IIHMR UNIVERSITY

Agreement of
Liquid Waste Management

INDIAN INSTITUTE
OF HEALTH
MANAGEMENT
RESEARCH
1, Prabhu Dayal Marg
Sanganer Airport, JAIPUR - 302 011, INDIA
Tel. : 2791431-34
Fax : 91-141-2792138
E-mail : iihmr@iihmr.org
URL : http://www.iihmr.org
Gram : HEALTHINST

Ref : IIHMR/2006
Dated : October 19, 2006

M/s A.V.System,
G-9, Radhika Tower,
Loha Mandi,
S.C.Road,
Jaipur

Sub : Order for Sewerage Treatment plant at IIHMR, Jaipur

Sir,

Kindly refer your offer no.AVS/STP/222/06 dated 30.03.06 vide which the complete system including financial costs and terms and conditions of the work was given to us. The same is hereby approved as per the following documents:-

1.	Your offer no.AVS/STP/222/06 dated 30.03.06	-	Page 1
2.	General Information	-	Page 2
3.	System Description	-	Page 3
4.	Salient Features	-	Page 4
5.	Scope of Work	-	Page 5 to 8
6.	Price, terms & conditions	-	Page 9
7.	M/s A.V.System some major works successfully completed	-	Page 10 to 11
8.	Drawing of Sewerage Treatment Plant	-	Page 12
9.	Certificates and concerned literature	-	Page 13 to 23

All the above documents will form part of the Agreement which may please be signed within 15 days of issue of this letter of acceptance.

The work is to be completed within six months of the issue of this letter.

As per terms and conditions, 10% i.e Rs.1,07,500/- of total work of Rs.10.75 lacs is being paid vide cheque no. _____ dated _____ drawn on _____.

Thanking you,

Yours faithfully,

For INDIAN INSTITUTE OF HEALTH MANAGEMENT RESEARCH

Received and Accepted

M.L.MEHTA
TRUSTEE SECRETARY

21/11/06.

20 Inspired Years

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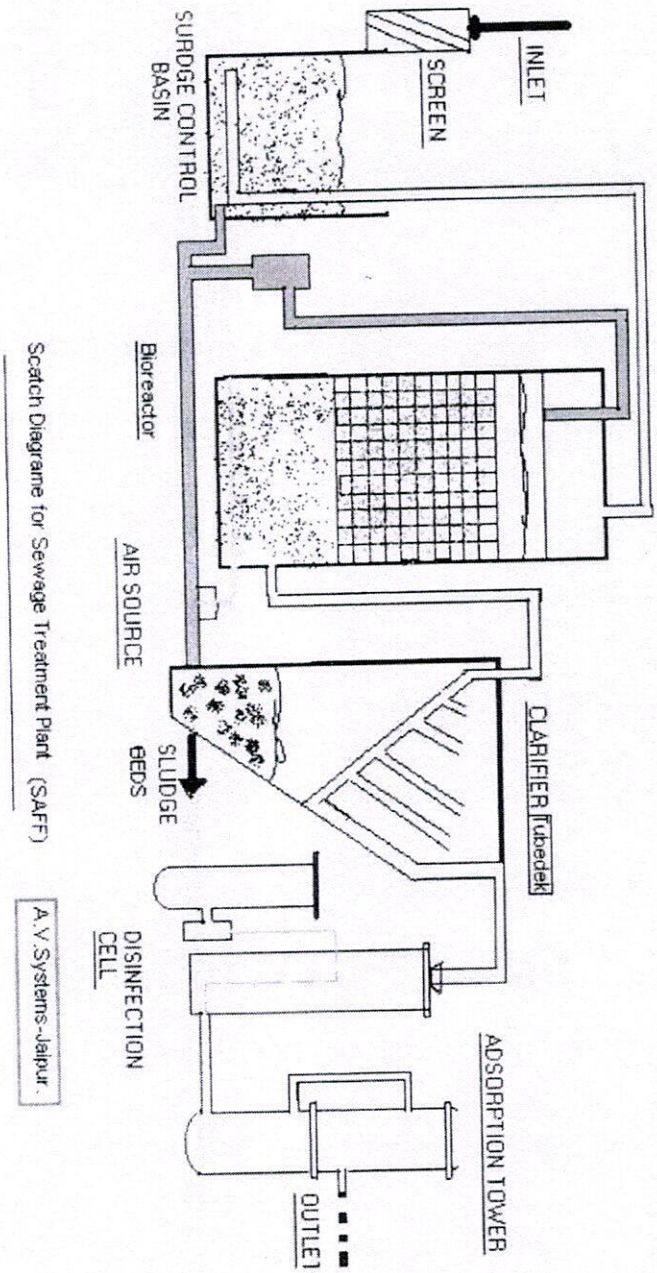
The IIHMR University
1, Prabhu Dayal Marg
Near Sanganer Airport, Jaipur-302029

A V Systems



Scatch Diagrame for Sewage Treatment Plant (SAFF)

A.V. Systems-Jaipur.

