Subject: - 100KLD STP PLANT BASED ON MBBR TECHNOLOGY PROVIDING AND FIXING ON TRUNKY BASIS

ANNEXURE – I

PACKAGE SEWAGE TREATMENT PLANT USING FLUIDISED MEDIA REACTOR (FMR/MBBR) TECHNOLOGY

DESIGN BASI

Design Capacity 100 KLD

Proposing FMR 100 KLD STP based on MBBR Technology.

Operating Hours 20 Design
flow rate 5 m3/h

The sewage treatment plant has been designed on the following Inlet parameters which are summarized below:-

INLET SEWAGE CHARACTERISTICS

PH	5.5-9.0
BOD_5 @ 20^0C	300 PPM
COD (Cr)	500 PPM
TSS	<100PPM
Inlet Temperature	27^0 C (Assumed) – Max.
O&G	< 20 PPM
Fecal Coliform	$10^{7-}10^8$ MPN/ 100 ml
Total Kjeldahl Nitrogen	45 PPM

TREATED SEWAGE CHARACTERISTICS

PH	6.5 – 8.0
BOD_5 @ 20^0C	<5 PPM

COD	<10PPM
TSS	<5 PPM
O&G	< 10 PPM
Fecal Coliform	<1000 MPN/100 ml (After disinfection)
TN	< 10 PPM

C) ASSUMPTIONS, NOTES AND COMMENTS

1. All other pollutants other than mentioned above have been considered as nil at the inlet of S.T.P which exceed the disposal standard as well as will adversely affect the performance of biological treatment.

2. No TDS removal is envisaged in S.T.P.

3. Invert level – Sewage shall be available for at inlet of Bar Screen through pump.

4. Sewage shall be treated on 24 hrs basis.

5. The plant design does not account for any toxic contamination from industries.

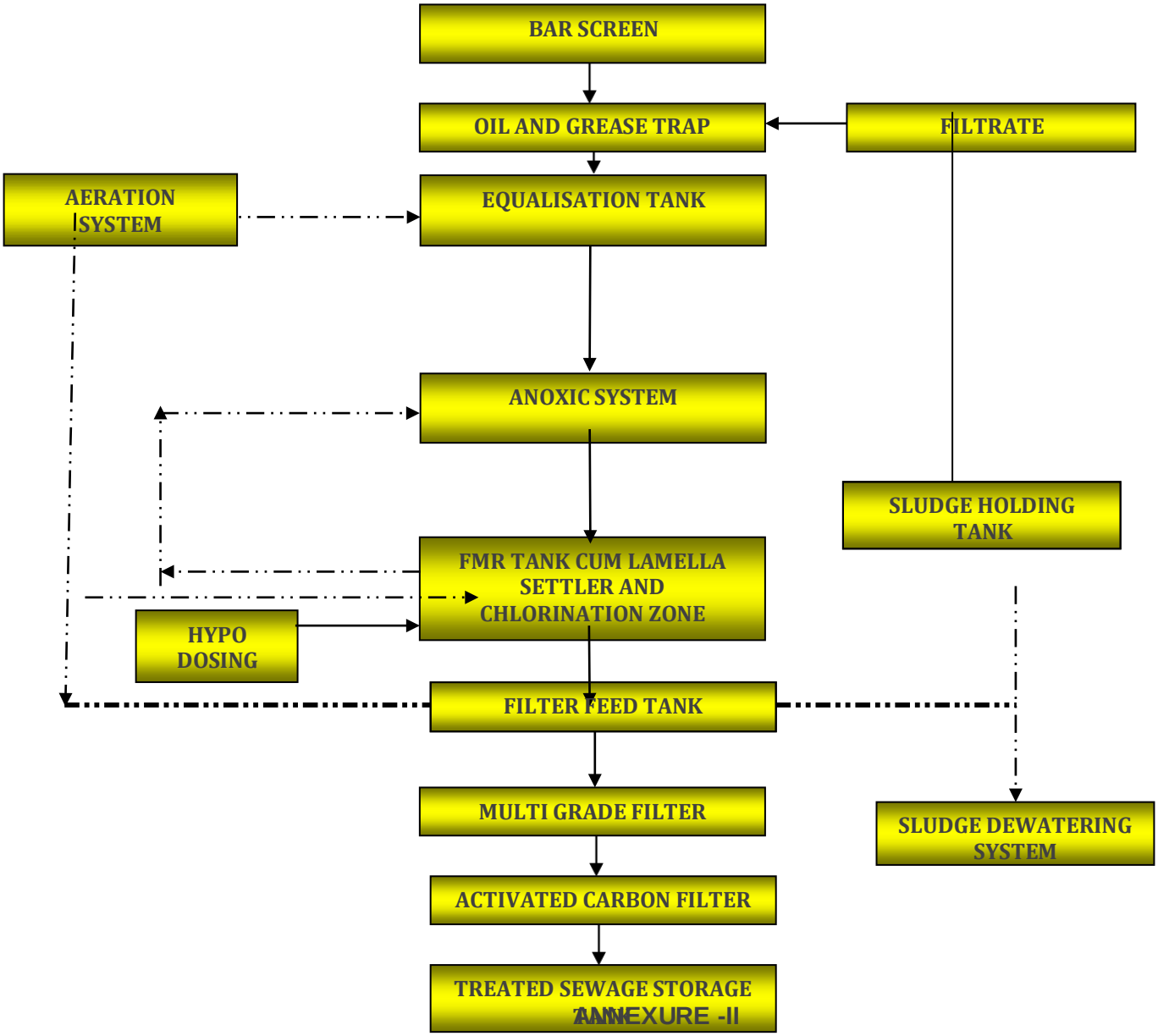
6. The plant shall function in aerobic condition only.

