



ZERO WASTE WORLD

Our Principals



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INTRODUCTION

Universal Environmental Engineering (M) Sdn. Bhd. (UEE) established in 1997 by a group of professionals who have many years of experience in water & wastewater industry, both in Malaysia and abroad. With 20 years experience and around 300 STPS, ETPs & Equipment, UEE has branches at Singapore, Saudi Arabia, Bangladesh and Pakistan. UEE aims to be at the forefront of environmental technology. UEE reached the status of most established home-grown company and systems design engineers, related civil / environmental engineering and turnkey contractors in this industry. We continuously strive to create a ZERO WASTE WORLD through our efficient and economical solutions in.

1. Waste Water Treatment Systems
2. Solid Waste Recycling
3. Renewable Energy Technologies
4. Industrial Research & Development



MISSION STATEMENT

To achieve the Highest Quality for Design, Construction and Fabrication of its Products and Services at Affordable Price

PROJECT CAPABILITIES:

Over the years, UEE has demonstrated its uncompromising integrity to achieve the highest quality for the design, construction and fabrication of its product & services. We are on course to achieve ISO 9001:2000 accreditation in near future.

For the past twenty years, UEE has installed around 300 treatment plants and equipment all over Malaysia and Asian countries.

The Treatment Systems employed includes;

- Conventional Activated Sludge
- Extended Aeration
- Oxidation Ditch
- Compatible Aeration
- Trickling Filters
- Sequential Batch Reactors
- Bio Bola
- Chemically Enhanced Primary Treatment (CEPT) System
- Dissolved Air Flotation (DAF) System



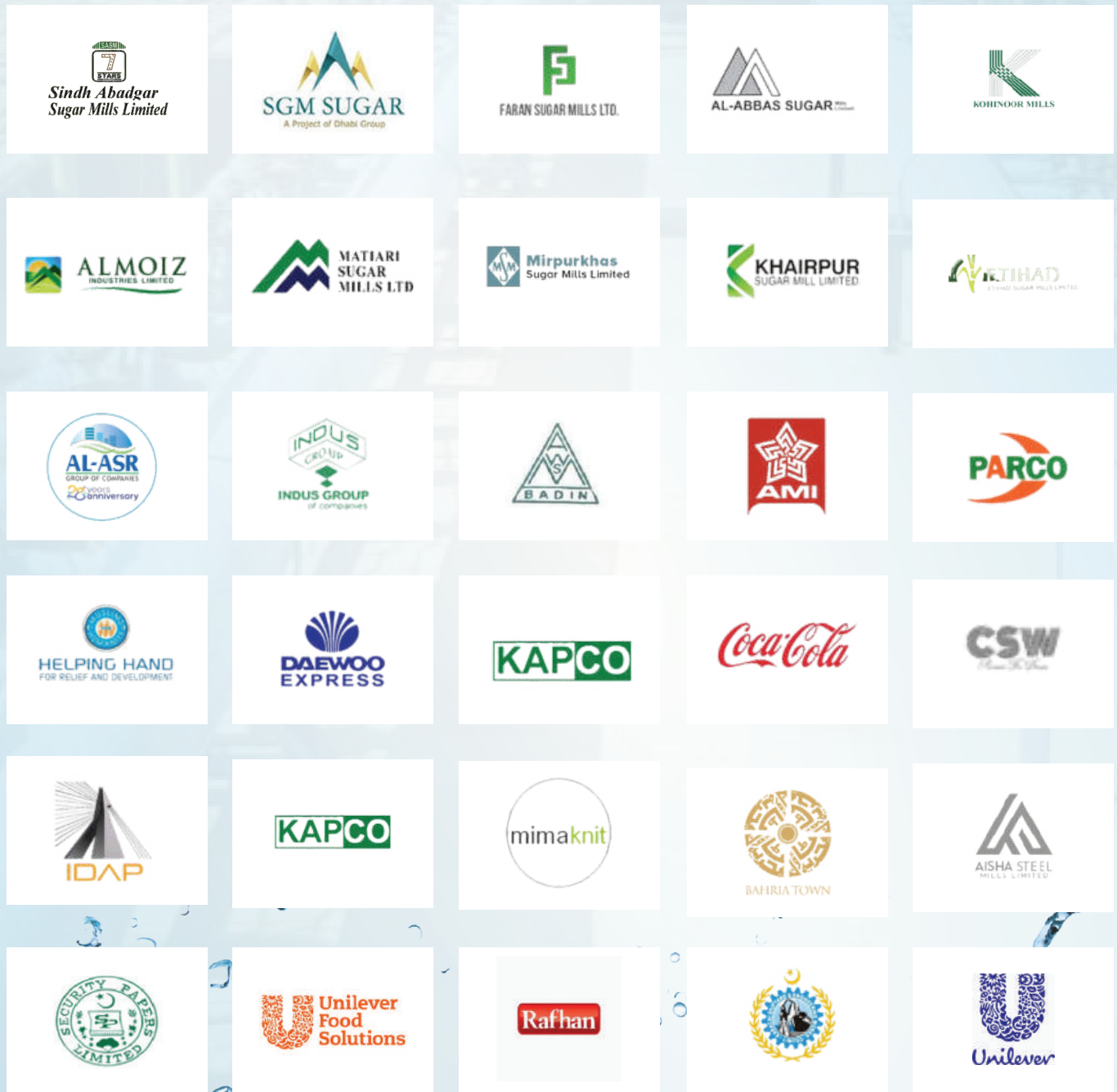
And many other technologies. Our expertise also involves underground/inside building mechanical sewage treatment plants. We are also specialized in designing package potable water treatment plants;

