



Envirofirst Sewage Treatment Plant (STP)

Sewage and Wastewater Treatment Solution

Suitable for Hotels / Villages / Schools / Domestic / Other Commercial Purposes
Made Cost Effective

The proposed biological treatment system is based on the advanced MBBR technology. The design and detailing of the MBBR Wastewater Treatment Plant is done in such a way that provides maximum treatment efficiency and process stability.

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Technical Director





Sewage Treatment Plant based on MBBR Technology

Original

The scheme proposed for the treatment of sewage is a compact and effective Sewage Treatment Plant using the revolutionary “Moving Bed Bio Reactor (MBBR)” technology. The concept underlining the Moving Bed bioreactor is to provide continuously operating bio-film reactor, which is non-clog gable does not require backwashing and has a very low-pressure drop. This is achieved by growing the biofilm on smaller carrier elements that move along with the wastewater in the reactor. The air stream constantly keeps the bio media in suspension and at the same time provides the required oxygen to the biomass. The system uses specially designed bio-media, which provides a large surface area for biological growth. The bio-media is made of plastic material, which has a very long life.

Suggested

The Envirofirst sewage treatment Sewage Treatment Plant (STP) is a compact, effective and innovative solution which can be configured for a wide range of effluent treatment scenarios.

A key feature is the revolutionary Moving Bed Bio Reactor technology which operates as a continuous mode bio-film reactor, non cloggable and with no requirements for backwashing. A very low pressure drop is achieved by growing the biofilm on smaller carrier elements that move with the waste water in the reactor. The air stream constantly keeps the bio media in suspension and at the same time manages the oxygen supply to the biomass. The bio - media used is purpose designed to present a very large surface area for biological growth, The bio-media itself is made of a type of plastic material which has a very long life.

Bar Screen

The Sewage effluent passes through an in-line screen for removal of coarse suspended solids. These screens would be manually operated.

Oil & Grease Trap



Oil & Grease is introduced to remove the oil & grease particles coming from the kitchen & other household waste. The oil & grease particles float upon the top layer of sewage waste & then remove manually from the oil & grease trap.

Equalisation Tank

The oil free sewage water is then collected in a collection cum equalisation tank to meet the peak hour's requirement and to get a homogenous mixture in Equalisation Tank. An aeration grid can be provided to keep the suspended matter in suspension and to avoid septic conditions.

Raw Sewage Transfer Pump

The Raw sewage transfer pump is installed at the roof of equalisation tank to transfer the raw sewage into the aeration tank. The pumps selected are self-priming non-clog type & specially design for sewage uplifting at a constant rate.

Aeration Tank

The sewage from aeration tank shall be then constantly pumped into aeration tank through sewage transfer pumps at a constant flow rate. Sewage Treatment Plant is of modular construction and comprises of bar screen, Equalisation Tank, Aeration section, Sedimentation Section (Tube Settler), Treated Sewage Holding/ Transfer Chamber and Chlorination. The treatment occurs in various aerobic chambers provided in the system. The system will have the flexibility of varying the sequence of aerobic chambers depending upon flow rates.

In aerobic chambers, thousands of MBBR media is fed, upon which the biomass grow. The attached growth by the action of Aerobic bacteria ensures that water is treated to the highest possible biological standards.

MBBR Media

MBBR media are available in various specifications to suit the clients' requirements, and we can manufacture them by using EPDM, PVC, stainless steel and polypropylene. This is also known as Non Clog Type Fab Media. These are very well-known in high colour density and its super stability. We have provided the high production of these equipment. These offered at very affordable prices.

Technical Specifications

Length

30mm



Diameter	32mm
Shape	Trapezoidal/Cylindrical
Specific Weight	0.47 kg/m ²
Density	0.93 gm/cc
No. of Pieces Per Cubic Meter	17,000 (Approx.)

Air Blowers with Air Diffusion System

Air blowers with the air diffusion system are employed to provide the diffused air to the bacteria present in the aeration tank. Numbers of Air diffusers are introduced to disperse the air into the aeration tank which would increase the contact period and help in better biodegradation of solid waste.

