

Bioclean STP



MalaTECH
water

CUTTING EDGE BIOTECHNOLOGY FOR THE OPTIMIZATION OF ANAEROBIC APPLICATIONS

- wastewater sludge, and organic Carbon-limited digesters
- high-rate anaerobic reactors (UASB, EGSB, IC)
- anaerobic wastewater, and leachate treatment
- sludge storage ponds
- slurry storage & treatment systems



INCREASED BIOGAS OUTPUT - FOAM CONTROL - STABLE OPERATION - INCREASED RESISTANCE - ODOR CONTROL

PRODUCT DESCRIPTION:

Bioclean STP is an all-natural product made by fermentation technology. The product is a complex of microbes, enzymes, micronutrients and trace elements, developed for the optimization of wastewater sludge processing, organic Carbon-limited anaerobic digesters, and high-rate anaerobic reactors (UASB, EGSB, IC).

By the constant dosage of Bioclean STP we provide the presence of specific microbes in the anaerobic reactor. These microbes hydrolyse the organic substances faster and to a greater extent than those, which, due to the ideal conditions for their proliferation, are already present in the reactor. Bioclean STP contains carefully selected naturally occurring anaerobic and facultative anaerobic microbes, which have faster and more effective metabolism to improve the pace of all the 4 major steps of anaerobic digestion.

BIOCLEAN STP - FIELDS OF APPLICATION AND BENEFITS:

- Overall increase in biogas formation by 18-30% in wastewater sludge processing, and organic Carbon limited anaerobic digesters with stabilised biogas output rate.
- Foam control in digesters
- Improved granulation, pellet formation, and performance in high-rate (UASB, EGSB, IC) anaerobic reactors
- Improved resistance of the biology in anaerobic reactors and digesters against inhibitory or toxic shocks, changes in the operational setup, or in the environment
- Improved anaerobic wastewater treatment & odor control in anaerobic lagoons (wastewater & leachate)
- Improved sludge reduction & odor control by accelerated hydrolytic rate of organic particulate matter in sludge storage ponds
- Odor control & sludge reduction for slurry storage & treatment applications



IMPORTANT INFORMATION:

For determining exact dosages for your application, please provide us information by sending us our questionnaire filled with information as much as possible: [Click here for questionnaires!](#) Whenever you have any questions, do not hesitate to [contact us!](#)

PACKAGING INFORMATION:

The product is available in 1 kg double-wall bags, 20 bags make up 1 carton box which is the lowest unit for ordering.

STORAGE INFORMATION:

Keep the product in a cool and dry place below 30 Celsius. Avoid exposure to direct sunlight.

BIOCLEAR STP - PROCESS DESCRIPTION - APPLICATION IN DIGESTERS

1) INCREASING BIOGAS OUTPUT BY IMPROVING ANAEROBIC DIGESTION PROCESS



Bioclean STP is a complex of anaerobic microorganisms, enzymes, micronutrients and trace elements, is highly efficient in improving the reaction rate of all stages of anaerobic degradation. In chronological order are the four stages of the anaerobic digestion process as follows:

1. Hydrolysis
2. Fermentation or acidogenesis
3. Acetogenesis
4. Methanogenesis

During hydrolysis the complex molecules with large molecular weight, like lipids, polysaccharides, proteins and nucleic acids are degraded into simpler compounds like fatty acids, monosaccharides, amino acids and nucleotides. In this stage the effect of Bioclean STP's hydrolytic bacteria and enzymes can be perceived primarily at the faster hydrolysis of hardly biodegradable organic macromolecules. This is the rate-limiting step of the four processes. By faster hydrolysis a more effective substance transformation can be achieved resulting in less waste for landfill, and higher biogas yield at the same hydraulic retention time.

During the fermentation the less complex compounds resulted by hydrolysis are further degraded. Both the electron donors and the electron acceptors are organic compounds. Through several intermediate products acids, mostly low-carbon-chain carboxylic acids are finally formed. Following the fermentation in the process of acetogenesis Acetate, Hydrogen and Carbon Dioxide are produced, which are utilized by methanogenic bacteria in the fourth stage. Fermentation and acetogenesis can be treated together as a biological process. The types of acidic compounds formed by the acidogenic bacteria are dependent on many factors. These are temperature, pH, redox potential, the final products of hydrolysis (the types of the acidogenic reaction's substrates), and the composition of acidogenic microbe population. The composition of the fermentation's end products determines the rate of acetogenesis. Fluctuations in the acetogenesis cause fluctuations in the next process, the methanogenesis too, because the end products of the acetogenic bacteria are directly used by the methanogens. The carefully selected acidogenic microorganisms of Bioclean STP help the development of a fast-metabolising acidogenic microbe population capable of continuous, stable formation of properly composed and homogeneous end products, and as a result a stable, constant acetate-formation will be achieved. It helps to avoid the increase of Hydrogen's partial pressure, which depresses the acetogenesis. The latter is responsible for the phenomenon when Propionic Acid, Butyric Acid, Ethanol and other foaming agents are formed instead of Acetate.