For A. V SYSTEMS

Prop.

vertical and cross-fluted design eliminates the choking of media and offers only a minimal resistance to flow. It also helps in handling higher solid concentration in the wastewater since the voidage is 95-97%. The BIOdek anaerobic fixed film reactors provide an effective way to treat high strength wastes while generating surplus energy in the form of methane gas.

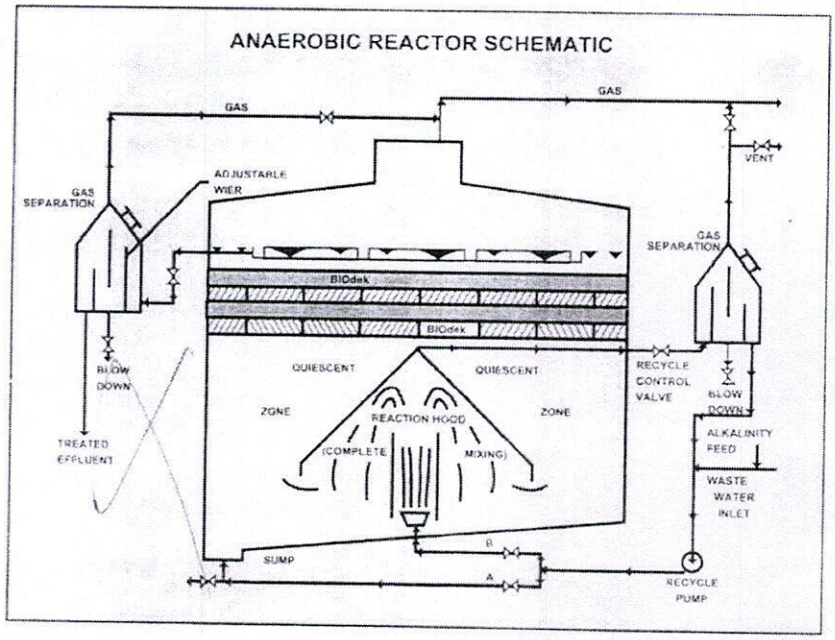


Fig 1.13

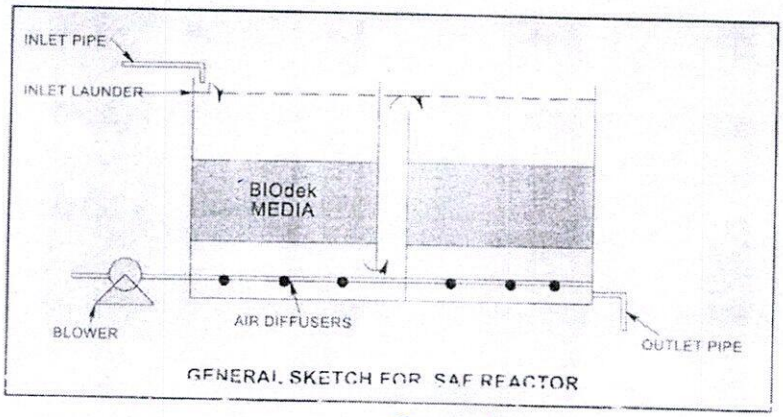
SAFF Reactors

SAFF or *submerged aerobic fixed film* reactors incorporate the advantages of fixed film technologies and combine with them the fine bubble diffused aeration techniques, to get a highly efficient biological treatment unit. It has as its main components, the BIOdek media and fine bubble diffused aeration grid.

With the higher surface area of BIOdek, higher organic loading rates are enabled, thus reducing the overall size required of the aeration tank. This leads to a considerable reduction in civil costs.

The system configuration enables better oxygen transfer efficiency with plug flow conditions. Submerged fixed film growth in SAFF reactors sustains good microbial growth even in adverse conditions and also handle shock loads very well. Sludge production is low, no sludge recirculation is required and mean cell residence time is enhanced.

Air requirement is based only on the organic load and mixing requirements are not called for, as this system is primarily an attached growth system. This makes it suitable for indoor applications or basement installations.



GENERAL SKETCH FOR SAF REACTOR

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Media Configuration

BIOdek fixed film biological treatment media is a self supporting crossflow synthetic media. It is fabricated from completely corrugated, rigid PVC sheets and forms a cross-corrugated pattern with each adjacent sheet. Unlike conventional modular sheet media, no flat sheets are used in the fabrication of the module. Each sheet is corrugated at a 60° angle and assembled in a cross-corrugated pattern with adjacent sheets.

