55.3-60

Tested and certified by NSF International Standard 40 + 245

Recommended by Federal Environment Agency

Umweltbundesamt

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