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# MBBR

## Moving Bed Biological Reactor STP

# Septech MBBR

Moving Bed Bio Reactor (MBBR) is an attached growth activated sludge process. The basis of the process is the carrier elements (or biomed) that are made from polyethylene. The biomed provide a large protected surface area for the aerobic biofilm and optimal conditions for the bacteria culture to grow and thrive. The biofilm is responsible for the biological oxidation of organic constituents in the wastewater. The MBBR reactor can be loaded with biomed up to 40% to 60% of the tank's effective volume thus significantly reducing the required footprint.

## Advantages of the MBBR system over other activated sludge processes are:

- Reduced footprint for the aeration tank (MBBR reactor) and overall plant footprint. Relatively stable and can withstand shock loads
- Low sludge production
- Mother Liquor Suspended Solids (MLSS) is not a design parameter so no need for Return Activated Sludge (RAS) and the associated pumps/pumping facilities
- Modular design, easy to expand
- Utilises medium/coarse bubble diffusers, instead of more expensive fine bubble systems
- May be used to retrofit or upgrade existing conventional activated sludge plants without need for new tanks

## Aeration System

- The aeration system for the MBBR reactor consists of a peripheral aeration and airlifts
- The cleansing effect of the airlifts makes the MBBR Reactor constantly self cleaning
- The debris cleared off the biomed, consisting almost exclusively of inert bacteria cell membranes, is flushed out of the aeration tank with the general circulation
- The system has 3 compartments and is designed for removal of maximum Biological Oxygen Demand (BOD) in the 1st and 2nd compartment while the nitrification is carried out in the 3rd compartment
- Air from positive displacement blowers is supplied to fulfill the oxygen requirement for the process

## Settling Tanks

- The incoming water from the reactor tank is allowed to settle in the settlement tank to separate solids from clear water. The tank is designed for conservative overflow rate to ensure good separation and minimise solids carryover into chlorine contact tank

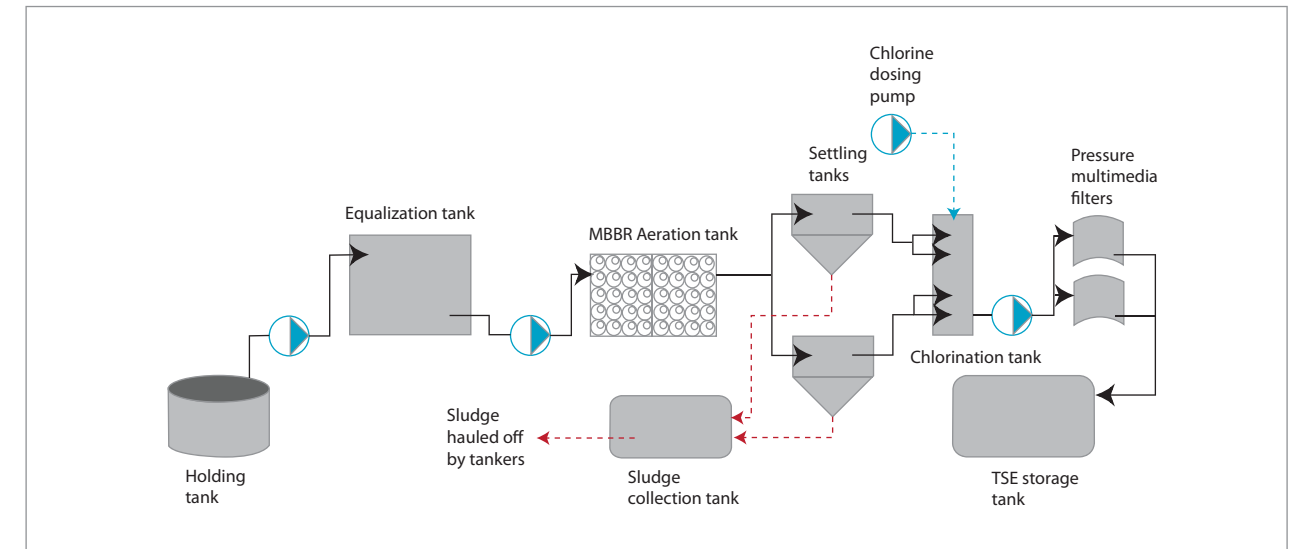
## Chlorine Contact Tank

- The supernatant liquid overflows from settlement tank to chlorine contact tank via V-notch. Sodium Hypochlorite is dosed and the sufficient residence time is provided for disinfection