Standard Design & Construction Features

- 100% oil free air delivery.
- Factory engineered, factory guaranteed, superior product.
- Alloy steel hardened and ground timing gears (FRP coating if required).
- Anti-friction bearings.
- Rotary oil sealing.
- Rigid one-piece CI casing and side plates.
- Horizontal and vertical configurations available.
- Easy rotor timing setting.
- No vanes, valves or rings to wear.
- Large inlet and outlet connections for minimum loss.
- Improved volumetric efficiency and reduced operating temperatures.
- Alloy steel toughened shafts ground to close tolerances.

Air Diffusers

Air Diffuser is an enhanced version of pipe aerator. It comes with a new silicone rubber membrane, and EPDM which has a higher tear strength and anti-microbial property. Pipe aerator comprises a support pipe made of PP (polypropylene), a membrane made of SIK (silicone rubber), which is fixed to the support pipe by two stainless steel clips and an EPDM seal, EPDM seal.

2.3.3 pipe aerator with 1 1/4" internal thread D = 63mm, 64 x 1.5 diameter and wall thickness.

Advantages of Air Diffusers



- Permanently elastic SIK membrane
- High temperature resistance
- No hardening/brittleness
- Low susceptibility to incrustation
- Suitable for industrial wastewater treatment plants
- Suitable for intermittent operation
- High oxygen utilisation
- Bubble size of 1.5 to 2mm at the membrane surface
- Low buoyancy aeration unit
- Self-sealing when air supply is cut off
- Quick and robust installation

Chemical Dosing System

Water is then fed to flocculation chamber which is dosed with alum on a continuous basis at a proportional flow rate (sized to the capacity of the plant) for solids removal by sedimentation in the clarifier.

Tube Settler

The tube settler, which is designed on low overflow rate, is provided after the aeration tank to enable separation of solids. A steep slope is provided in the settling tank to eliminate the need of scrapper mechanism. The settled sludge being collected at the bottom of tube setter is partially re-circulated back to Aeration Tank to give a constant feed to the bacteria & balance is taken to the sludge drying beds to dry & disposal.

Tube Settler Media

Clarification/Sedimentation is the most important stage in the field of wastewater treatment. The most efficient sedimentation systems have high settling surface area whilst maintaining a small structure. Tube settler media provides a large settling surface area within the specified volume thus giving high flow rates. They have a chevron shaped self-supporting structure in a tubular form with six sides. They are primarily used in applications like solid-liquid water in clarifiers in primary and secondary sedimentation and oil water separators. Tube Settler Media have no moving parts as a result of which there is no energy loss. The distribution and entry velocity are minimum resulting in maximum efficiency and



better sewage quality. The efficient design minimises space requirements and is sturdy and easy to transport and install. It increases the capacity of existing clarifiers due to increase in available settling area. In the case of new plants, it results in reduced tank sizes thus reducing civil construction costs. They are uniquely designed to give one of the highest surface areas in the current genre of tube settlers. In addition, the inherent shape of the modules gives an efficient mechanism for the sludge to flow downwards

Sludge Recirculation Pump

The sludge recirculation pump is installed at the bottom of tube settler tank to transfer the activated sludge into the aeration tank back and rest of sludge into the sludge drying bed. The pumps selected are self-priming non-clogging type & specially designed for sludge transfer.

Surge Tank

The clarified water collected from the launder of tube settler is then collected in the surge tank. The surge tank is for the holding capacity for the filter feed pump.

Filter Feed Pump

The filter feed pump is installed before the pressure sand filter to inject the treated sewage water into the pressure sand filter with pressure. The pumps selected are centrifugal type and specially designed for clear water application at a constant rate.

Pressure Sand Filter

The clarified water collected in the surge tank further allows passing through a pressure sand filter. The treated water will then be passed through Pressure Sand Filter to reduce suspended load and turbidity, and fine particles. It finally polishes the treated water. The backwash from the PSF unit will be fed back into the Equalisation Tank.



Activated Carbon Filter

The clarified water from Pressure Sand Filter is then passed through Activated Carbon Filter to reduce suspended load and turbidity, BOD, colours, odour and fine particles. It finally polishes the treated water. The wastewater is treated to the extent that this can be used for gardening or for flushing toilet and outside washdown. The backwash from the ACF unit will be fed back into the Equalisation Tank.

UV Disinfection System

The in-line disinfection system is introduced after the Activated Carbon Filter for the disinfecting treated water. The disinfected water from the UV disinfection system is then stored in the treated water tank.

