



# BIHAR STATE POLLUTION CONTROL BOARD

Parivesh Bhawan, Patliputra Industrial Area, P.O.-Sadakat Ashram, Patna-800010

EPABX:-0612-2261250/2262265, Fax:-0612-2261050

Ref. No. B-3032


Patna, dated- 27/07/2020.

## Notice

Bihar State Pollution Control Board has prepared charter on waste water treatment and other pollution control measures in Hotels, Restaurants & Banquet Halls. Hotels have been categorized as red, orange and green category by Ministry of Environment Forest & Climate Change, Govt. of India upon their size/waste water generation. Industries including Hotels, Restaurants & Banquet Halls are bound to comply with provisions/mandate of pollution control acts, related Regulations and standard thereof. Hotels have to install sewage treatment plant (STP) to comply with discharge standards. Air pollution control measures also have to be adopted for maintenance of Ambient Air Quality.

Board had consultation meeting with representatives of Hotels, Restaurants & Banquet Halls in past. As per their request this Board has prepared a charter on waste water treatment and other pollution control measures in Hotels, Restaurants & Banquet Halls.

Concerned stakeholders are requested to submit their suggestions/inputs if they feel/comments to this Board through email: [bspccb@yahoo.com](mailto:bspccb@yahoo.com) within 15 days. After that this charter shall be implemented by incorporating the suggestions if any, by BSPCB for prevention and control of pollution in Hotels, Restaurants & Banquet Halls.

  
(Alok Kumar)  
Member Secretary.

**Charter**

**for**

**Waste Water Treatment**

**&**

**Other Pollution Control Measures**

**in**

**Hotels, Restaurants & Banquet Halls**



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**1. Background:** Tourism in Bihar has significant potential considering the rich cultural and historical heritage. Hotel/Hospitality industries have emerged as one of the key drivers of growth among the services sector in the State. Hotels have been categorized as Red, Orange & Green category depending upon their size/capacity of waste water generation.

**2. Categorization of Industries:** Central Pollution Control Board (Ministry of Environment, Forest & Climate Change, Govt. of India) has classified industrial sectors under Red, Orange, Green & White categories based on pollution index/pollution potential. Range of pollution index for the purpose of categorization of industrial sectors is hereunder: -

Industrial Sector having pollution index score of 60 and above	Red category
Industrial Sector having pollution index score of 41 to 59	Orange category
Industrial Sector having pollution index score of 21 to 40	Green category
Industrial Sector having pollution index score up to 20	White category

**3. Categorization of Hotels:** Hotel industries have been categorized as hereunder: -

S. N.	Categorization	Remarks
1.	Hotels having more than 100 rooms/ having over all waste water generation 100 KLD and more & having a coal/oil fired boiler.	Hotel (Big) <b>Red Category</b>
2.	Hotels (< 3 star) or Hotels having > 20 rooms and less than 100 rooms and waste water generation less than 100 KLD & having a coal/oil fired boiler.	Hotel (Medium) <b>Orange Category</b>
3.	Hotels up to 20 rooms and waste water generation less than < 10 KLD without boiler.	Hotel (Small) <b>Green Category</b>
	Banquet hall with minimum floor area of 100 sq.m.	
	Restaurant with minimum seating capacity of 36	

**4. Sources of Pollution in Hotels:** D.G set and kitchen exhaust are sources of air pollution in hotels and restaurants. Additionally noise pollution is created from musical instruments/sound amplifier system at clubs/banquet halls during events.

Kitchen, laundry, toilet/bath room are main sources of water pollution. Solid wastes are also generated. These sources of pollution have to be addressed for maintaining environmental quality.

**5. Statutory Compliances for prevention and control of pollution:**

CPCB & BSPCB are mandated for maintaining wholesomeness of water resources/ bodies. Industries including hotels/hospitality industries, restaurants & banquet halls are bound to comply with the provisions/ mandates of pollution control Acts and related regulations. The Water (Prevention and Control of Pollution) Act, 1974, The Air (Prevention and Control of Pollution) Act, 1981 and the Environment (Protection) Act, 1986, enacted by the Parliament and rules made thereunder are comprehensive legislations for prevention and control of pollution & environmental protection in the country.

Hotels have to install Sewage Treatment System along with oil & grease skimming facility to comply with the sewage discharge standards. Presently, hotels/hospitality industries have not developed proper facility for treatment and disposal of their waste water and consequently are discharging untreated waste water into the municipal drain which ultimately pollutes environment.

**6. Provisions of the Pollution Control Acts:**

- **Section 24 of the Water Act, 1974:** No person shall knowingly cause or permit any poisonous, noxious or polluting matter to enter into any stream or well or sewer or on land.
- **Section 25 of the Water Act, 1974:** No person without the previous consent of the Board shall establish or take any step to establish any industry, operation or process or any treatment and disposal system or an extension thereto which is likely to discharge sewage or trade effluent into stream or well or sewer or land.

**7. Discharge Standards for Hotels:** MoEF&CC, Govt. of India has notified discharge standards for Hotel industry vide GSR 794(E), dated 04.11.2009 under E(P) Act, 1986 as hereunder: -

SN	Industry	Parameter	Standards		
"39		<b>Effluent Standards</b>			
		<b>(i) Hotel with at least 20 bedrooms</b>			
			Limiting concentration in mg/l, except for pH		
			<b>Inland Surface water</b>	<b>On land for irrigation</b>	
		pH	5.5-9.0	5.5-9.0	
		BOD <sub>3</sub> days, 27°C	30	100	
		Total Suspended Solids	50	100	
		Oil & Grease	10	10	
		Phosphate as P	1.0	-	
		<b>(ii) Hotel with less than 20 bedrooms or a Banquet Hall with minimum floor area of 100 m<sup>2</sup> or a Restaurant with minimum seating capacity of 36</b>			
		pH	5.5-9.0	5.5-9.0	
		BOD <sub>3</sub> days, 27°C	100	100	
		Total Suspended Solids	100	100	
		Oil & Grease	10	10	
		<p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>i. Hotels, banquet halls, restaurants, etc. located in coastal area shall also comply with the provisions of the Coastal Regulation Zone, as applicable.</li> <li>ii. If the effluent is discharged into a municipal sewer leading to a Sewage Treatment Plant, the hotel or restaurant or banquet hall, as the case may be, shall provide a proper Oil and Grease Trap for effluent arising from its kitchen and laundry and shall have to comply with the 'General Standards for Discharge of Environmental Pollutants Part-A: Effluents' notified under Schedule-VI."</li> </ul>			

**8. General Discharge & Emission Standards:** MoEF&CC, Govt. of India has notified general discharge & emission standards vide GSR 422(E), dated-19.05.1993 under E(P) Act, 1986 [the E(P) Amendment) Rules, 2016 as hereunder: -

Parameters for discharge	Standards		
	Inland surface water	Public sewers	Land for irrigation
PH	5.5-9.0	5.5-9.0	5.5-9.0
Total Suspended Solids (TSS) (mg/l).	100	600	200
Bio-chemical Oxygen Demand, BOD [3 days at 27OC] (mg/l).	30	350	100
Chemical Oxygen Demand, COD (mg/l).	250	-	-
Oil & Grease (mg/l).	10	20	10
Emission: The particulate matter emissions from the stack shall be less than 150 miligram per normal cubic meter.			