- Ultra Filtration
- UV Sterilizers
- Nano/Micro Filters
- Reverse Osmosis Systems

We deal in complete Recycling Systems, package of Wastewater & Water Treatment Plants.

We are constantly engaged in engineering innovation and research in order to exploit the development of new products and applications to suit the requirement of local conditions.

Client Logos



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Kuala Lumpur, Malaysia
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CEPT System

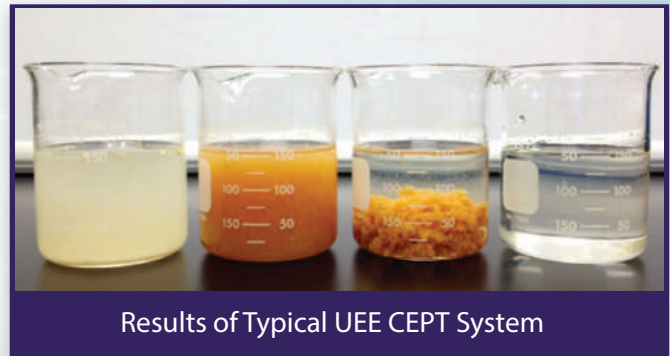
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Chemically Enhanced Primary Treatment (CEPT) with Modified Sedimentation Tank especially for Primary Treatment of wastewater for Turbine Washwater & Tanneries.

Wastewater treatment in the world is evolving. Application of secondary biological treatment to industrial and municipal wastewater is not widely practiced due to a number of reasons which include high capital costs, lack of

operation and maintenance skills, and the absence of stringent enforcement of environmental standards. In this scenario, best management practices must be used that are commensurate with available financial resources and skills. Chemically Enhanced Primary Treatment (CEPT) is a technology that appears to have potential in the world to cope with evolutionary demand of environmental protection.



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Wastewater characterization is an important step in designing effective treatment facilities for industrial wastewater. This is especially true for turbine wash water and tanneries which exhibit significant differences in their production processes generating effluents of unique and complex nature. Turbine wash water and tannery wastewater are highly polluted in terms of organic, solids, and chromium contents. A major portion of these pollutants is in particulate form and hence coagulation- flocculation-sedimentation is the most appropriate at first step.

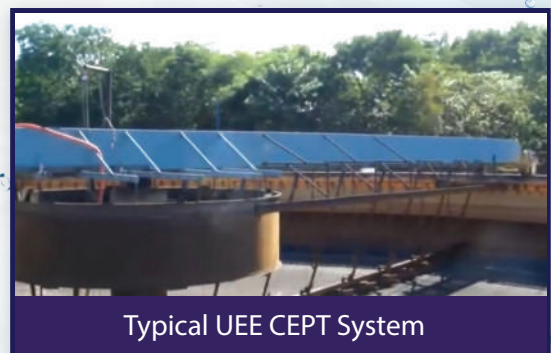
The application of CEPT reduces the footprint of primary settling unit as it permits the use of high surface overflow rates. Similarly, reductions in terms of space and cost of subsequent biological unit are achieved due to the decreased organic loadings following CEPT. With minor retrofits, CEPT can also be applied to existing overloaded.

Modified Sedimentation Tank (MST) has been designed with appropriate mixing control by simulating lab condition to field one by using computational fluid dynamics. The MST performance has been catalyzed by the application of CEPT. Following are the key advantages of MST with CEPT.