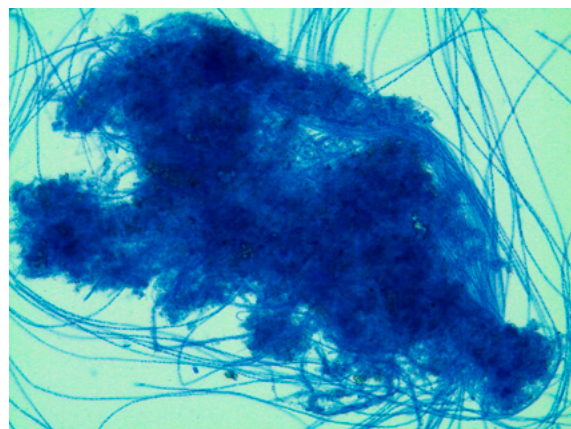
During the methanogenesis methane is formed through two different metabolic pathways from the final products of fermentation. The Hydrogen-utilizing methanogenic organisms produce methane using Hydrogen as electron acceptor, and Carbon Dioxide as electron donor, and the Acetoclastic methanogens break the Acetate into Carbon Dioxide and Methane. Bioclean STP enhances the speed and reduces the fluctuation of the process's fourth stage by providing more stable supply for the methanogens as described above.

Profit generated by converting the extra biogas to heat or energy is usually 2-4 times higher than the customer spends on the maintenance dosage of Bioclean STP per year.

2) FOAM CONTROL

Foaming and the associated operational problems in anaerobic digesters are caused by one of the following reasons:

- Along with the raw materials, foam-causing materials, like detergents from dairy industry, or oils enter the anaerobic reactor. In case of wastewater treatment plants, the problem usually occurs, when the quantity of filamentous bacteria in the excess sludge is significantly high, and during their lysis surfactants released into the reactor cause foaming.
- The digester is exposed to a toxic shock, which causes a significant cell lysis.
- The fermentation and the acetogenesis are not running properly, and there are significant fluctuations in the process.



Bioclean STP reduces the foaming of the reactor in each case, because:

- In case of foaming caused by surfactants and the lysis of filamentous bacteria, the substances that cause the foaming are quickly decomposed by the extracellular esterase and lipase enzymes produced by the bacteria in Bioclean STP.
- The resistance against toxic and inhibitory loads is higher when the reactor is treated with Bioclean STP, and besides that, in case of constant treatment, the degradation of lysed cells, and surfactants released during cell lysis are faster.
- Bioclean STP stabilizes the fermentation and acetogenesis, so the concentration of organic compounds that results foaming is significantly reduced.

3) ENHANCED RESISTANCE OF MICROBIAL COMMUNITY, MORE STABLE ANAEROBIC REACTOR PERFORMANCE

In many cases (change in temperature, pH, quality of raw material, cumulative load changes, inhibitory or toxic loads etc.) the microbial community has to adapt to the new conditions, which, because of the low growth rate of anaerobic microbes, can take longer time. This can lead to an imbalance between the steps of anaerobic digestion, causing operational problems like foaming or temporarily lower biogas formation.

By the application of Bioclean STP the resistance, and adaptability of the microbial community significantly improve. The bacteria of Bioclean STP, which are constantly dosed into the reactor, adapt faster to the changes in operational setup, environment, and substrate composition, due to the fact that their enzyme system is not yet adapted to a defined environment.

Substances, which are toxic even in low concentrations, can be present in digesters treating both wastewater sludge and other industrial wastes. Detergents from cleaning operations, disinfectants, pharmaceutical residues, solvents, preservatives, and different inorganic chemicals or ions (ammonia, heavy metals) may also inhibit anaerobic processes. Unfortunately, no one can fully prevent these materials entering the reactor. The microbial community of reactors treated with Bioclean STP recovers easier after toxic substances have infiltrated the system.

