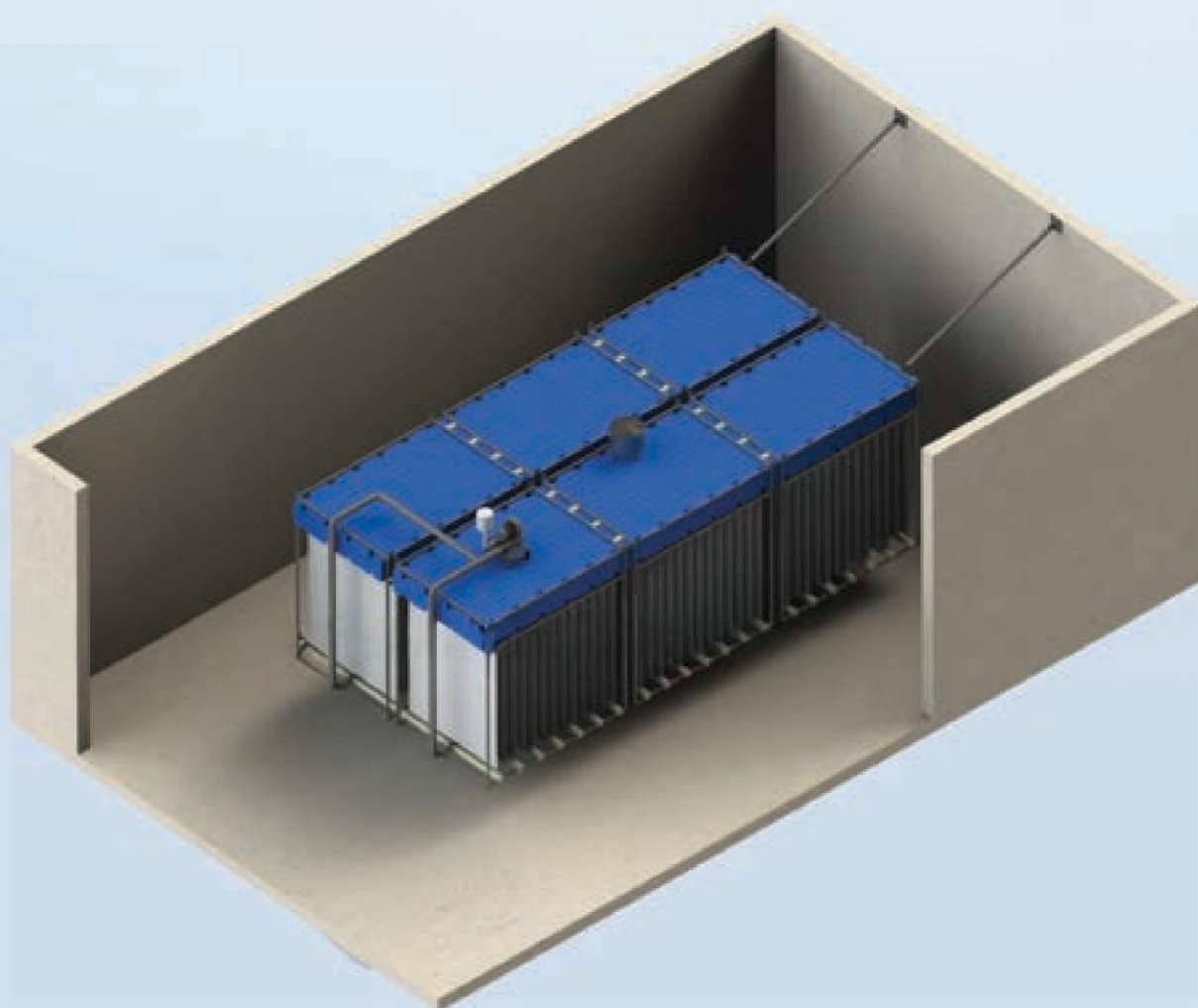




BIO-LACE[®] IFAS

Integrated Fixed Film Activated Sludge



IFAS Reactor from Euroclean



Bio-Lace® is developed for upgrading the existing treatment plants to achieve their desired goals without any downtime.