1. The capital cost of the system is much lower as compared to the other available systems in the market.
2. The system requires less land area as compared to conventional sedimentation tank of the same capacity.
3. The system is completely automatic, easier to operate and user friendly.
4. The operational cost in achieving 99% of the chromium removal efficiency is only 0.07 US\$/cum of wastewater.
5. Besides, chromium removal of 99%, TSS and COD can be removed up to 95%.
6. For individual cases, the system will be optimized by using modeling technique through computational fluid dynamics to avoid dead zones to improve settle-ability in the settling tank.
7. All the equipment provided for the system will be on the bases of extensive experience in wastewater field.
8. Sludge clarifier scrapper will be provided to remove the settled sludge from the sedimentation tank effectively.
9. Sludge Drying Beds will be robust and won't require extensive maintenance.
10. In consideration of the optimized chemical dosage rates with respect to the individual characteristics of the effluent at each industry, standard jar test apparatus the Phip and Birds Six paddle stirrer with a programmable unit and illuminated base will be employed.

Table: Efficiency of CEPT System

WastewaterParameters	Effluent Standards	Efficiency of our System
TSS	< 100 mg/L	>80%
COD	< 100 mg/L	>65%
Heavy Metals	< 0.5 mg/L	>99%



Typical UEE CEPT System

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Compatible Aeration System

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Typical UEE Compatible Aeration

Sedimentation, Dissolved Air Floatation (DAF), etc., is mostly accompanied with the secondary biological treatment. primary treatment system is able to remove significantly TSS and heavy metals and some portion of BOD and COD from the influent. However, significant amount of pollutants in terms of BOD and COD, are still left in the effluent to be treated. Therefore, there is a need of treatment plant, which should be compatible.

with the primary treatment system to remove the remaining pollutants in the wastewater before discharge into the environment. UEE Compatible Aeration System has the ability to work in harmony with any primary treatment system. The system is designed to adjust the dissolved oxygen levels of the wastewater automatically. The system is designed on high HRTs in order to sustain peak organic loadings.



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Following are the advantages of UEE Compatible Aeration System.

Easy operation.

- Few mechanical parts/equipment can be installed on the existing Ponds/Tanks. (Construction cost can be saved.
- Low maintenance and operation cost, involving low electricity consumption for surface aerator, air blower and submersible pump by means of Dissolved Oxygen (DO) Controller.
- High quality biological treatment process.
- Stability and reality in treatment performance is unique.
- Various model available fo small, medium and high scale development project such as industrial wastewater treatments, hospital, housing projects etc.
- The advantage of having long hydraulic retention times is that it allows the plant to operate effectively over widely varying flow and waste loadings. The system is able to produce low sludge wastage that is good for environment.
- To breakdown the organic material in the wastewater, bacteria require oxygen. This may be introduced by agitation (using surface aerators) or by submerged

"diffusers". In a surface-aerated system, the aerators provide two functions: they transfer air into the basins required by the biological oxidation reactions, and they provide the mixing required for dispersing the air and for contacting the reactants (that is, oxygen, wastewater and microbes). Typically, the floating surface aerators are rated to deliver the amount of air equivalent to 1.8 to 2.7 kg O₂/kWh.

- Likewise, Compatible Aeration System through Fine Bubble Diffused Air, are robust and can withstand surges in hydraulic or organic load. The system introduces air in the form of fine bubbles through submerged diffusers. fine bubbles promote higher oxygen transfer efficiency and are therefore used in preference to coarse bubbles.
- Solids in the wastewater are held in suspension by the bubbles and bacteria in the sewage break down organic materials. Wastewater is held in the aeration tank for more than 22 hours. The effluent is then polished and/or discharged to the receiving environment.
- Compatible Aeration System can consistently produce a high quantity effluent. By monitoring in fluent and effluent, the activity in the aeration tank can be adjusted to cater for variations in hydraulic or organic load.