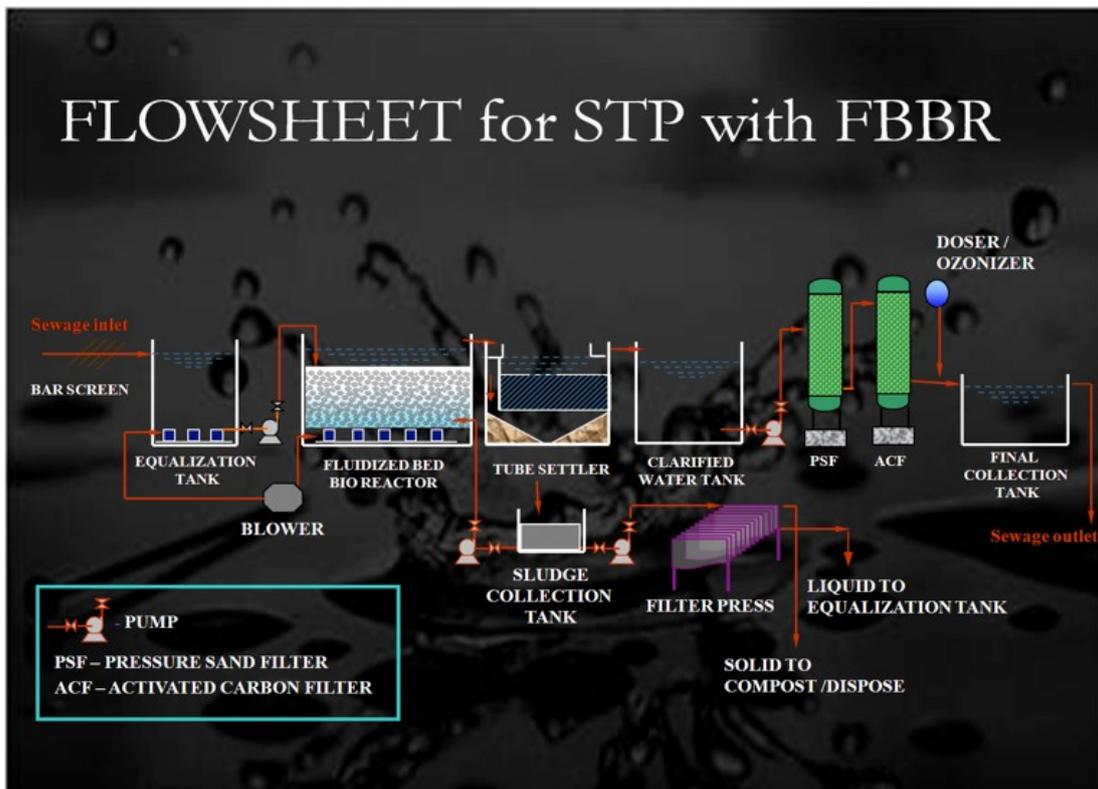
Sludge Drying Feed

A proportion of sludge from the clarifier and bioreactor is pumped via the hydro cyclone into the Sludge drying beds (SDB). Supernatant from the sludge beds is decanted and returned to equalisation tank for re-processing. A part of sludge is periodically re-circulated as MLSS to aeration tank.

Electrical Controls

Centralised electrical control panel is provided to operate the electrical components of STP. It will have both automatic and manual operation mode. The control system shall include circuit breakers, motor, starters and timers all housed in a weatherproof cubicle type panel board.