**9. Sewage Discharge Standards for STP:**

The new STPs as well as existing/under construction STPs shall comply with the discharge standards (pH: 5.5-9.0; BOD: 10 mg/L; COD: 50 mg/L; TSS: 20 mg/L; and Faecal Coliforms (FC): Desirable 100 Permissible 230 MPN/100/ml) in compliance with the E(P) Rules, 1986 and further order of the Hon'ble NGT dated-30.04.2019 in O.A. No.1069/2018.

**10. Compliance of the order of the Hon'ble NGT:** The Hon'ble NGT, Principal Bench, New Delhi in its order dated-10.12.2015, 13.07.2017 and 14.05.2019 in O.A. No. 200/2014 in the matter of MC Mehta Vs Union of India & Ors has directed for following compliances: -

- Closing down of polluting industries, Hotels, Dharmshalas & Ashrams being run without STPs and without consent of the State Pollution Control Board, if they were releasing domestic waste or sewage into the river.

- No person shall be permitted to extract ground water for industrial and commercial purposes unless it has obtained permission from Central Ground Water Authority (CGWA)/ (CGWB).
- There shall be complete prohibition on extraction of ground water in the critical areas.
- There shall be complete prohibition on disposing of MSW, e-Waste or BMW on the flood plain or into river Ganga or its tributaries.

**11. Compliance of Solid Waste Management:** Hotels are bulk waste generators: Duties of waste generators are enumerated under the Solid Waste Management Rules, 2016.

- ✓ All waste generators shall segregate and store the waste generated by them in three separate streams namely bio-degradable, non bio-degradable and domestic hazardous wastes in suitable bins and handover segregated wastes to authorized rag-pickers or waste collectors.
- ✓ No waste generator shall throw, burn or bury the solid waste generated by him, on streets, open public spaces outside his premises or in the drain or water bodies.
- ✓ All hotels and restaurants shall, within one year from the date of notification of these rules and in partnership with the local body ensure segregation of waste at source as prescribed in these rules, facilitate collection of segregated waste in separate streams, handover recyclable material to either the authorized waste pickers or the authorized recyclers. The bio-degradable waste shall be processed, treated and disposed off through composting or bio-methanation within the premises as far as possible. The residual waste shall be given to the waste collectors or agency as directed by the local body.

**12. Hazardous Waste Generation from Hotels:** MoEF&CC, Govt. of India has notified the Hazardous & Other Waste (Management & Trans-boundary Movement) Rules, 2016 under the Environment (Protection) Act, 1986 vide notification no. GSR 395(E), dated-04.04.2016. As per provision, the occupiers are responsible for safe and environmentally sound management of hazardous and other wastes. In compliance with rule-6, every occupier who is engaged in handling, generation, collection, storage, transportation, use, treatment, processing, recycling, recovery, pre-processing, co-processing, utilization, offering for sale, transfer or disposal of the hazardous & other waste is required

to obtain authorization from SPCB. Used/spent oil (HW cat. no. 5.1) and oil & grease skimming (HW cat. no. 35.4) are listed as Hazardous waste in Schedule-I of the said rules.

### **13. Pollution Control System in Hotels, Restaurants & Banquet Halls**

#### **A. Air Pollution Control System:**

- ✓ D.G. set should have acoustic enclosure.
- ✓ Kitchen exhaust system should be placed with proper exhaust height as applicable for D.G. sets.
- ✓ The height of D.G. set must be in accordance with CPCB guidelines as hereunder: -

The minimum height of stack to be provided with each generator set can be worked out by using the following formula: -

$$H=h+0.2 \text{ KVA}$$

H=Total height of stack in meter

h=height of the building in meters where the generator set is installed.

KVA=Total generator capacity of the set in KVA

Based on the above formula the minimum stack height to be provided with different range of generator sets may be categorized as follows:

<b>For Generator Sets</b>	<b>Total Height of Stack in Meter</b>
50 KVA	Height of the building + 1.5 meter
50-100 KVA	Height of the building + 2.0 meter
100-150 KVA	Height of the building + 2.5 meter
150-200 KVA	Height of the building + 3.0 meter
200-250 KVA	Height of the building + 3.5 meter
250-300 KVA	Height of the building + 3.5 meter

Similarly for higher KVA ratings a stack height can be worked out using the above formula.

#### **B. Ambient Air Quality Standards in respect of noise for different area/zones:-**

1. Ambient Air Quality Standards in respect of noise has been specified as hereunder: -



Area Code	Category of Area	Limits in dB(A) Leq.	
		Day Time (06:00 am to 10:00 pm)	Night Time (10:00 pm to 06:00 am)
(A)	Industrial Area	75	70
(B)	Commercial Area	65	55
(c)	Residential Area	55	45
(D)	Silence Zone	50	40

**Note:**

- (i) Silence zone is an area comprising not less than 100 meters around Hospital, Educational Institutions, Courts, religious places or any other area declared as such by the competent authority.
- (ii) Mixed categories of areas may be declared as one of the four above mentioned categories by the competent authority.
- (iii) A " Decibel" (dB) is a unit in which noise is measured.

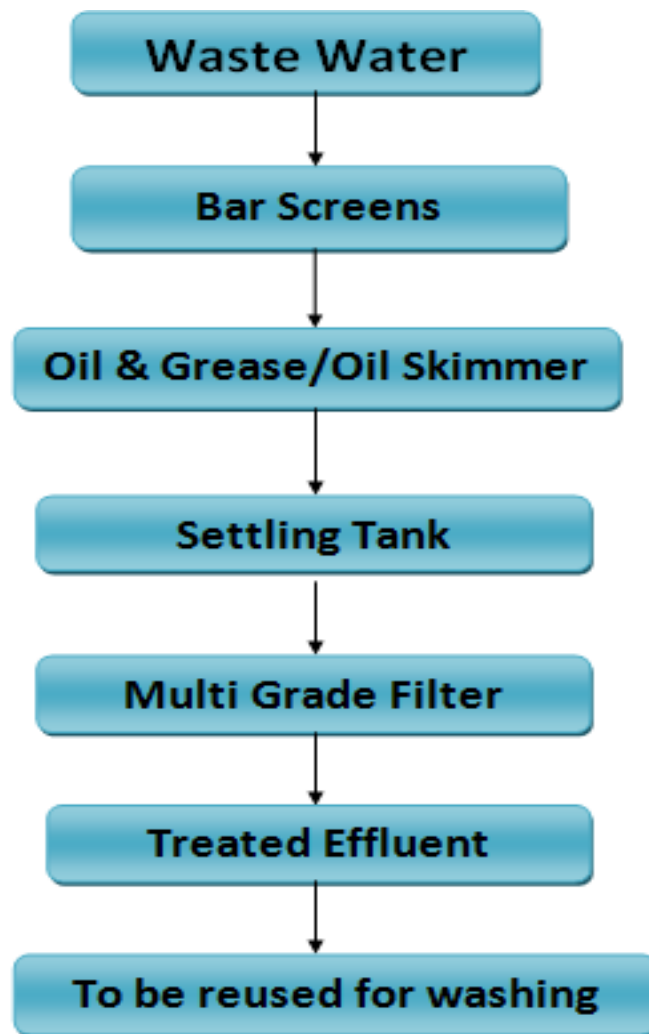
**C. Water Pollution Control System:** The waste water from hotels, restaurants & banquets halls are generated from mainly kitchen, bathing, laundry activities and toilets. The waste water from toilet is usually refer to as *black water* and waste water from other activities is referred to as *grey water*. In the absence of actual water supply data and domestic waste water generation, for design purposes, 135 liter/capita/day water supply and 80% sewage/waste water generation may be taken as reference. The black water has to be passed through septic tank for its treatment and disposal. The grey water is to be treated through STP.