With recent guidelines on treatment discharge norms, achieving the required parameters without extensive civil modifications and with minimal downtime has become essential.

The amount of sewage flowing into rivers and lakes is causing serious environmental problems threatening not only those immediate areas but also, entire ecosystem. While many proposals exist for treating sewage, a new method has merged that is attracting the attention of local governments across the country.

The Bio-Lace® system is developed by Euroclean USA. Bio-Lace® can be easily implemented to treat the organic pollutants entering the lakes, rivers and oceans.

What is Bio-Lace®?

Bio-lace is rope-like fiber made using a combination of advanced polymer materials and specific braiding techniques. The important application is it uses the microbes to adhere and degrade organic

Pollutant. Bio-Lace® is Installed in aeration tank.

How does Bio-Lace® work?

The Bio-Lace floating reactor is made with a specialized float with high-grade buoyancy. The regenerative blower gives oxygen via the highly efficient diffuser system to supplement aeration to Bio-Lace® module. This module is chosen precisely for a quick deployment, in field conditions without disturbing the existing operating system.

Each Bio-Lace® Module is simply made up of a core strand covered with numberless rings of thread. This thread is made of polymer, such as poly (vinylidene chloride) and polypropylene thread. In appearance, it resembles a fantastically long tangle of thread covered in loops. When in use, 10 m lengths of the cord are stretched between pairs of poles, spaced 10 cm apart. These poles are planted on the riverbed to keep the cords submerged. The total number of lace cords required varies depending on the width and depth of the tank or water body..

When Bio-Lace® module is placed in the water, entire media becomes submerged, and oxygen is supplied to the microbes from the bottom via diffused aeration.

These conditions will help the microorganisms to grow on the Bio-Lace®. In their natural state, rivers contain sufficient hydrophytes and microorganisms to cleanse the water with normal levels of contamination. However, they cannot cope with large quantities of contaminants and become less efficient when the surface area of the riverbed's surface area is reduced by flattening or covering it with concrete. The objective of Bio-Lace® is to supplement the Lakes/ river's inherent ability.

At first it might seem to be a matter of chance that bacteria adhere to Bio-Lace®; however, the thread rings possess a positive charge in water, while microbe cells are negatively charged. As a result, the microbes are attracted to and held by the threads. Additionally, bacteria is divided into two types aerobic and anaerobic based on their presence of oxygen requirement. The intricate design of bio-lace prevents dissolved oxygen from reaching the core center, creating an environment where anaerobes thrive. Meanwhile, aerobes multiply on the outer part of the threads. Bio-Lace® thus provides a symbiotic culture bed for a wide spectrum of microbes including bacteria,

algae, and protozoans. The proliferating microbes efficiently treat the sewage, and ensure a high quality of treated water.

Anaerobes consume the excreta of the aerobes, so the system becomes a balanced food chain in itself, and produces less excess sludge than other systems. The simple Bio-Lace® system requires little maintenance, and is easy to install.

Bio-Lace® has been recognized as a promising water treatment tool, and can be implemented in medium and small sized ponds, lakes, rivers, treatment plants without any significant down time.

Hence, Bio-Lace® works in three stages - attached, growth and dispersal.

- Attachment of bacteria to surface
 - Growth of bacteria in multiple layers
 - Detachment and collection as sludge
- Bio-Lace® is highly resilient against toxic shock and hydraulic surges



Bio-Lace® is the choice material for microorganisms to grow on for a number of reasons

- Bio-Lace® has a positive charge and when placed in water attracts microbes, that naturally have a slightly negative charge.
- Its large surface area and space make it an ideal environment and dwelling for many different kinds of microorganisms.
- The contact material is made of small fibers, allowing bacteria to attach to its surface easily.
- The structure of Bio-Lace® and even ring of strands of cord around a central core, give bacteria the best conditions in which to multiply, both at the surface and interior of the cord.