## Tertiary Filtration

- As a final step, this disinfected Treated Sewage Effluent (TSE) is filtered for achieving the Effluent water quality, prior to transfer to TSE storage tank

A typical process flow diagram of the MBBR Sewage Treatment Plant



## Influent Characteristics

Below table shows a typical analysis of domestic sewage for which our MBBR units are designed.

Parameter	Unit	Values
BOD <sub>5</sub>	mg/l	300
COD	mg/l	500
Total Suspended Solids (TSS)	mg/l	250
Ammonia Nitrogen (NH <sub>3</sub> -N)	mg/l	30
Oil and Grease	mg/l	< 2
pH	units	6.5 - 8.5
Wastewater Temperature	Deg C	25 - 35
Total coliform	MPN/100 ml	10 <sup>7</sup> - 10 <sup>8</sup>

## Effluent Quality

Treated sewage quality shall be as follows if the influent parameters are compliant to the above and the STP is operated in accordance with the O&M manual that will be provided by Septech.

Parameter	Unit	Values
BOD <sub>5</sub>	mg/l	≤ 10
TSS	mg/l	≤ 10
pH	units	6 - 9
NH <sub>3</sub> -N	mg/l	≤ 5
Oil and Grease	mg/l	≤ 1
Wastewater Temperature	Deg C	25 - 35
Total coliform	MPN/100 ml	≤ 20



## Service and After Sales

Septech gives you one-stop shopping for a complete and comprehensive waste management system, for seamless integration, both aesthetic and functional with your environment. Septech provides a full back-up after sales service to ensure the installation runs effectively, including long term contract maintenance, if required.





# UTB

## Underground Trickling Biofilter

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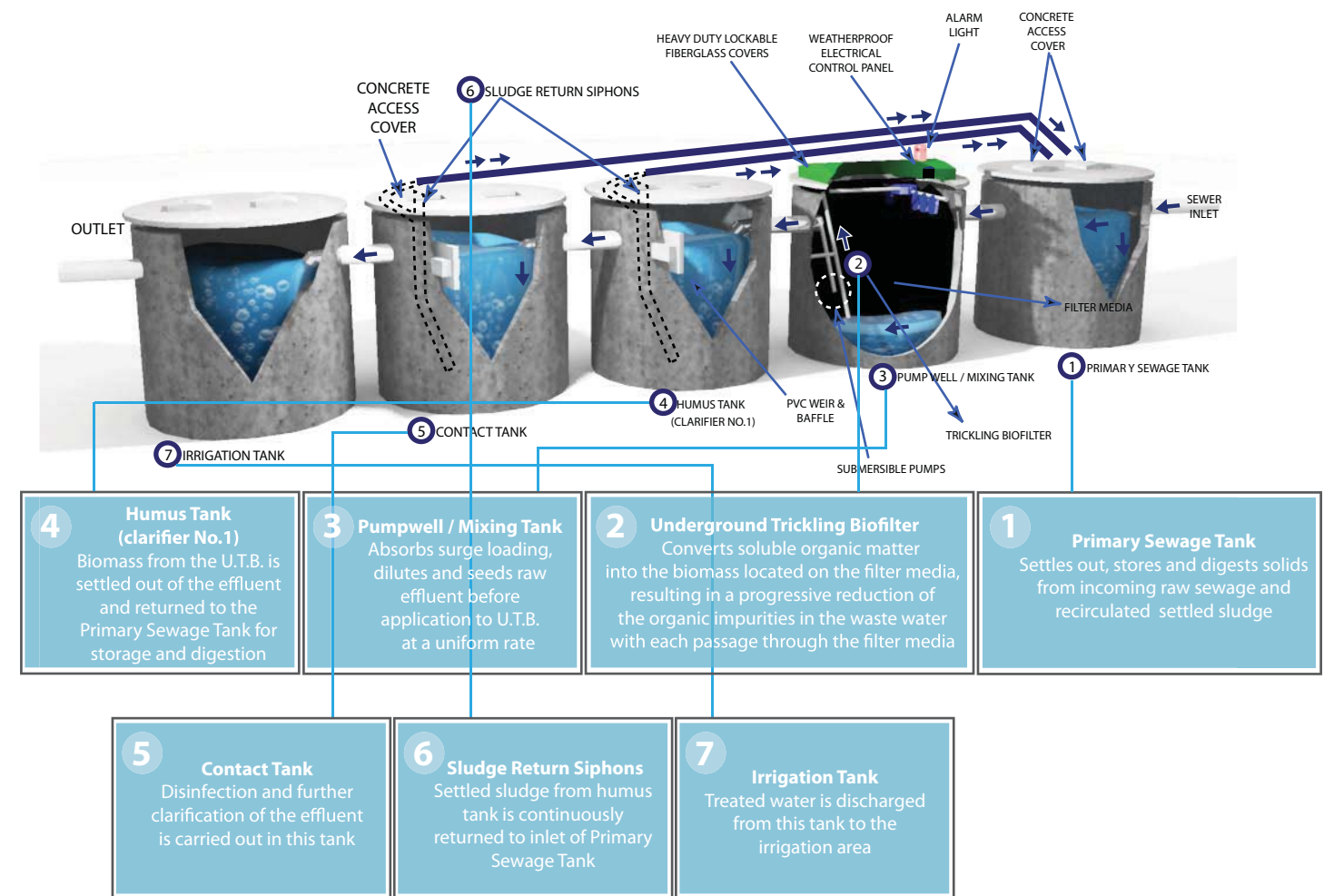
# Underground Trickling Biofilter