The waste water from aforesaid sector have coarse and fine particle along with high BOD, COD, TSS, Total Nitrogen, Ammonia Nitrogen, Nitrate Nitrogen, Phosphorus (Total and ortho) and oil & grease.

This requires physical screening for removal of coarse and fine particles from waste water followed by equalization, oil & grease traps/skimmer, settling and multi grade filter (MGF) as primary treatment system to comply with the discharge standards notified by the MoEF&CC, Govt. of India if the waste water is discharged into municipal drain leading to Sewage Treatment Plant (STP). The aforesaid treatment system may be useful for the hotels, restaurants and banquets halls having waste water generation <10 KLD.

Hotels (< 3 star) or Hotels having > 20 rooms and less than 100 rooms and waste water generation less than 100 KLD & hotels having more than 100 rooms/ having overall waste water generation of 100 KLD should have STP with physical screening, equalization tank, Oil & grease trap followed by biological treatment such as Activated Sludge Process or Membrane Bioreactor (MBR), MGF/sand filter and chlorination or any other technology for treatment of sewage/domestic waste water.

- 14. (a) Schematic diagram for Primary Treatment of Waste Water of Hotels, Restaurants & Banquet Halls, if effluent is discharged into municipal sewer leading to STP for compliance of general discharge standards.**



#### **14. (b) Treatment process design for treatment of waste water of Hotels/Restaurants & Banquet Halls having waste water generation > 10 KLD:**

The treatment process includes primary treatment, secondary biological treatment and tertiary treatment system. The primary treatment system includes screening, oil & grease skimming/trapping and equalization. Solids are removed through screening arrangement which may be coarse screening (size larger than 20 mm) and fine screening (size larger than 2 mm). The equalization tank is designed to smooth out peak flow and meet the design flow for two hours. The aerobic biological treatment system such as Activated Sludge Process (ASP), Sequencing Batch Reactor (SBR), Moving Bed Bio-Reactor (MBBR) and Membrane Bio-Reactor (MBR) are the suitable technologies for biological treatment of waste water generated from aforesaid sectors. Multi Grade Filter (MGF)/Dual Media Filter (DMF)/Ultra Filtration (UF) may be adopted as tertiary level of treatment.

The **Activated Sludge Process (ASP)** is a type of waste water treatment process for treating sewage or industrial waste waters using aeration and a biological floc composed of bacteria and protozoa.

The **Sequencing Batch Reactor (SBR)** is a fill-and draw activated sludge system for wastewater treatment. In this system, wastewater is added to a single "batch" reactor, treated to remove undesirable components, and then discharged. Equalization, aeration, and clarification can all be achieved using a single batch reactor. To optimize the performance of the system, two or more batch reactors are used in a predetermined sequence of operations. SBR systems have been successfully used to treat both municipal and industrial wastewater. They are uniquely suited for wastewater treatment applications characterized by low or intermittent flow conditions.

The unit processes of the SBR and conventional activated sludge systems are the same. The difference between the two technologies is that the SBR performs equalization, biological treatment and secondary clarification in a single tank using a timed control sequence. This type of reactor does, in some cases, also perform primary clarification. In a conventional activated sludge system, these unit processes would be accomplished by using separate tanks.

The **Membrane Bio-Reactor (MBR)** is the combination of a membrane process like micro-filtration or ultra-filtration with a biological wastewater treatment process, the activated sludge process. It is now widely used for municipal and industrial wastewater treatment. There are

two types of MBR system namely vacuum (gravity driven) and pressure driven system. Vacuum or gravity systems are immersed and normally employ hollow fiber or flat sheet membrane installed in the bio-reactors or a subsequent membrane tank. Pressure driven systems are in-pipe cartridge systems located externally to the bio-reactor. This system performs both functions of aerobic treatment and solid-liquid separation. The complete MBR system is able to operate at high MLSS concentration up-to 8000 mg/L. Activated sludge in the aeration tank is clearly removed by the membrane. The individual membranes are housed in units known as modules, cassettes or rags and a combined series of these modules are referred to as a working membrane unit. In order to ensure pathogen free water for the purpose of reuse, chlorination using sodium hypochlorite is adopted for disinfection followed by the de-chlorination. Alternatively, Ultra-filtration through UV-System may also be adopted for disinfection of treated water.

The model of sewage treatment system for the capacity having plant up to 10 KLD, 50 KLD and 100 KLD provided by M/s Hyper Filtration Pvt. Ltd., 16/1, A-4, Site IV, Industrial Area, Sahibabad, District-Ghaziabad-201010 (UP) India (Tel: +91-120-4179700; Fax: 91-120-417915; email: wastewater@hyperfiltration.in) along with tentative cost are enclosed (**for reference only**).

#### **15. Charter for waste water treatment and other pollution control measures in hotels, restaurants & banquet halls:**

- Installation of STP of adequate capacity in large hotels as per waste water generation.
- Installation of Primary Sewage Treatment System for treatment of kitchen laundry waste water in medium & small hotels, restaurants & banquet halls comprising of physical screening through bar screens, oil & grease traps followed by settling & filtration through multi grade filter (MGF).
- If the effluent is discharged into a municipal sewer leading to a Sewage Treatment Plant, the hotel or restaurant or banquet hall, as the case may be, shall have to comply with the 'General Standards for Discharge of Environmental Pollutants Part-A: Effluents' notified under Schedule-VI" with respect to public sewer recipient (pH: 5.5-9.0, BOD: 350 mg/L, TSS: 600 mg/L & Oil & grease: 20 mg/L).
- Ensure use of treated sewage in horticulture and flushing of toilets.
- Obtain permission from Central Ground Water Board for extraction of ground water.
- Minimize water consumption and adopt rain water harvesting.