Distinctive Features of Bio-Lace®

Polyvinylidene chloride, one type of raw material for Bio-Lace®, is physically and chemically stable and, as a result, Bio-Lace® endurance is high. The weight of the lace is well suited to float in water with the gathering bacteria groups. The rigidity of the lace is suited to produce even lengths of strands coming out from the middle cord.

1. Bio-Lace® treatment makes water cleaner and reduces odor.
2. Elimination rate using Bio-Lace® treatment
 - BOD less than 10 ppm -----> more than 95% removal
 - T-N less than 5 ppm ----- > more than 90% removal
 - T-P less than 1.0 ppm----- > more than 80% removal
3. Bio-Lace® is designed to adapt to quality or volume changes of the water.
4. Bacteria absorbs the by-product of other bacteria thus producing a food chain which reduces the amount of waste produced.
5. The superior microorganisms multiply and eliminate phosphorus.

Distinctive features of Wastewater Treatment System (ETP/STP) Using Bio-Lace®

- Superior microorganisms grow faster on the bio membrane than with using the activated sludge method. Therefore, this method can make the food chain longer and creates less sludge (waste). This feature of Bio-Lace® makes it more economical.
- Bio-Lace® is the choice material for bacteria, microorganisms, and primeval creatures to grow on. By using Bio-Lace® these things can co- exist therefore the lace has a higher efficiency, quality and can better adapt to a change in water volume, density or quality.
- In a properly engineered system cleaning of the Bio-Lace® isn't required as often therefore you can have water treatment that is more stable.
- The increased amount of surface area holds a larger quantity of microorganisms per unit length compared to other bio-reactor media. This means that less area is taken up by the bio-reactor.

Bio-Lace® Usage

- **Municipal Sewage treatment Plants - STP's**

- ▶ Communities
- ▶ Residential societies- Homes & Apartments
- ▶ Large office buildings & Schools

- **Industrial Effluent Treatment Plants – ETP's**

- ▶ Food Factories
- ▶ Breweries
- ▶ Fisheries
- ▶ Recycling water plants in chemical industries & Pharma

- **Cleaning rivers, lakes & canals**

Other Applications of Bio-Lace®

1. When pollution in the rivers exceeds the river's natural ability to cleanse the water, Bio-Lace® is deployed horizontally on the riverbed becoming a dwelling for microorganisms where they live and multiply. The aim of this method is to reduce the flw sludge loading. This principle is based on the self-purification that rivers have naturally.
2. It can be used for compact water recycling systems on boats or ships.