FLOWSHEET for STP with FBBR



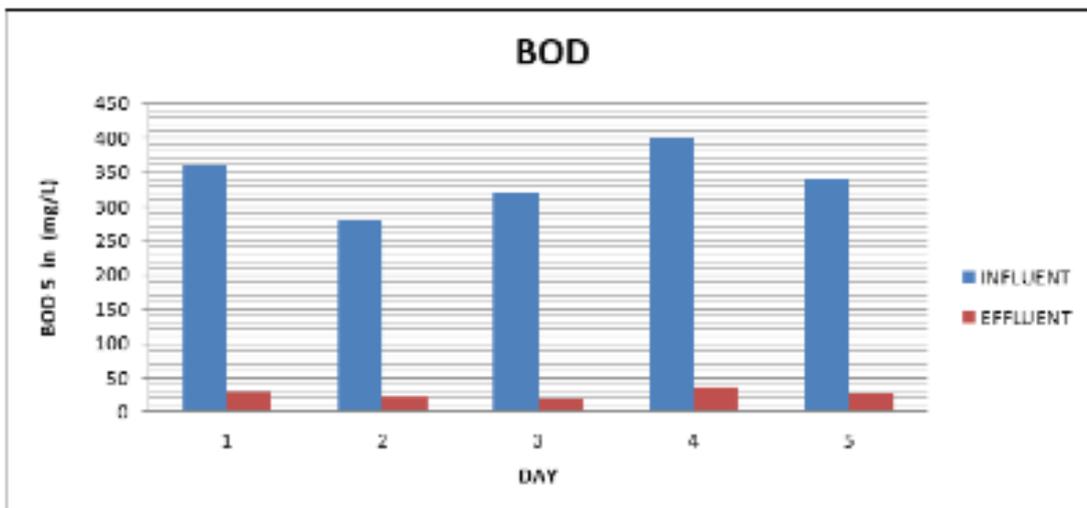
Characteristics of Inlet & Outlet

The pH of the inlet and outlet can vary from 6.5 to 7.5 which were measured using a pH meter. The ratio of Biological Oxygen Demand measured over 5 days (BOD5) and Chemical Oxygen Demand over the same period (COD) indicates the biodegradability of sewage.

Higher BDO/COD ratio indicates higher biodegradability of the sewage. This ratio indicates the extent to which the organic matters in STP sewage is degradable by aerobic microorganism and if biological processes is suitable for treatment for the sewage type.