7. Oil present if any shall be in free & floating form.

D) PROCESS GUARANTEES

Our process guarantees are based on above mentioned design basis and assumptions.

2. PROCESS BLOCK DIAGRAM



INTRODUCTION FMR - FLUDISED MEDIA REACTOR

Conventional waste water treatment technologies like submerged aerated fixed film (SAFF) reactor, Trickling filters or other activated sludge processes have inherent disadvantages of large area of operation, higher power inputs and constant operator attention.

In line with our endeavor to introduce latest technologies related to Water & Waste water treatment, It has developed FMR a Fluidized Media Reactor using attached growth process forWaste water treatment. As compared to conventional Technologies FMR media reactors are compact, energy efficient and user friendly.

The FMR process refers to the operation of activated sludge tanks in various configurations in a combination of suspended biomass, MLSS (mixed liquid suspended solids) and attached biomass, which is attached to the FMR media. This technology is based on MBBR/FAB technology.

Basic principle

Flock forming organism's form clusters or attach to available surfaces. The FMR carrier material allows high biomass concentrations per cubic meter of material, which Increases the specific volumetric capacity of activated sludge tanks Controls biomass activity Reduces operating cost .

FMR SCHEME:

The FMR technology is a single tank design unit; incorporating

A Oil grease trapper
A specially tanks with synthetic media,
A lamella settler, and
A chlorine contact

The **bar screen** removes larger floating matter and suspended particles. Screened sewage flows into the FMR tank, which contains the FMR media. The FMR media significantly increases the surface area for bacterial growth. Air is supplied through fine diffusers. Bacteria oxidize the organic matter present in the sewage oxidized sewage overflows in the lamella settler. Suspended particles in the treated wastewater settle, with a part of the settled sludge sliding back to the aeration tank.

The lamella plates provide larger surface areas, thus reducing the settling tank size. Treated water overflows into a chlorine contact tank, wherein the treated water is disinfected by dosing hypochlorite solution through an electronic dosing system.

Advantages using FMR

Significant reduction in space requirement due to high surface area & loading rate of FMR media
Reduced power and operating costs
No Sludge Recycle.
No moving parts, less maintenance.