Material & Form

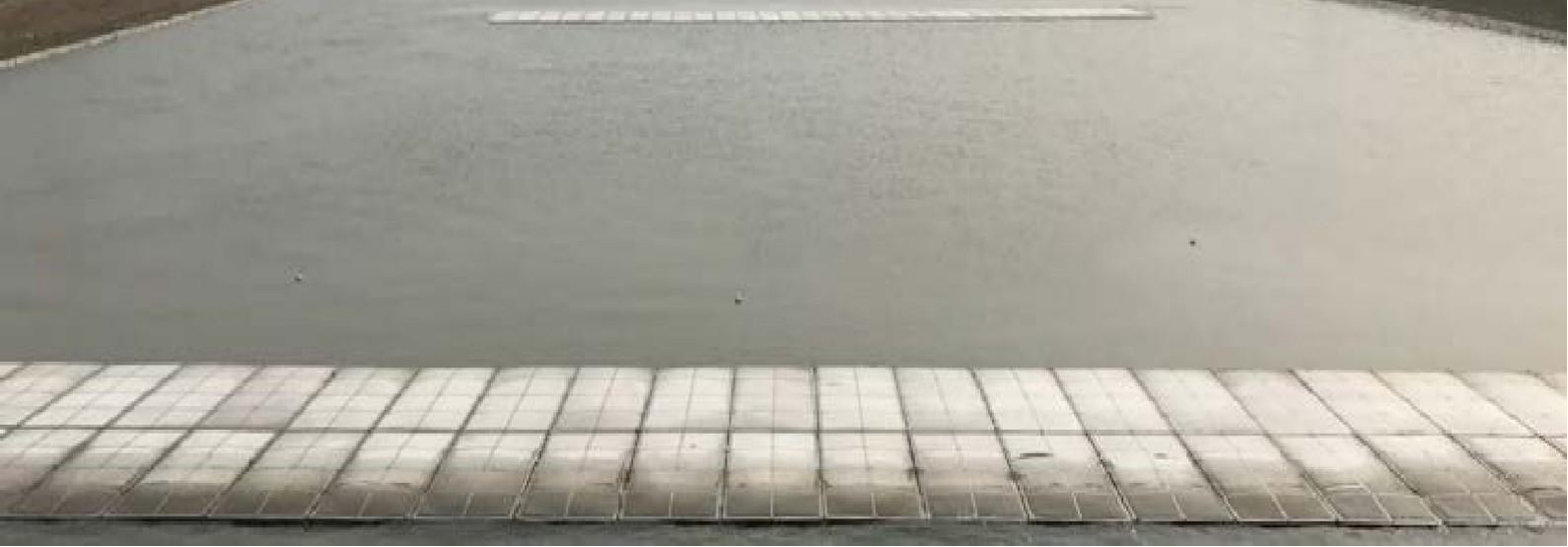
Of the many waste water clarifying methods, the biological process is widely used for clarifying organic waster water such as sewage. As is well known, the activated sludge process is the core technology or organic wastewater clarification. The process, however, has been little improved for long time.

The Bio-Lace® bed immersion method is therefore noteworthy as it meets many present demands in current waste water clarification: easy maintenance and management, less sludge production, and effective clarification of waste water containing resistant or unusual organic substances.

Because the performance of the bio-filter immersion methods depends greatly on the nature of the filter, it was desirable to develop a microorganism carrier with excellent characteristics.

The new product can hold microbial flocs of various types in bulk, and can extensively clarify waste water with symbiotic microorganisms in an ideal environment. In particular, aerobic and anaerobic bacteria can coexist in the cord by holding a larger quantity of microorganisms for its unit length, this enables the construction of smaller disposal vessels.

The flexible cord adopts any form when installed, so that it is applicable to vessels and equipment of any configuration and structure, cleaning and repair are easily conducted if necessary.



In comparison with conventional method:

CHARACTERSTICS & COMPARISION (TECHNICAL)		
Characteristics	Euroclean - Bio-Lace®	MBBR Media
Type of media	String type (Fixed)	Dispersed Media (pieces)
Material	Textile	PP/PVC/HDPE/ Recycled material
Mesh	Not required	Required (To avoid slippage from reactor)
Ploughing	Firmly attached to media. Ensures consistent results and Biomass concentration	Easily detachable from media and washout from reactor
MLSS (Mixed liquor suspended solids) Concentration	Upto 8000 ppm Due to thin film; large surface area	limited Upto 4000-5000 ppm
Attachment of microbes	High consistency	Moderate (Inconsistent)
BOD removal rate	High	Moderate
Nitrification rate	High	Moderate
Pre and Post denitrification	High	Moderate
Life of the media	15 years	15 years
Installation	Simple. Plug & play	Need sieves and other arrangement in Stainless steel to avoid carry over of media hence additional expenses.
Maintenance	Easy to refresh & re-use. Draining of tank not required.	Need to empty the tank and segregate the media
Weight	comparatively very less weight.	115 Kg/ m3
Displacement	Easy to remove and displace into another tank	Not possible
SALR	4 Kg/m3	< 4Kg/m3 In-consistent due to less surface area
Disturbance to Aeration system	No disturbance to surface or diffused aeration	Need special care when surface aerators are used in reactor



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