- ↗ Apply online and obtain CTE & CTO from BSPCB under related acts.
- ↗ Apply online and obtain authorization under the Hazardous & Other Waste (Management & Trans-boundary Movement) Rules, 2016 if they generate hazardous waste.
- ↗ Use D.G. set with acoustic enclosure for control of noise pollution. The use of D.G. sets without acoustic enclosure is illegal.
- ↗ During events/functions at banquet halls, clubs etc. noise is produced by musical instruments, fire crackers, DJs and hence it is to be ensured that sound producing instruments or musical instruments are not used at night time (10:00 pm to 08:00 am) and in open spaces ambient air quality standards are maintained at all times.
- ↗ Comply with provisions of SWM Rule i.e. segregate solid waste in bio-degradable, non-bio-degradable & domestic hazardous waste in suitable bins and hand over segregated waste to ULB or authorized rag picker or waste collector. Bio-degradable waste shall be processed, treated & disposed through composting or bio-methanation within the premises as far as possible.
- ↗ If solid waste is not collected by ULBs for some reasons then they will ensure its transportation to the processing and disposal within 24 hours. They must have temporary storage facility for at least 02 days.

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**होटल, धर्मशाला एवं आश्रम के संचालक कृपया ध्यान दें!**

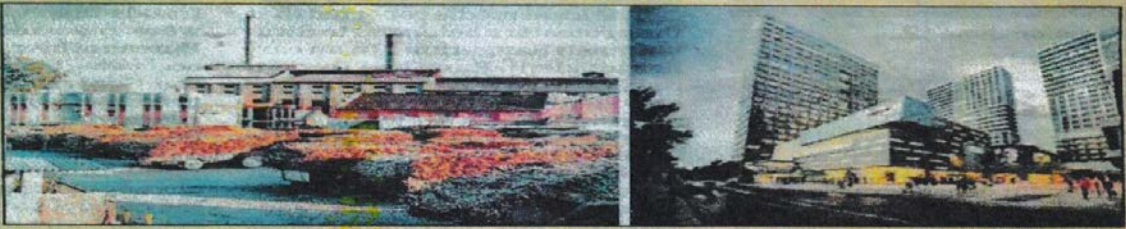


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**सभी औद्योगिक एवं व्यवसायिक संस्थान कृपया ध्यान दें!**



**आवश्यक सूचना**

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# **HYPER FILTRATION PVT.LTD.**

16/1, A-4, Site IV, Industrial Area, Sahibabad District Ghaziabad-201010 [U.P] India

Tel +91-120-4179700, Fax- 91-120-4179715

Corporate identification number : U74899DL2000PTC107242

[wastewater@hyperfiltration.in](mailto:wastewater@hyperfiltration.in), [waterexpert2000@yahoo.com](mailto:waterexpert2000@yahoo.com)

**SUBJECT : Offer for Sewage Treatment Plant with Fully Automatic MBR technology to produce Ultra Filtered water suitable for Horticulture & Flushing, Capacity 100 KL per day**

Dear Sir,

Refer to your query, we are submitting our offer for **Sewage treatment plant** with Latest Fully Automatic **MBR technology** to produce Ultra Filtered water suitable for Horticulture and flushing. **The capacity of plant is 100 KLD.**

We hope that your goodselves will find the technical proposal in the line of your requirement.

Assuring prompt services all the times,

Regards

**For Hyper Filtration Pvt Ltd,**

**[Rajiv Yadav]**

## TREATMENT SCHEME OF MBR

Considering the requirements of our esteemed customer, we are proposing treatment with state-of-the-art membrane separation technology called **MBR** which can produce very good quality with highest possible bacterial reduction without adding any chemicals. **MBR** is the latest technology in sewage and wastewater treatment. **MBR** has many advantages such as higher quality of treated water, smaller space for installation and easier operation compared to conventional activated sludge process. Proposed treatment scheme with MBR is shown below:

### MBR System

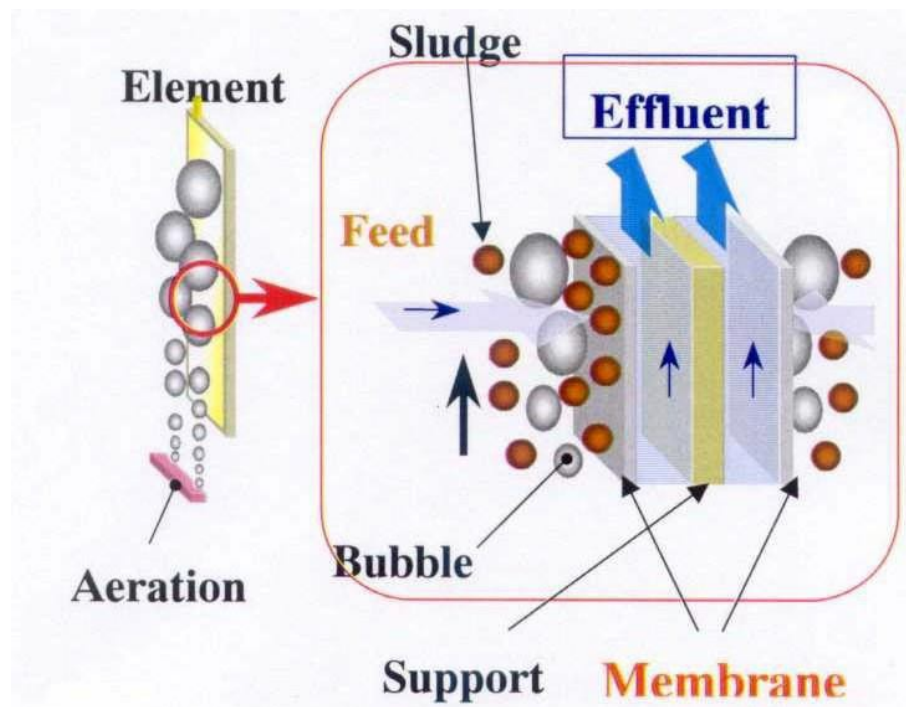


FIG. : PRINCIPLE OF MEMBRANE OPERATION



Activated sludge in the aeration tank is clearly removed by the flat sheet type submerged membrane. The membrane module consists of housing, aeration diffuser, permeate water manifold and membrane elements. The membrane element consisting of flat sheet membranes sandwiching a support panel is set up vertically. Feed water including activated sludge is filtrated by flat sheet membranes with pore size of 0.02 micron meter. The air bubbles supplied from the bottom of the membrane elements continuously scour off cake of activated sludge accumulated on the membrane surface. This is continuous filtration operation. The air bubbles are also used for the biological reaction to decompose organic substances included in the raw sewage.

The material of the membrane is hollow fibre PVDF (Poly vinylidene fluoride). PVDF is fluorine polymer which has high stability for chemicals and good physical strength. The form of membrane is fibre reinforced flat sheet membrane. The membrane has small and uniform pore size. Therefore, the rejection property of this membrane is excellent. Almost all particles with sizes more than 0.1 micron meter can be removed effectively using this membrane.

### **Description of Treatment Scheme**

Sewage effluent shall be collected into a screen chamber. This manually cleaned screen is provided to remove floating and big size particles which may otherwise choke the pumps and pipe lines.

After screening, sewage effluent is collected in underground equalization tank where mixing of effluent is done through air diffusion system. From equalization tank, Non clog, submersible pumps transfer the effluent to Biological chamber for further degradation of organic impurities.