Septech designs, manufactures, installs and maintains biofilters which are encased in a precast concrete modular unit with a capacity ranging from 5m<sup>3</sup>/day to 150m<sup>3</sup>/day

Quality of treated effluent exceeds irrigation standards without the use of tertiary treatment or pressure filters.

## Advantages of this system include:

- Projects take days, rather than months to complete
- Ten times less sludge accumulation than extended aeration plants
- No separate plantroom or sludge storage tanks required
- Noiseless and odourless
- Aesthetically pleasing - installed underground
- No full time operator required
- Proven track record throughout the UAE
- Easily maintained by unskilled workers



The Septech UTB System has been installed at various locations throughout the Emirates, including Ajman City Centre, Sharjah Expo Centre, Gulf Extrusion Factory, Abu Al Abyad and Sir Baniyas Islands, Emirates Stud Farm, Etisalat Academy, Dubai Outsource Zone, Wadi Al Helo Villas, Al Khawaneej Private Palace and Al Maha Desert Resort.



## When the UTB is recommended:

The UTB is ideal for a variety of different client profiles, including schools, office complexes, labour camps, exhibition halls, villa compounds and shopping centres.



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## Domestic Wastewater Treatment Solutions

Enviro-Pack Domestic Sewage Treatment Plant

# Domestic Wastewater Treatment Solutions

## Product Attributes

The Enviro-Pack Domestic sewage treatment system effectively treats effluent flows up to 4m<sup>3</sup> per day and is suited to a variety of applications, including villas, mosques and holiday resorts.

Treated effluent is of a consistently high standard and mechanical components in contact with the wastewater are of a non-corrosive material. The Septech Enviro-Pack Domestic Sewage Treatment Plant ensures treated effluent is odour-free and meets local and international environmental laws, even after extended periods of non-use.

Installed in one day by the client or Septech, plant operation is noiseless, odourless and a low ground profile means the treatment plant is aesthetically pleasing and easily concealed within the garden landscape.

## One Pump System

The Enviro-Pack Domestic sewage treatment plant, backed by a Septech warranty and servicing agreement is operated and maintained via a reliable, single pump system, reducing operation and maintenance costs.