FMR is best suitable when

Designing a new waste water treatment plants when operating cost & space are constraints Upgrading of existing waste water treatment plants Operate plants in low temperature areas Reduce bulking problems in existing treatment.

Applications of FMR

I) Decentralized compact sewage treatment plants for Residential complexes, Hotels, Commercial Centers, Office Premises, Industries and Rural Communities.

II) Industrial wastewater treatment from: any kind of factories after COD removal.

PROCESS DETAIL

Bar Screen:

Raw sewage from the source is usually received into the bar screen chamber by gravity. Screen provided will remove all floating and big size matter such as plastic bottles, polythene bags, glasses, stones, etc., which may otherwise choke the pipeline and pump.

Equalization Tank:

Usually, sewage generation is more during morning hours and evening hours. Visually no sewage is generated during night hours. Any biological system needs constant feed for bacteria to work efficiently. Hence, it is important to put an equalization tank to collect the excess flow during peak hours and feed sewage in lean hours. A typical equalization tank has a capacity of 8 - 12 hours of average flow rate. The tank is generally of civil construction by client. Provision of air grid is to be made for thoroughly mixing the sewage to make it of homogenous quality and to keep the suspended matter in suspension and to avoid septic condition.

Transfer of Sewage

Our scope starts from transfer of sewage from Equalization Tank to Anoxic tank. The distance of transfer should not exceed beyond 20 meter. The transfer pump can be either submersible or non-submersible type for this application. However we have considered centrifugal non-submersible type. The layout shall be as per our standard.

Anoxic Tank

In this Tank/Process the sewage shall be processed under anoxic conditions here the process of nitrification & de-nitrification for removal of nitrogen.

Fluidized Media Reactor (FMR)

Fluidized Media Reactor (FMR) as the name indicates consists of floating media of various shapes and sizes. The main objective of adding this media is to make available more surface area for bacteria to grow on, thereby maintaining and retaining maximum possible bacterial population in a limited volume. The FMR media material allows biomass Concentration of 20 - 40 Kgs/m3 material. Thus, FMR consists of combination of biomass in attached as well as suspended form. High concentration of biomass enables reduction of aeration tank and in turn reduction in overall cost. Volume of the media shall vary from 6 to 25 % based on the concentration of organic matter.

Another main feature of the FMR is its compactness. The FMR consists of biological system for removal of organic matter (BOD, COD), lamella for clarification and chlorine contact tank for disinfection. As all units are placed inside a single tank, it saves space and also increases operational ease.

In FMR, raw sewage enters at the top of the tank. Air is introduced at the bottom of the tank through fine bubble diffusers. Media will be in suspension because of the turbulence created by the air. The bacteria required for the oxidation of the organic matter is attached to the media and some part is suspended in the tank. After oxidation, the bacteria grow in number and need to be separated from the aeration tank liquor. The lamella section inside the FMR helps in clarification and separation of the bacteria (sludge) and clear overflow flows into chlorine contact tank. Lamella plates helps in increasing the settling area and removing the particles effectively in a smaller plan area.

In chlorine contact tank, Sodium hypo Chlorite (NaOCl) is added for disinfecting the clarified sewage Baffle plates are provided to make better contact. The chlorinated treated sewage then flows out of FMR either for further treatment or for disposal

Chlorination tank

After settling tank chlorine shall be dosed to remove bacterial effects at Chlorination tank by chlorine dosing pump.

Break water tank

The clarified water shall be stored in break water tank to feed in Filtration plant and carbon filter for final treatment.

Multi Grade Filtration Plant

After Break water tank it will be pumped to filtration plant to treat further

Activated carbon Filter

After Filtration plant filtered water shall be pass through ACF to remove chlorine and smell and colour.

Final treated water tank

Final treated water shall be stored in final tank for further re- uses and other low end applications.

Sludge:

The sludge from the Clarifier to be transfer from the bottom of the Clarifier once in a week by gravity/pump to SHT and it will be pumped to Filter press through screw pumps to final dewatering. Final solid shall be used as manure and water shall be re-circulated to EQT