In Biological-MBR tank, high MLSS (mixed liquor suspended solids) i.e. upto 8000 mg/l is maintained. The high amount of bacteria gives better and complete removal of organic matter from the raw sewage effluent in relatively small area. Oxygen required for the bacteria is supplied through the twin lobe type air blower. The air is used both for scouring of membranes and supplying oxygen to bacteria. The filtration is carried out by the suction pump directly sucking permeate water from PMTR modules at vacuum. The permeate water produced is ultra filtered and having turbidity < 1.0 NTU.

## **ADVANTAGES OF MBR**

**MBR** is the latest technology in sewage and wastewater treatment with many advantages as listed below:

### **Operation**

**MBR technology is a Fully Automatic System, thus, resulting in Less maintenance and man power required.**

**Auto Cleaning and Backwashing of MBR is done automatically at regular intervals resulting in higher membrane life, consistent output quality and no operation difficulties.**

### **Gives superior quality of treated water**

The quality of treated water in case of **MBR** is much superior than conventional biological systems. As the membrane acts as a physical barrier, it does not allow any sludge particles and to great extent bacteria and viruses to pass through it. Microorganisms like coliform or cryptosporidium can be easily removed in **MBR**.

### **Does not require clarifier / Settler unit**

**MBR** does not require clarifier tank where as conventional activated sludge process requires clarifier which further adds to the area requirement and cost.

### **Do not require further tertiary treatment**

Conventional biological systems require further tertiary treatment to match the performance of the **MBR** system.

### **Less number of treatment units**

**MBR** system has minimum number of treatment units and very simple to operate. It does not require any regular handling of hazardous chemicals. As the treatment units are less, it is less prone to system breakdowns.

### **High membrane life**

The membranes are made of PVDF with PET non woven fabric. It is resistant to many chemicals and hence has long operational life.

### **Retrievable membranes**

The membranes can be easily taken out of the system for physical inspection without emptying the aeration tank which makes the operation and maintenance of the unit simple.

### **Low Sludge Production**

The sludge produced is only one fourth of conventional system. The sludge produced is also high stable and hence easy to dispose off.

### **Odor less Treatment**

**Nuisance due to odor, unnecessary sludge etc is not an issue created in this treatment.**

## **Technical Specifications of Biological System**

### **1. Influent Quality**

Proposal addresses the aerobic treatment portion of the Sewage effluent using the **MBR**.

#### **A. Sewage Effluent**

Influent Quality	Unit	Design values
<b>Effluent Type</b>		<b>SEWAGE</b>
<b>EFFLUENT QUANTITY</b>	<b>KLD</b>	<b>100</b>
pH		6.0 - 8.5
Chemical Oxygen Demand (COD)	mg/L	< 600
Biological Oxygen Demand (BOD)	mg/L	< 250
Total Suspended Solids	mg/L	< 250

#### **B. MBR OUTLET QUALITY**

<b>Parameter</b>	<b>Unit</b>	<b>Values</b>
<b>Quantity</b>	<b>KLD</b>	<b>100</b>
pH		6.5 - 7.0
Chemical Oxygen Demand (COD)	mg/L	< 50
Biological Oxygen Demand – (BOD)	mg/L	< 10
TSS	Mg/l	< 5

## Scope of Supply

### 1. Collection Pit to collect the Sewage effluent

Qty	:	One No
MOC	:	RCC (Client Scope)
<b>Capacity</b>	:	<b>40 KL</b> <b>(To hold the sewage effluent )</b>
Screen	:	One No. Manual Screen
MOC	:	Stainless Steel 316

### 2. Pump to transfer Sewage effluent from Collection Pit to Anoxic Tank

Quantity	:	<b>Two Nos. (1+1)</b>
Working	:	One Working + One standby
Type	:	Non Clog, Submersible
Material of construction	:	CI Body
Discharge Capacity	:	10 m3/hr @ 1.5 Kg/Cm2
Drive Motor	:	TEFC, 3-Phase, 415 Volt, 2900 rpm
Make	:	Leo Pumps
Accessories	:	Butterfly valves and Pipe line for standby arrg.

### 3. Anoxic Chamber for Denitrification

Qty	:	One No
MOC	:	MS Rubber Lined
<b>Capacity</b>	:	<b>Suitable for 100 KLD</b>

### 4. Biological Chamber

#### BLOWERS FOR AERATION AND MBR

		Qty
Twin Lobe Air Blowers complete with interconnecting pipelines, valves and fittings for standby arrangement. Make of Blowers – Akash Make of motors – ABB / BBL		<b>2 Nos (1+1)</b>
<b>Diffused Aeration System in Biological Tank</b>	Qty	Capacity / Size
<b>Tank for Biological and MBR Unit</b>		<b>Suitable for</b>

<b>MOC - MS Rubber Lined</b>		<b>100 KLD effluent</b>
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Fine Bubble Diffusers, <b>MOC - TEFLON COATED EPDM MAKE SSI USA</b>	1 Lot	Suitable to supply air as per process requirement
<b>Unique Air Diffuser arrangement with Stainless steel pipe and header assembly to drop air and easy and independent maintenance without decantation for each pair of diffuser.</b>	1 lot	SS 316 Pipe and manifold as per requirement
Air header manifold to be laid over the aeration tank	1 Lot	MS
Inter connecting pipeline of blower and air headers	1 Lot	MS / UPVC
Pipeline with isolation valves and fittings	<b>1 Lot</b>	MS / UPVC

## **5. MBR Unit**

Design Basis	Fully Automatic
Membrane	Most Strong Multi Layer Reinforced PVDF
<b>Make of membranes</b>	<b>GE (Suez) USA</b>
Membrane Skid	Stainless Steel 316
<b>MBR Modules</b>	<b>Suitable for 100 KLD</b>

### **Component Details :**

<b>MBR Skid</b>	
<b>Stainless Steel 316 Skid</b> with proper arrangement of components for mounting of MBR membranes having the connections of permeate, backwash, CEB and air scouring header. <b>(Suitable for 100 KLD)</b>	1 No.