Typical results for Compatible Aeration Plants are as follows:

WastewaterParameters	Compatible Aeration system	Conventional Activated Sludge System
BOD	< 50 mg/L	>80%
COD	< 100 mg/L	>80%
TSS	< 100 mg/L	>60%

Following is the comparison of Compatible Aeration system with Conventional Activated Sludge system

Description	Compatible Aeration system	Conventional Activated Sludge System
Hydraulic Retention Time>	23 hrs	6 – 16 hrs
f/M ratio	App. 0.05	0.25 – 0.5
Sludge Age	App. 5 days	20 days



Typical UEE Compatible Aeration system through Surface Aerators



Typical UEE Compatible Aeration system through Fine Bubble Diffuser

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Mechanized Oil Removal System

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Universal Environmental Engineering SDN. BHD. (UEE)'s Mechanized Oil Removal System is consist of Oil Skimmer with Oil/Grease Separator. The System is designed for medium to large industrial applications such as pits, holding ponds, API separator waste tanks, or any location where waste oil collects. This unit is capable of skimming free oil at the top, improve the concentration of oil and can achieve very high oil recovery rates.

Because of its design, UEE's Mechanized oil Removal System can be adapted to suit many applications. Standard units come with 0.7 kW,

submersible motors. However, other drive options are available including larger kW motors, variable speed drives, and single or 3 phase and 120/240V Complete, Skid Mounted Skimmer Systems & winterization packages are also available.

The UEE's Mechanized oil Removal System is a complete oil recovery system. This system is designed to remove and recover surface oil, collect it in its intermediate Oil/Grease separator, and automatically achieve the thickening of oil keeping in view of economical disposal.



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Oil/Grease Separator is equipped with automatic oil- water removal by difference in their specific gravity. The tank also has an overflow drain to re-circulate the excess water back to the pit. Other features are controllable timer provided for automatic operation. The standard Oil/Grease tank has a capacity of 1.5 cum, but can be sized according to customer specifications.

The skimmer pump is a 2" progressive cavity pump driven by a 0.7 kW electric motor This system has a pumping capacity of 18 cum per

hour. Other pump packages are available upon request to meet customer specifications. The UEE's Mechanized oil Removal System is also available with a variable speed module. This allows the operator to adjust the speed of the motor for varying conditions in oil thickness, viscosity, and to control recovery and efficiency rates. Extension arms/throughs can be added for down hole or vertical applications, such as, high docks, sumps, or for clearance over or through guard rails, etc.

Following are the advantages of using UEE Mechanized oil Removal System.

- Fully automatic and user friendly system
- Least Operational cost.
- Quantity of disposal Oil is less. Hence, the system saves additional cost of disposal.

Typical results for UEE Mechanized oil Removal System are as follows:-

Parameters (mg/L)	Raw Sewage	Effluent
Oil & Grease	10-300	<10

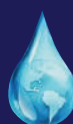
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Biobola System

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Typical UEE septic tank with Biobolas concrete structure

Septic Tanks are one of the simplest forms of sewage treatment and dates back to the sewerage system development in France in 1860.

UEE specially designed septic tank with Biobolas comprises of three chambers connected in a series. In the first chamber, greases and oils float to the surface forming a "scum" layer, while solids from the incoming sewage settle

forming "sludge" in the second chamber. The efficiency of the secondary chamber in removing the pollutants is also increased through biomass retention in the form of Biobolas. Effluent from between the scum and sludge layers then passes into the third chamber where further sedimentation occurs in a clarifier. Finally, the effluent leaves the third chamber and is discharged into a drain or allowed to percolate into the soil..



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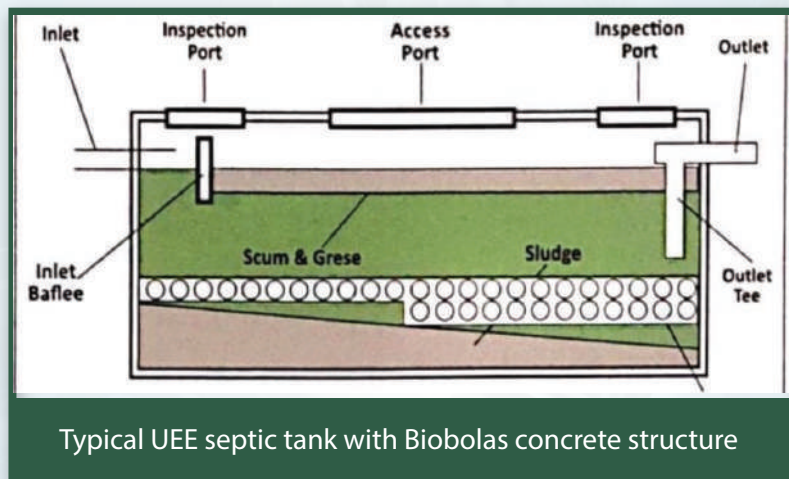
The sludge in the tank undergoes anaerobic digestion and is converted into more stable organic compounds and gases such as carbon dioxide (CO₂), methane (CH₄) and hydrogen sulfide (H₂S), UEE septic tank with Biobola system is usually designed for more than 24-hours retention time. Enough storage capacity is provided so that scum and sludge can be deposited in the tank for up to two years after which it must be desludged to keep the tank operating satisfactory.