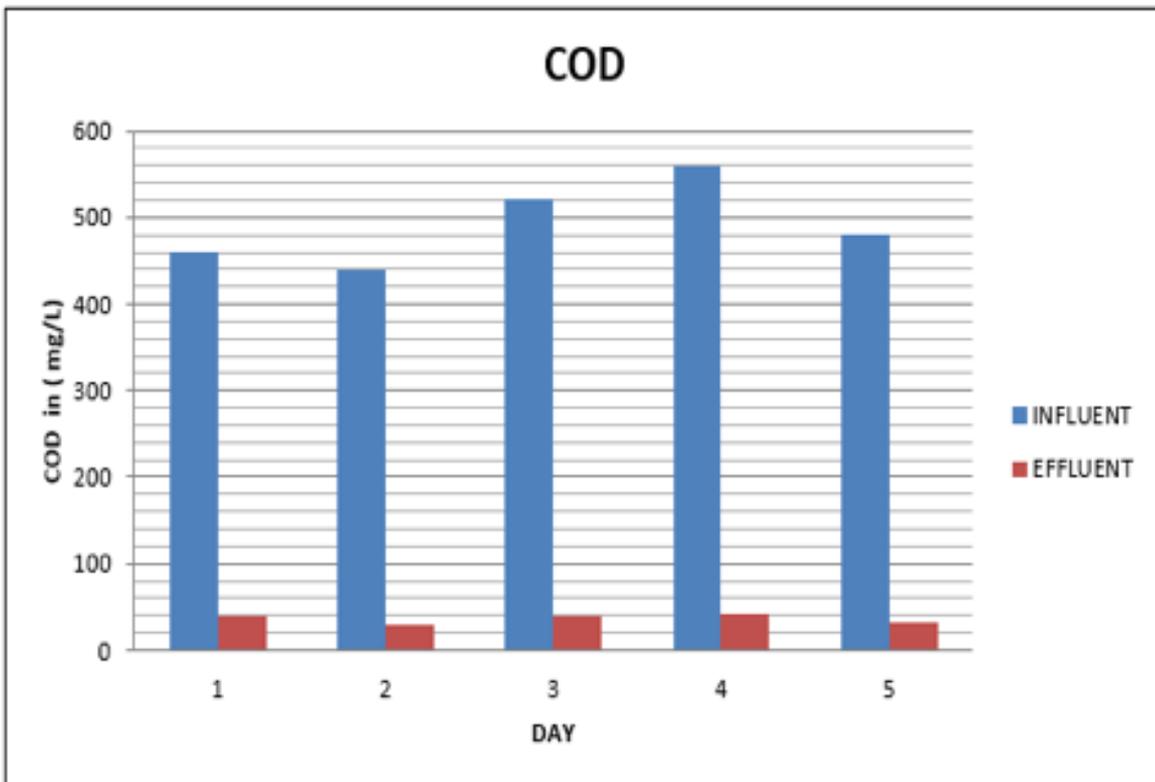
BOD Removal Efficiency

BOD (Biological Oxygen Demand) is described as the Dissolved Oxygen used by aerobic microorganism in biochemical oxidation process of organic matter. The BOD5 of the raw sewage from the Plant at its inlet vary from 300-400 mg/L over the five-day sampling period. The BOD5 of the treated water at its outlet may vary between 5-10 mg/L which is within the permissible limits as allowed by CPCB. BOD removal is indicative of the efficiency of biological treatment processes. The efficiency of removal of BOD 5 varies from 95-98% with overall average removal efficiency around 97%.



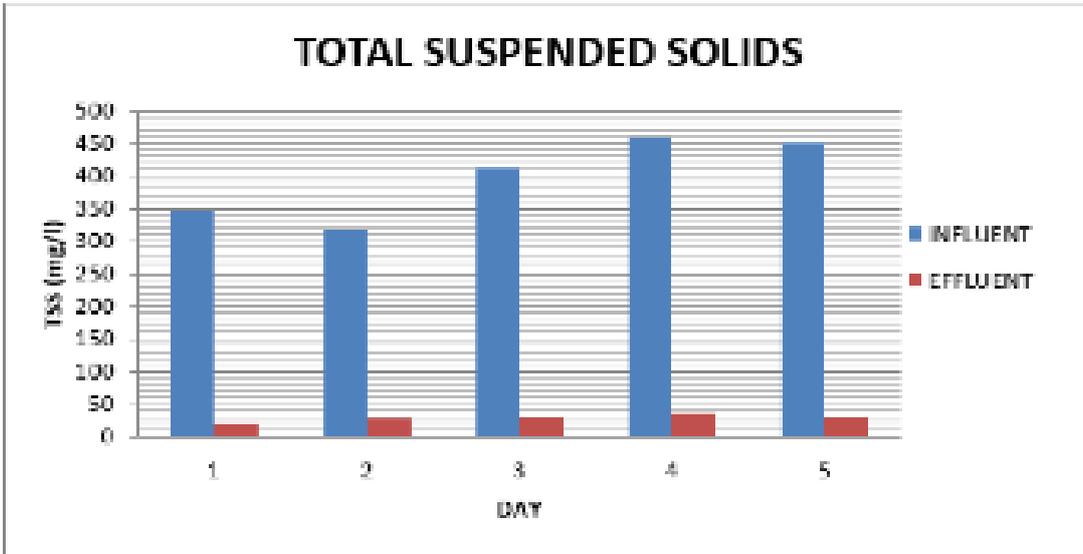
COD Removal Efficiency

Chemical Oxygen Demand (COD) of the inlet vary between 450-500 mg/L while at outlet it may vary between 40-50 mg/L. The COD value determines the efficiency of biological process of treatment plant. The removal efficiencies varied from 98% overall average of removal being 98% over 5-day sampling period.



TSS Removal Efficiency

MBBR technology has very high TSS removal efficiency rate than normal treatment methods. The TSS values of inlet varied from 300-400 mg/L measured using gravimetric method. The TSS at outlet varied from 40-50 mg/L with an average removal efficiency of around 98 %.



Inlet & Outlet Parameters

The International Parameters of incoming raw sewage;

- | | |
|---------------------------|-----------------|
| 1. PH | 4.5 - 8.5 |
| 2. TSS | 350 mg/l. |
| 3. BOD-5 days @ 20-degree | 300 mg/l. |
| 4. COD | 450 - 500 mg/l. |
| 5. Oil & Grease | <50 mg/l. |

The Outlet Parameters of treated sewage expected shall have the following characteristics;

- | | |
|--------------|-----------|
| PH | 7.0 - 7.5 |
| TSS | <50 mg/l. |
| BOD | <10 mg/l. |
| COD | <50 mg/l. |
| Oil & Grease | <10 mg/l. |

It is expected that the treated sewage be used for land irrigation; EWS Flushing; Car Washing Fountains; horticultural and agricultural use or discharged to a normal drainage system.



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