<b>Sludge Recirculation Pumps</b>	
Non Clog, Sludge Recirculation Pump complete with electric motor and standby arrangement, capacity 8-10 m <sup>3</sup> hr @ 10 - 12 m Make : Leo Pumps	<b>2 Nos (1+1)</b>

<b>Permeate &amp; Backwash pumps</b>	Qty
<b>Permeate &amp; Backwash Pumps, operated on VFD, MOC - SS, complete</b> with electric motor and standby arrangement, <b>Capacity : 8-10 m3/hr, Head – 14 m, Make : Leo Pump</b>	2 Nos (1+1)

### **Instrumentation**

<b>Magnetic Flow Transmitter to monitor the MBR permeate flow and operation of MBR pump.</b>	1 No.
<b>Pressure and vacuum Gauges with isolation valves.</b>	1 Lot

### **Control Panel**

Control panel with VFD and timer for fully automatic, safe and energy efficient operation of complete system.	1
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### **Pipe line and Valves for MBR**

Stainless Steel Structure complete with connection and fitting for mounting the MBR modules	1 No
Interconnecting pipe line of MBR unit with butterfly valves and actuator make Saunders, Solenoid valves make Rotex for fully automatic operation through pneumatic control.	1 Lot

### **6. MBR Outlet Tank**

Quantity : One No  
Material of construction : HDPE

### **7. Ultra Violet Unit at final outlet**

No off : One Unit  
Capacity : Suitable for 100 KLD  
U V Unit : Complete with SS housing, quartz and lamp

## **8. Sludge Dewatering unit**

### **a. Sludge drying beds**

Quantity	:	One No
MOC	:	MS Rubber Lined
Media	:	Filter media by Hyper

**9. One No : Electrical control panel complete with standard make components for fully automatic operation of complete system.**

**10. One Lot Interconnecting pipe line complete with elbows, flange & fittings.**



## **PRICE SCHEDULE**

S N	<u>DESCRIPTION</u>
01	<p><b>Sewage Treatment Plant designed on Fully Automatic MBR Unit to produce Ultra Filtered water for Horticulture and flushing.</b></p> <p>Fully Automatic <b>MBR unit</b> complete with SS 316 Screening, 2 Nos Effluent Transfer pumps Biological and Anoxic Chamber MOC MS Rubber Lined, MBR and outlet tank, Fine bubble Air Diffusion system in Biological Chamber with SSI USA Make Teflon coated EPDM diffusers, SS Air drop pipe line, MS Air header, <b>MBR unit</b> consist of Most strong Multi layer Reinforced PVDF Membrane Module <b>make GE SUEZ USA</b>, SS 316 Skid, 2 Nos Twin Lobe type Air blowers for aeration, Backwash unit, Permeate and Backwash pumps operated on VFD, Sludge Re-circulation Pumps, Electro Magnetic Flow Transmitter, pneumatic actuated valves, Sludge Drying Bed, UV Unit , Control panel with VFD for fully automatic operation of system, Interconnecting pipe line, pneumatic actuated valves and accessories as per attached technical specifications.</p> <p><b>Capacity – 100 KLD</b></p>
	<p><b>Price for complete electro mechanical work : Rs 40.55 Lakh (Forty Lakh Fifty Five Thousand only)</b></p>
	<p><b>RCC Work for collection pit and shed shall be in client scope</b></p>

For Hyper Filtration Pvt Ltd,

(Rajiv Yadav)

**TERMS & CONDITIONS**

S.NO.	REFERENCE	TECHNICAL SPECIFICATIONS REFERENCE
1	TRANSPORTATION	TO YOUR ACCOUNT
2	INSURANCE	IN YOUR SCOPE
3	GOVT LEVIES	GST - EXTRA as APPLICABLE (@ 18%)
4	PAYMENT SCHEDULE	40 % ADVANCE ALONGWITH ORDER, 60% AGAINST INSPECTION AND DISPATCH OF PLANT
5.	DELIVERY	WE WILL DESPATCH THE MATERIAL WITHIN 10 - 12 WEEKS OF RECEIPT OF ORDER AND ADVANCE AMOUNT AS PER TERMS.
6.	SCHEDULE OF EXCLUSION FROM OUR SCOPE	ALL CIVIL WORK REQUIRED FOR THE PLANT UNLOADING AND PLACEMENT AT SITE. UNSKILLED LABOUR REQUIRED AS AND WHEN NECESSARY. ELECTRICAL CONNECTIONS TO OUR PANEL. INFEEED WATER / EFFLUENT SUPPLY TO OUR SYSTEM. EQUIPMENT LIKE WELDING MACHINE / GAS CYLINDER IF REQUIRED.
7.	GUARANTEE	ONE YEAR FROM THE DATE OF MANUFACTURING. HOWEVER FOLLOWING EQUIPMENTS ARE NOT COVERED ELECTRICAL MOTOR GETTING BURNT DAMAGE DUE TO IMPROPER OPERATION. PUSH BUTTONS OF ELECTRICAL PANEL. MECHANICAL SEALS OF PUMPS THE GUARANTEE CARDS OF BOUGHT OUT EQUIPMENT WOULD BE SENT TO YOU AND WE WOULD COORDINATE DURING SUCH GUARANTEE PERIOD AS AND WHEN REQUIRED.
8.	VALIDITY OF QUOTE	30 DAYS. ALL SPECS AND PRICES MAY CHANGE AFTER SUCH PERIOD IS OVER.

For Hyper Filtration Pvt Ltd,

[Rajiv Yadav]



# **HYPER FILTRATION PVT.LTD.**

16/1, A-4, Site IV, Industrial Area, Sahibabad District Ghaziabad-201010 [U.P] India

Tel +91-120-4179700, Fax- 91-120-4179715

Corporate identification number : U74899DL2000PTC107242

[wastewater@hyperfiltration.in](mailto:wastewater@hyperfiltration.in), [waterexpert2000@yahoo.com](mailto:waterexpert2000@yahoo.com)

**SUBJECT : Offer for Sewage Treatment Plant with Fully Automatic MBR technology to produce Ultra Filtered water suitable for Horticulture & Flushing, Capacity 50 KL per day**

Dear Sir,

Refer to your query, we are submitting our offer for **Sewage treatment plant** with Latest Fully Automatic **MBR technology** to produce Ultra Filtered water suitable for Horticulture and flushing. **The capacity of plant is 50 KLD.**

We hope that your goodselves will find the technical proposal in the line of your requirement.

Assuring prompt services all the times,

Regards

**For Hyper Filtration Pvt Ltd,**

**[Rajiv Yadav]**

## TREATMENT SCHEME OF MBR

Considering the requirements of our esteemed customer, we are proposing treatment with state-of-the-art membrane separation technology called **MBR** which can produce very good quality with highest possible bacterial reduction without adding any chemicals. **MBR** is the latest technology in sewage and wastewater treatment. **MBR** has many advantages such as higher quality of treated water, smaller space for installation and easier operation compared to conventional activated sludge process. Proposed treatment scheme with MBR is shown below:

### MBR System

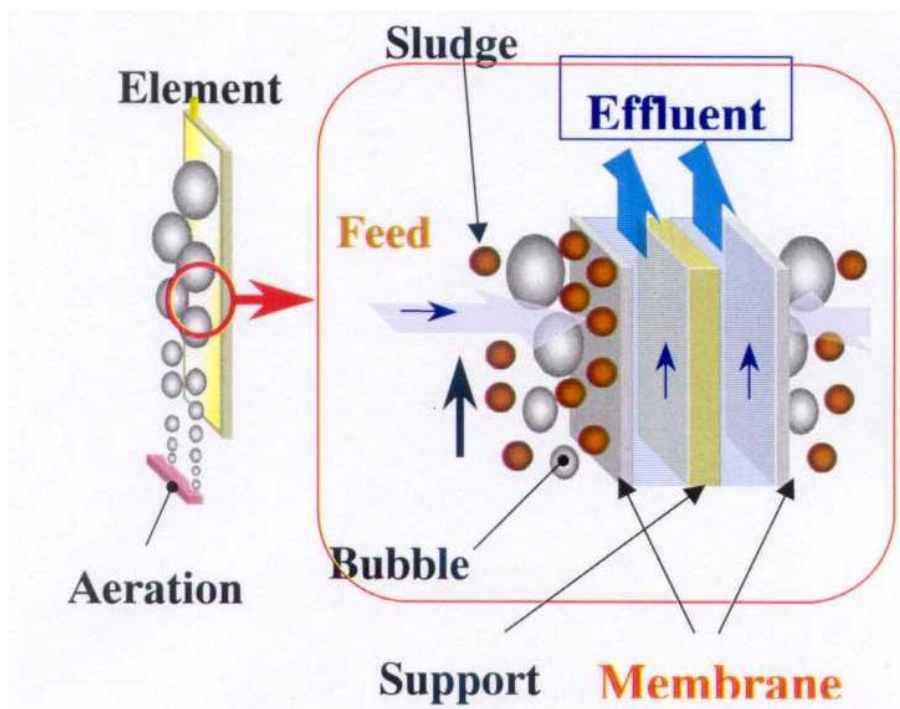


FIG. : PRINCIPLE OF MEMBRANE OPERATION

Activated sludge in the aeration tank is clearly removed by the flat sheet type submerged membrane. The membrane module consists of housing, aeration diffuser, permeate water manifold and membrane elements. The membrane element consisting of flat sheet membranes sandwiching a support panel is set up vertically. Feed water including activated sludge is filtrated by flat sheet membranes with pore size of 0.02 micron meter. The air bubbles supplied from the bottom of the membrane elements continuously scour off cake of activated sludge accumulated on the membrane surface. This is continuous filtration operation. The air bubbles are also used for the biological reaction to decompose organic substances included in the raw sewage.

The material of the membrane is hollow fibre PVDF (Poly vinylidene fluoride). PVDF is fluorine polymer which has high stability for chemicals and good physical strength. The form of membrane is fibre reinforced flat sheet membrane. The membrane has small and uniform pore size. Therefore, the rejection property of this membrane is excellent. Almost all particles with sizes more than 0.1 micron meter can be removed effectively using this membrane.

### **Description of Treatment Scheme**

Sewage effluent shall be collected into a screen chamber. This manually cleaned screen is provided to remove floating and big size particles which may otherwise choke the pumps and pipe lines.

After screening, sewage effluent is collected in underground equalization tank where mixing of effluent is done through air diffusion system. From equalization tank, Non clog, submersible pumps transfer the effluent to Biological chamber for further degradation of organic impurities.

In Biological-MBR tank, high MLSS (mixed liquor suspended solids) i.e. upto 8000 mg/l is maintained. The high amount of bacteria gives better and complete removal of organic matter from the raw sewage effluent in relatively small area. Oxygen required for the bacteria is supplied through the twin lobe type air blower. The air is used both for scouring of membranes and supplying oxygen to bacteria. The filtration is carried out by the suction pump directly sucking permeate water from PMTR modules at vacuum. The permeate water produced is ultra filtered and having turbidity < 1.0 NTU.

## **ADVANTAGES OF MBR**

**MBR** is the latest technology in sewage and wastewater treatment with many advantages as listed below:

### **Operation**

**MBR technology is a Fully Automatic System, thus, resulting in Less maintenance and man power required.**

**Auto Cleaning and Backwashing of MBR is done automatically at regular intervals resulting in higher membrane life, consistent output quality and no operation difficulties.**

### **Gives superior quality of treated water**

The quality of treated water in case of **MBR** is much superior than conventional biological systems. As the membrane acts as a physical barrier, it does not allow any sludge particles and to great extent bacteria and viruses to pass through it. Microorganisms like coliform or cryptosporidium can be easily removed in **MBR**.

### **Does not require clarifier / Settler unit**

**MBR** does not require clarifier tank where as conventional activated sludge process requires clarifier which further adds to the area requirement and cost.

### **Do not require further tertiary treatment**

Conventional biological systems require further tertiary treatment to match the performance of the **MBR** system.

### **Less number of treatment units**

**MBR** system has minimum number of treatment units and very simple to operate. It does not require any regular handling of hazardous chemicals. As the treatment units are less, it is less prone to system breakdowns.

### **High membrane life**

The membranes are made of PVDF with PET non woven fabric. It is resistant to many chemicals and hence has long operational life.

### **Retrievable membranes**

The membranes can be easily taken out of the system for physical inspection without emptying the aeration tank which makes the operation and maintenance of the unit simple.

### **Low Sludge Production**

The sludge produced is only one fourth of conventional system. The sludge produced is also high stable and hence easy to dispose off.

### **Odor less Treatment**

**Nuisance due to odor, unnecessary sludge etc is not an issue created in this treatment.**

## **Technical Specifications of Biological System**

### 1. Influent Quality

Proposal addresses the aerobic treatment portion of the Sewage effluent using the **MBR**.

#### **A. Sewage Effluent**

Influent Quality	Unit	Design values
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<b>Effluent Type</b>		<b>SEWAGE</b>
<b>EFFLUENT QUANTITY</b>	<b>KLD</b>	<b>50</b>
pH		6.0 - 8.5
Chemical Oxygen Demand (COD)	mg/L	< 600
Biological Oxygen Demand (BOD)	mg/L	< 250
Total Suspended Solids	mg/L	< 250

#### **B. MBR OUTLET QUALITY**

<b>Parameter</b>	<b>Unit</b>	<b>Values</b>
<b>Quantity</b>	<b>KLD</b>	<b>50</b>
pH		6.5 - 7.0
Chemical Oxygen Demand (COD)	mg/L	< 50
Biological Oxygen Demand – (BOD)	mg/L	< 10
TSS	Mg/l	< 5



## Scope of Supply

### 1. Collection Pit to collect the Sewage effluent

Qty	:	One No
MOC	:	RCC (Client Scope)
Capacity	:	<b>20 KL</b> <b>(To hold the sewage effluent )</b>
Screen	:	One No. Manual Screen
MOC	:	Stainless Steel 316

### 2. Pump to transfer Sewage effluent from Collection Pit to Anoxic Tank

Quantity	:	<b>Two Nos. (1+1)</b>
Working	:	One Working + One standby
Type	:	Non Clog, Submersible
Material of construction	:	CI Body
Discharge Capacity	:	5 m <sup>3</sup> /hr @ 1.5 Kg/Cm <sup>2</sup>
Drive Motor	:	TEFC, 3-Phase, 415 Volt, 2900 rpm
Make	:	Leo Pumps
Accessories	:	Butterfly valves and Pipe line for standby arrg.