UEE septic tank with Biobola system is suitable for single dwellings or individual buildings with a population equivalent (PE) up to 150 and installed where there are no

central sewerage systems. It is a cheap solution to disposing of sewage.

Following are the advantages of using UEE septic tank with Biobola system.

- Simple system as no mechanical items. Effective for small population offices and buildings.
- No operational cost.
- Biobolas improves the effluent quality by retaining biomass in the system.
- Life time performance, if proper deluding is carried out periodically.



Typical results for UEE septic tank with Biobola system are as follows

Parameters (mg/L)	Raw Sewage	Effluent
Biochemical Oxygen Demand	200-400	<80
Suspended Solids	200-350	<100

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SBR System

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Sequencing Batch Reactor (SBR) for Sewage treatment Plant

Sequencing Batch Reactor (SBR), is generally reputed for more biomass retention. The inherent capacity to compensate for variable loading conditions in biological systems for wastewater treatment is limited by a relatively slow adaptation of the mass of active bacteria in the system. SBR processes offer distinct advantages when,

compared with continuous processes, including a high degree of process flexibility and no requirement for a separate clarifier. With its intrinsic flexibility the modern SBR enjoys a gradually widening application and is subject to extensive use due to the advantages it offers.

Following are the key advantages of UEE SBR System.

The capital and operational cost of the system is much lower as compared to the other available biological systems in the



Typical UEE SBR System in operation

UEE SBR with bubble Diffuser System



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- The system requires less land area as compared to conventional activated sludge system and extended aeration activated sludge system of the same capacity
- All the equipment provided for the system will be on the basis of extensive experience in wastewater field
- High effluent quality, reduces main pollutants such as BOD and COD up to 90%.
- The system is completely automatic, easier to operate and user friendly
- Provision of polishing tank to avoid any unsettled sludge to mix in the effluent. The polishing tank can be used as aquatic life retention tank.
- SBR operates on storage and batching system storing the effluent at peak times and treating it in small batches throughout the rest of the day - thereby ensuring that each batch receives the full treatment time. Batch system eliminates peak surges.
- There are no moving parts or electrical components within the tank. All functions within the tank are operated by air power generated by a small compressor/blower.
- Blowers are connected with DO controller for efficient electrical consumption. The system is completely automatic, thus disallowing heavy duty blowers to run continuously without considering the dissolved oxygen level in the tank.
- Process is simplified, since all the unit processes are operated in a single tank; final sedimentation tank and return activated

sludge pumping are not required Compact facility. Operation is flexible; Nutrient removal can be accomplished by operational changes, Quiescent settling enhances solid separation (low effluent SS). Systems require less space (small foot print) than extended aeration plants-of equal capacity. The system allows for automatic and positive control of mixed liquor suspended solids (MLSS) concentration and solids retention time (SRT) through the use of sludge wasting.

Following are the unit processes of SBR system

1. Primary Treatment Processes

- Mechanical/Manual Screen
- Grit Settling Tank
- Equalization Tank

2. Secondary Treatment Processes

- Filling Process
- Aeration Process
- Settling Process
- Decant Process

3. Tertiary/ Discharge System.

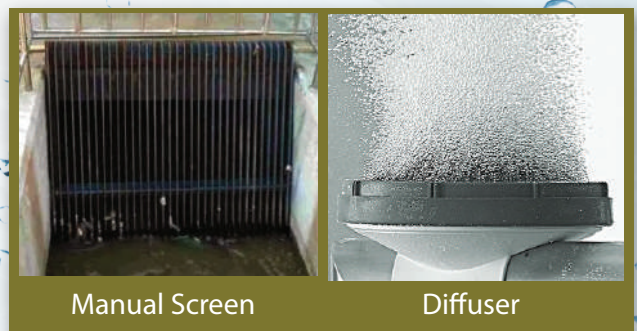
The down side of the aeration system is Polishing Tank. This tank avoids un-settled sludge particles to flow through the effluent and reduces the BOD to an acceptable quality.

4. Sludge Treatment

Sludge removal from the SBR Tank is done by the desludging pumps as mentioned above Sludge from SBR Tank is pumped into the Sludge Holding Tank and further after maturation into the Sand Drying Beds to dewater the sludge by filtration and natural evaporation.