## The Process

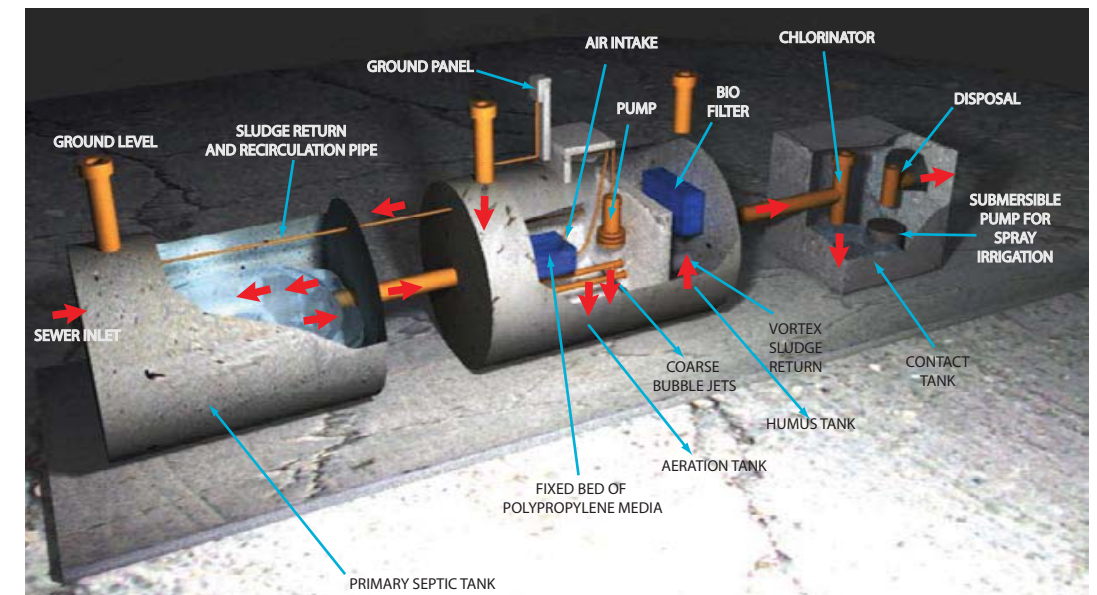
- Wastewater is gravity fed into the primary septic tank where waste undergoes settlement and digestion across a 24-hour period
- Settled wastewater then flows into the aeration chamber where effluent is mixed, diluted and aerated, via coarse bubble jets
- Organic matter in the wastewater is oxidised by micro-organisms growing on the fixed bed of polyethylene media in the aeration chamber
- Organic impurities in the wastewater are progressively reduced
- Treated wastewater undergoes settlement in the secondary tank due to reduced flow velocity which causes sludge particles to settle to the bottom of the tank
- Clean wastewater flows upward through a biofilter developed by Septech, further polishing the wastewater



## Continual Cycle

Sludge automatically returns and is stored, via the vortex lift in the secondary tank to the inlet of the primary sewage tank on a continual basis, with the following benefits:

- Storing and digesting settled sludge in the primary septic tank reduces sludge accumulation in the final settlement tank, reducing solids carryover into the irrigation chamber
- Clean effluent, recycled through the plant suppresses odour producing micro-organism activity
- By continuously recycling treated effluent, the biomass in the aeration chamber is fed stored organics from the primary sewage tank, keeping micro-organisms at maximum population levels and reducing the potential for insufficient food supply to the treatment plant during extended periods of non-use, such as weekends and holidays. This means untreated effluent is prevented from being discharged from the unit when waste flow recommences



## Enviro-Pack Domestic Sewage Treatment Plant



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# Capitox

## Sewage Treatment Package Plant

# Capitox Sewage Treatment Package

The Capitox range of compact, packaged sewage treatment plants for small communities is designed to extended aeration parameters. This well proven activated sludge principle of sewage treatment is accepted as one of the most reliable methods of effluent purification. This system has been designed as a low cost packaged unit, requiring a minimum of attention or maintenance and is ideally suitable for small villages, hotel developments, housing estates, universities and any other location that is separated from local municipal sewerage facilities.

A consistent high quality effluent is produced for discharge to rivers or for use in irrigation systems without further treatment. As with all treatment systems, a certain amount of sludge is produced which must be removed periodically. However, an important benefit of the Capitox system is that sludge is retained in the system and no separate sludge storage units, with attendant problems of septicity, are necessary.