DOSAGE OF BIOCLEAN STP IN DIGESTERS:

Day 1: 20 ppm based on digester's total net volume
(e.g: for a 5 000 m³ digester it is 100 kg of Bioclean STP for the first day)
Day 2: 12 ppm based on digester's total net volume
Day 3: 8 ppm based on digester's total net volume
Day 4: 7 ppm based on digester's total net volume
Day 5: 5 ppm based on digester's total net volume
Day 6: 5 ppm based on digester's total net volume
Day 7: 5 ppm based on digester's total net volume

Week 2: 30 ppm per day based on average daily amount of raw material added to the digester (m³/d) (e.g. considering 250 m³/d of average daily raw material feed, it is 7.5 kg of Bioclean STP per day on week 2)

Week 3: 20 ppm per day based on average daily amount of raw material added to the digester (m³/d) (e.g. considering 250 m³/d of average daily raw material feed, it is 5 kg of Bioclean STP per day on week 3)

Onwards: 6-12 ppm per day based on average daily amount of raw material added to the digester (m³/d) (e.g. considering 250 m³/d of average daily raw material feed, it is 1.5-3.0 kg of Bioclean STP per day onwards to maintain the upgraded performance of the digester)

DOSING LOCATION:

Raw material holding tank if mixing is applied. If you have multiple digesters working parallel, make sure each digester receives the necessary amount of Bioclean STP based on its volume, and daily feed. You can add Bioclean STP in-line to the feed as well. Bioclean STP does not require pre-activation for digester applications, but it is highly recommended to pre-mix the powder with pure water well in a bucket before adding it to the reactor inlet. No dosing unit or dosing system is needed for the application of Bioclean STP.



BIOCLEAN STP - PROCESS DESCRIPTION - APPLICATION IN HIGH-RATE UASB, EGSB, IC REACTORS - IMPROVED PELLET, AND GRANULE FORMATION, ENSURING HIGHER RESISTANCE FOR THE BIOLOGY

Our carefully selected anaerobic bacteria in Bioclean STP are ready to attach to granules in high-rate anaerobic applications. Improved pellet-formation are not just down to our bacterial species, but also the nutrient-micronutrient-trace element supply which is also in the product. Application of Bioclean STP in high-rate anaerobic reactors also strengthens the immunity of the biology against inhibitory or toxic shocks, ensures quicker recovery, and results more stable COD removal capacity, and biogas output.



DOSAGE OF BIOCLEAN STP IN HIGH-RATE ANAEROBIC REACTORS:

Bioclean STP requires premixing with pure water 1 day before application in case of high-rate applications!

Week 1: 8 ppm based on average m^3/d hydraulic raw wastewater load

Week 2: 4-6 ppm based on average m^3/d hydraulic raw wastewater load

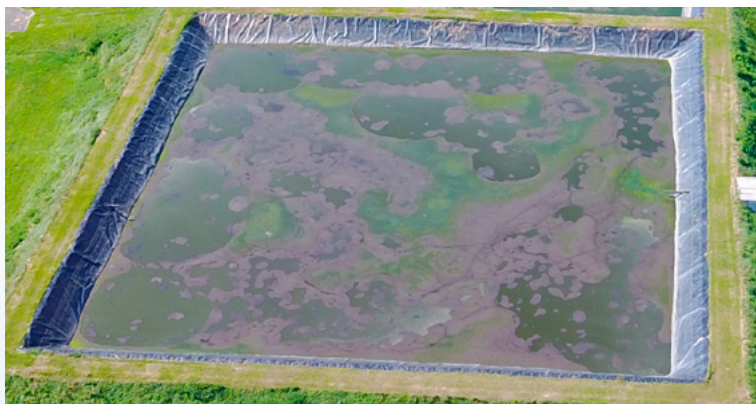
Onwards: 0.5-2 ppm based on average m^3/d hydraulic raw wastewater load to maintain the upgraded performance of the reactor.

DOSING LOCATION:

Raw wastewater entering the reactor. No dosing unit or dosing system is needed for the application of Bioclean STP for high-rate anaerobic applications. The daily dosage can be done as a slug-dose once per day.

BIOCLEAN STP - PROCESS DESCRIPTION - ANAEROBIC WASTEWATER, LEACHATE, SLURRY, AND SLUDGE TREATMENT

Application of Bioclean STP boosts anaerobic processes in storage ponds, tanks, and in anaerobic wastewater treatment with continuous wastewater load. The application of the product is very easy and straightforward, but a different approach is needed for applications with extremely high hydraulic residence time for the raw material, where the raw material is usually hardly biodegradable (slurry treatment, and odor removal, organic sludge reduction in sludge storage ponds, and odor control), and for applications with lower HRT, but continuous load, and more easily biodegradable substances in the feed (leachate treatment, anaerobic wastewater treatment).