### 3. Anoxic Chamber for Denitrification

Qty	:	One No
MOC	:	MS Rubber Lined
Capacity	:	<b>Suitable for 50 KLD</b>

### 4. Biological Chamber

#### BLOWERS FOR AERATION AND MBR

		Qty
Twin Lobe Air Blowers complete with interconnecting pipelines, valves and fittings for standby arrangement. Make of Blowers – Akash Make of motors – ABB / BBL		<b>2 Nos (1+1)</b>
<b>Diffused Aeration System in Biological Tank</b>	Qty	Capacity / Size
<b>Tank for Biological and MBR Unit</b>		<b>Suitable for 50</b>

<b>MOC - MS Rubber Lined</b>		<b>KLD effluent</b>
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Fine Bubble Diffusers, <b>MOC - TEFLON COATED EPDM MAKE SSI USA</b>	1 Lot	Suitable to supply air as per process requirement
<b>Unique Air Diffuser arrangement with Stainless steel pipe and header assembly to drop air and easy and independent maintenance without decantation for each pair of diffuser.</b>	1 lot	SS 316 Pipe and manifold as per requirement
Air header manifold to be laid over the aeration tank	1 Lot	MS
Inter connecting pipeline of blower and air headers	1 Lot	MS / UPVC
Pipeline with isolation valves and fittings	<b>1 Lot</b>	MS / UPVC

## **5. MBR Unit**

Design Basis	Fully Automatic
Membrane	Most Strong Multi Layer Reinforced PVDF
<b>Make of membranes</b>	<b>GE (Suez) USA</b>
Membrane Skid	Stainless Steel 316
<b>MBR Modules</b>	<b>Suitable for 50 KLD</b>

### **Component Details :**

<b>MBR Skid</b>	
<b>Stainless Steel 316 Skid</b> with proper arrangement of components for mounting of MBR membranes having the connections of permeate, backwash, CEB and air scouring header. <b>(Suitable for 50 KLD)</b>	1 No.

<b>Sludge Recirculation Pumps</b>	
Non Clog, Sludge Recirculation Pump complete with electric motor and standby arrangement, capacity 6-8 m <sup>3</sup> hr @ 10 - 12 m Make : Leo Pumps	<b>2 Nos (1+1)</b>

<b>Permeate &amp; Backwash pumps</b>	Qty
<b>Permeate &amp; Backwash Pumps, operated on VFD, MOC - SS, complete</b> with electric motor and standby arrangement, <b>Capacity : 4-5 m3/hr, Head – 14 m, Make : Leo Pump</b>	2 Nos (1+1)

### **Instrumentation**

<b>Magnetic Flow Transmitter to monitor the MBR permeate flow and operation of MBR pump.</b>	1 No.
<b>Pressure and vacuum Gauges with isolation valves.</b>	1 Lot

### **Control Panel**

Control panel with VFD and timer for fully automatic, safe and energy efficient operation of complete system.	1
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### **Pipe line and Valves for MBR**

Stainless Steel Structure complete with connection and fitting for mounting the MBR modules	1 No
Interconnecting pipe line of MBR unit with butterfly valves and actuator make Saunders, Solenoid valves make Rotex for fully automatic operation through pneumatic control.	1 Lot

### **6. MBR Outlet Tank**

Quantity : One No  
Material of construction : HDPE

### **7. Ultra Violet Unit at final outlet**

No off : One Unit  
Capacity : Suitable for 50 KLD  
U V Unit : Complete with SS housing, quartz and lamp

## **8. Sludge Dewatering unit**

### **a. Sludge drying beds**

Quantity	:	One No
MOC	:	MS Rubber Lined
Media	:	Filter media by Hyper

**9. One No : Electrical control panel complete with standard make components for fully automatic operation of complete system.**

**10. One Lot Interconnecting pipe line complete with elbows, flange & fittings.**

## **PRICE SCHEDULE**

<b>S N</b>	<b><u>DESCRIPTION</u></b>
01	<p><b>Sewage Treatment Plant designed on Fully Automatic MBR Unit to produce Ultra Filtered water for Horticulture and flushing.</b></p> <p>Fully Automatic <b>MBR unit</b> complete with SS 316 Screening, 2 Nos Effluent Transfer pumps, Biological and Anoxic Chamber MOC MS Rubber Lined, MBR and outlet tank, Fine bubble Air Diffusion system in Biological Chamber with SSI USA Make Teflon coated EPDM diffusers, SS Air drop pipe line, MS Air header, <b>MBR unit</b> consist of Most strong Multi layer Reinforced PVDF Membrane Module <b>make GE SUEZ USA</b>, SS 316 Skid, 2 Nos Twin Lobe type Air blowers for aeration, Backwash unit, Permeate and Backwash pumps operated on VFD, Sludge Re-circulation Pumps, Electro Magnetic Flow Transmitter, pneumatic actuated valves, Sludge Drying Bed, UV Unit , Control panel with VFD for fully automatic operation of system, Interconnecting pipe line, pneumatic actuated valves and accessories as per attached technical specifications.</p> <p><b>Capacity – 50 KLD</b></p>
	<p><b>Price for complete electro mechanical work : Rs 30.45 Lakh (Thirty Lakh Fourty Five Thousand only)</b></p>
	<p><b>RCC Work for collection pit and shed shall be in client scope</b></p>

For Hyper Filtration Pvt Ltd,

(Rajiv Yadav)

**TERMS & CONDITIONS**

S.NO.	REFERENCE	TECHNICAL SPECIFICATIONS REFERENCE
1	TRANSPORTATION	TO YOUR ACCOUNT
2	INSURANCE	IN YOUR SCOPE
3	GOVT LEVIES	GST - EXTRA as APPLICABLE (@ 18%)
4	PAYMENT SCHEDULE	40 % ADVANCE ALONGWITH ORDER, 60% AGAINST INSPECTION AND DISPATCH OF PLANT
5.	DELIVERY	WE WILL DESPATCH THE MATERIAL WITHIN 10 - 12 WEEKS OF RECEIPT OF ORDER AND ADVANCE AMOUNT AS PER TERMS.
6.	SCHEDULE OF EXCLUSION FROM OUR SCOPE	ALL CIVIL WORK REQUIRED FOR THE PLANT UNLOADING AND PLACEMENT AT SITE. UNSKILLED LABOUR REQUIRED AS AND WHEN NECESSARY. ELECTRICAL CONNECTIONS TO OUR PANEL. INFEEED WATER / EFFLUENT SUPPLY TO OUR SYSTEM. EQUIPMENT LIKE WELDING MACHINE / GAS CYLINDER IF REQUIRED.
7.	GUARANTEE	ONE YEAR FROM THE DATE OF MANUFACTURING. HOWEVER FOLLOWING EQUIPMENTS ARE NOT COVERED ELECTRICAL MOTOR GETTING BURNT DAMAGE DUE TO IMPROPER OPERATION. PUSH BUTTONS OF ELECTRICAL PANEL. MECHANICAL SEALS OF PUMPS THE GUARANTEE CARDS OF BOUGHT OUT EQUIPMENT WOULD BE SENT TO YOU AND WE WOULD COORDINATE DURING SUCH GUARANTEE PERIOD AS AND WHEN REQUIRED.
8.	VALIDITY OF QUOTE	30 DAYS. ALL SPECS AND PRICES MAY CHANGE AFTER SUCH PERIOD IS OVER.

For Hyper Filtration Pvt Ltd,

[Rajiv Yadav]