## Treatment Process

The activated sludge process is based on the fact that organic pollution contained within an effluent can be utilized in conjunction with atmospheric oxygen as a source of food by particular groups of microorganisms. This process normally takes place when polluted waters are discharged to clean rivers or streams, but in this case, the number of microorganisms present is relatively low and the process takes place at a relatively slow rate.

In activated sludge systems, the microorganisms concentration is kept high and the rate of reaction is therefore very fast. This high concentration is achieved by separating the microorganisms or activated sludge from the effluent in a settling tank, and recirculating it to the reaction or aeration tank where it will effect further biological oxidation of freshly introduced effluent. The polluting substances in the effluent are utilised by the microorganisms for two purposes. Firstly, for the production of energy to enable them to move, and secondly, for the production of new cell matter, i.e. the growth of the organism.



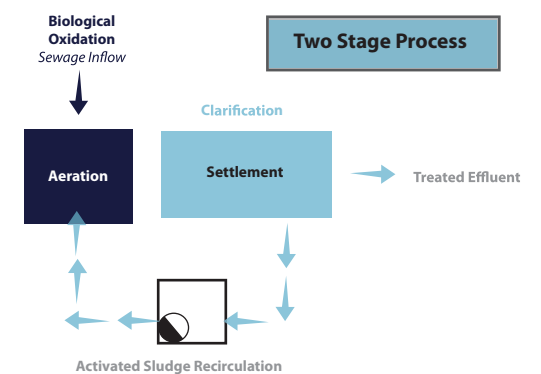
## Construction

Capitox plants are supplied with steel tanks as a standard, but concrete tanks may be used if so desired. The standard steel tanks are manufactured in prefabricated sections and protected with a vitreous enamel coating. The tank sections forming the tanks are grouted into a simple concrete base slab. A tripod support is provided for the surface aerator and drive assembly and a common steel access bridge provides access to the center of the aeration and settling tanks. The aeration equipment includes a medium speed surface aerator and an adjustable weir for mixed liquor off-take to the settling tank(s). Circular settling tanks are provided with a mechanical scraping mechanism fitted rubber edged 'echeleon' type scraper blades. The settled sludge in the center well of the settling tank is returned to the aeration tank by dry mounted return activated sludge pumps arranged in duty / standby configuration. Waste sludge is drawn from the system via a valve on the discharge pipework of the return activated sludge pumps.

In situations where gravity feed is not available, the raw sewage flow to the system may be collected in a ump and fed to the aeration tank by submersible electric macerator type pumps. On larger Capitox units, a separate macerator unit is provided. Level probes or switches normally control the level in the sump, and the provision of a standby pump unit is generally advisable.

Where the discharge consent criteria necessitates tertiary treatment stages, chlorination and/or filtration add-on packages can be provided. Chlorination can be either a liquid drip type feed or a gas type and can be supplied with a contact tank as preferred. Filtration units, to provide an effluent quality of better than 10mg/l BOD and 10 mg/l SS, are of the continuous sand filter type completewith feed pumps and compressor units. The washwater from the filters is returned to the head of the plant for re-treatment.

Key Feature	Benefits
Modular construction	Easy assembly - low cost erection. Flexibility of design for future expansion
Two stage process	No primary settling tanks or sludge
Inlet screens not required	No hand raking of screens or disposal of screenings
Simplicity of control	Easy operation
Minimal maintenance	Requires only occasional attention
Quiet running	Location adjacent of residential areas is practical
Extended aeration process	Copes with daily and seasonal variations in flow/capacity loading and varying peak flows. Maintains effluent quality
Process employs liquid borne organism	Absence of unpleasant odours and fly breeding conditions
Sludge is retained in system	Separate sludge storage not needed until disposal
Add-on packs available	Superior quality effluent standards to 10mg/l BOD, 10mg/l SS or even better



The utilisation of polluting substance for the production of energy is accompanied by the production of carbon dioxide and water, the former being lost from the system as a harmless gas. The use of polluting substances for the synthesis of new cells results in an accumulation of an excessive number of cells, and hence gives rise to the production of surplus activated sludge. This must be taken from the system at regular intervals once the required concentration of activated sludge has accumulated.