SLURRY TREATMENT, AND ODOR CONTROL, SLUDGE REDUCTION IN SLUDGE STORAGE PONDS, AND ODOR CONTROL:

These high HRT applications may result one of the best return of investment timeframe for our customers. High hydraulic residence time enables a very low specific load for Bioclean STP compared to the target achieved. Bioclean STP powder needs to be premixed with water, and the recommended way to execute the treatment is to use a high capacity pump with hoses and sprayer head, and pour the aqueous suspension of the product directly on the surface of the pond or tank filled with the raw material AS EVENLY COVERING THE SURFACE AS POSSIBLE. Please pay attention to the top of the pond or tank: if the raw material floated up on the top because of anaerobic activity and gas formation before the treatment, and forms a thick layer on the top, the access of Bioclean STP to the raw material may become limited. In this case, after spraying the suspension of Bioclean STP on the top of the layer covering the surface, you need to keep the surface wet by spraying water on it from time to time to prevent the surface from drying out, which would cause immediate death for bacteria in Bioclean STP. If the surface is kept wet, Bioclean STP will start to degrade the thick layer of organics on the top, and once it is done bacteria enter the water column, and start to degrade dissolved organic matter, and particulate organic matter on the top of the sludge layer.

Bioclean STP treatment is able to deliver 30% more Total Nitrogen removal in an anaerobic way than generic pond bacteria already exist in the system. Fouling odors mainly caused by Hydrogen Sulfide, Mercaptans, and Ammonia are also significantly reduced.

DOSAGE OF BIOCLEAR STP IN SLURRY, AND SLUDGE PONDS/TANKS

Since the HRT is high, the Bioclean STP treatments are recommended to be done periodically.

First treatment of the pond or tank: 20-60 ppm depending on overall net volume of liquid & solid waste in the pond or tank, e.g. for 2 000 m³ net volume of sludge or slurry, and water 40-120 kg of Bioclean STP is recommended for the first treatment depending on the nature, and concentration of the solid content.

Second and ongoing treatments can be done with 30-40% less Bioclean STP (etc. 14-40 ppm). The frequency of the treatments highly dependent on required timeframe by the customer for the anaerobic treatment. and the frequency, and quantity of new raw materials coming into the pond or tank. Treatments can be repeated every month, every second month, or if time is given for anaerobic breakdown, it can be done even twice a year.

DOSING LOCATION:

Even pouring of Bioclean STP suspension onto the surface of the waste stored in the pond/tank.

Leachate treatment, anaerobic wastewater treatment, odor control:

In case of applications with lower hydraulic retention time for the influent, daily dosage is recommended for Bioclean STP. The product does not need pre-activation for leachate, and anaerobic wastewater treatment applications, so no dosing unit or dosing system is needed for the application. The daily dosage can be done as a slug-dose once per day. Necessary amount of Bioclean STP should be well-premixed with water, and the aqueous suspension should be added to the raw inlet, or in the first part of the anaerobic bioreactor or pond.



All natural strict, and facultative anaerobic bacteria in Bioclean STP boosts anaerobic processes in the reactor or pond. Our customers can expect COD/BOD removal to be executed at a much higher rate resulting way lower effluent parameters. Total Nitrogen removal capacity of the anaerobic system can grow up to 30% more than the system was able to achieve with its generic bacteria. Odor control due to Hydrogen Sulfide, Mercaptans, and Ammonia is also achieved successfully by Bioclean STP.

DOSAGE OF BIOCLEAR STP IN LEACHATE, AND ANAEROBIC WASTEWATER TREATMENT PONDS/ REACTORS:

Day 1: 20-30 ppm based on pond or reactor volume e.g. for 2 000 m³ net volume of sludge or slurry, and water 40-60 kg of Bioclean STP is recommended for the first treatment

Week 1: 8 ppm based on average m³/d hydraulic leachate/raw wastewater load

Week 2: 4-6 ppm based on average m³/d hydraulic leachate/raw wastewater load

Onwards: 0.5-4 ppm based on average m³/d hydraulic leachate/raw wastewater load to maintain the upgraded performance of the reactor.

DOSING LOCATION:

Bioclean STP should be added to the raw inlet, or in the first part of the anaerobic bioreactor or pond.