Table: Efficiency of UEE-SBR system

Parameter (mg/L)	Raw Sewage	Effluent	DOE; Standard A
Biochemical Oxygen Demand	200-400	10:30	20
Chemical Oxygen Demand	300-500	30:50	50
Suspended Solids	200-350	15:50	50



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Reverse Osmosis

Reverse osmosis is a multi-stage water treatment process that removes contaminants from unfiltered water, or feed water, when pressure forces it through a semipermeable membrane. Residential reverse osmosis systems utilize at least three stages of treatment to reduce levels of virtually all contaminant types. In the final stage, the RO membrane, water flows from the more concentrated side (more contaminants) of the membrane to the less concentrated side (fewer contaminants) to provide clean drinking water. The fresh water produced is called the permeate. The concentrated water left over is called the waste or brine.

How does reverse osmosis work?

Reverse osmosis utilizes a semipermeable membrane with very small pores that traps contaminants while water is pushed through. In osmosis, water becomes more concentrated as it passes through the membrane to obtain equilibrium on both sides. Reverse osmosis, however, blocks contaminants from entering the less concentrated side of the membrane. For example, when pressure is applied to a volume of saltwater during reverse osmosis, the salt is left behind and only clean water flows through.

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The use of ultrafiltration technology for municipal drinking water & recycling water applications is a relatively recent concept. It is already commonly used in many industries. Ultrafiltration is proven to be a competitive treatment compare with conventional ones. In some cases, the combination of ultrafiltration with conventional process is also feasible particularly for

high fouling tendency feed water or for removal of specific contaminants. Recently, ultrafiltration has been recognized as competitive pre-treatment for reverse osmosis system. A system designed with an ultrafiltration as pre-treatment prior to reverse osmosis system has been referred to as an Integrated Membrane System (IMS).



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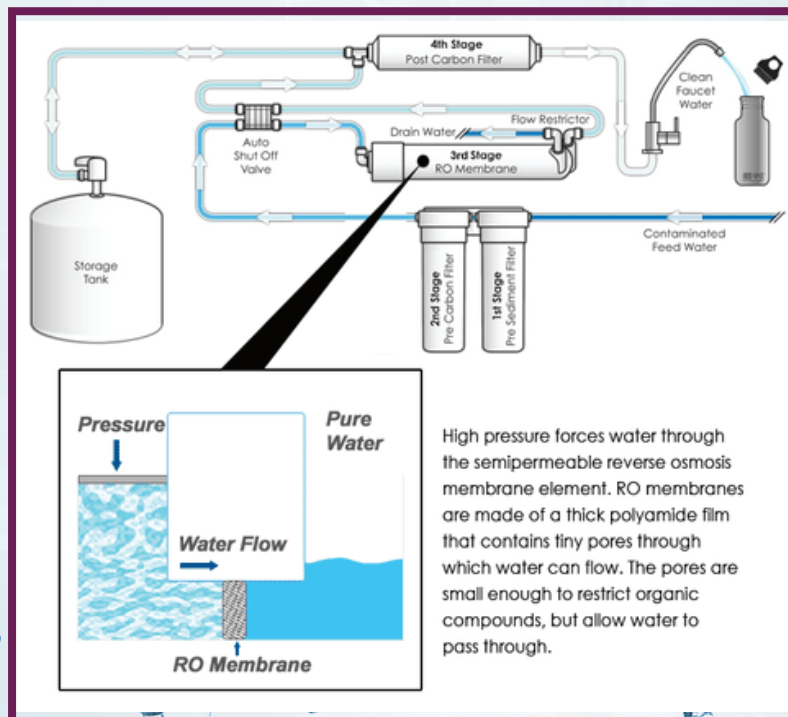
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Stages of RO systems

The RO membrane is the focal point of a reverse osmosis system, but an RO system also includes other types of filtration. RO systems are made up of 3, 4, or 5 stages of filtration. Every reverse osmosis water system contains a sediment filter and a carbon filter in addition to the RO membrane. The filters are called either prefilters or postfilters depending on whether water passes through them before or after it passes through the membrane.

Each type of system contains one or more of the following filters:

- Sediment filter: Reduces particles like dirt, dust, and rust
- Carbon filter: Reduces volatile organic compounds (VOCs), chlorine, and other contaminants that give water a bad taste or odor
- Semipermeable membrane: Removes up to 98% of total dissolved solids (TDS)



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