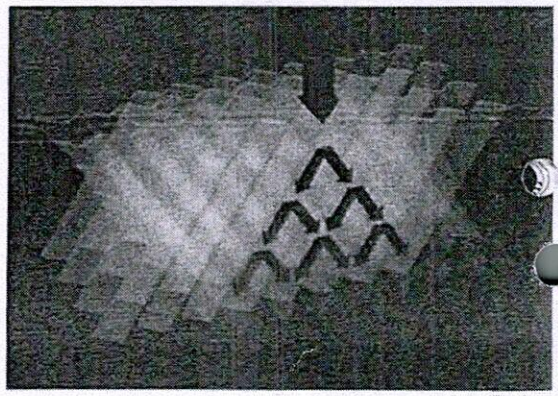

Fig 2.1

This configuration provides continuous and uniform horizontal redistribution of both air and water throughout the full depth of the media. (Fig 2.1). The result is greatly increased contact time between the wastewater and the media bio-film (Fig 2.2) as well as increased liquid film diffusion.

The media is resistant to rot, fungi, bacterial growth and other forms of micro-organisms and is chemically resistant to normal concentrations of sewage acids, alkalis, organic solvents, organic compounds and other water soluble substances occurring in municipal and industrial waste waters.

The system of interconnected channels in the cross fluted FB10 media makes it possible to use either a rotary distributor or a fixed nozzle system to achieve the desired irrigation. To ensure adequate contact time and liquid film diffusion, BIOdek is capable of redistributing the wastewater horizontally a minimum of 30 cm per 30 cm of media depth. BIOdek provides a minimum of 6000 mixing or horizontal redistribution points per cubic meter of media.

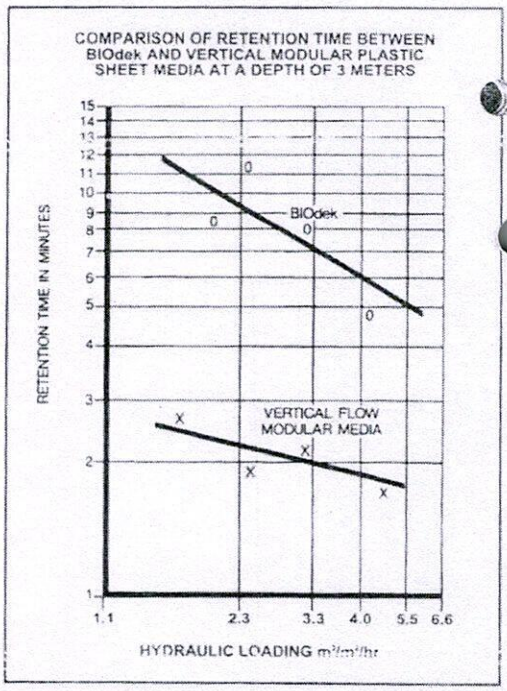

Fig 2.2

BIOdek is designed with a surface area of 102-240 square meters per cubic meter of media with a minimum of 95% void to volume ratio. The BIOdek media modules are selected for each installation based on load test data obtained in compression tests. This ensures adequate bearing capacity for each specified loading requirement. The PVC compound is UV resistant and specially formulated to resist long-term fatigue cracking under continuous loading.

MMATL's plastic fill media for effluent treatment

For A. V SYSTEMS

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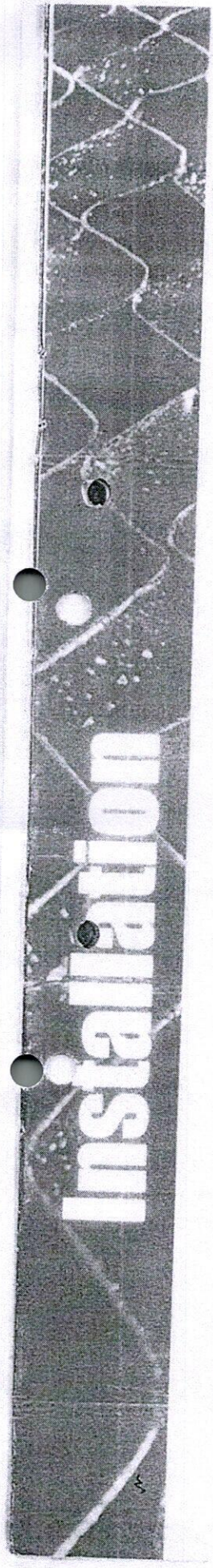


BIOdek Model	FB10.27	FB10.19	FB10.12	FB33.27	FB33.01	FB53.01
Specific Surface Area	102 (31.1)	157 (47.9)	243 (74.1)	93	140	105
Void Ratio m^2/m^3	>97	>97	>97	>97	>97	>97
Standard Dimensions	l- 1200mm w- 600mm h- 600mm	l- 1200mm w- 600mm h- 600mm	l- 1200mm w- 600mm h- 600mm	l- 1200mm w- 600mm h- 600mm	l- 1200mm w- 600mm h- 600mm	l- 1200mm w- 600mm h- 600mm
Maximum width of support	100mm	100mm	100mm	100mm	100mm	100mm
Dry Weight	30 kg/m³	40 kg/m³	50 kg/m³	30 kg/m³	35 kg/m³	30kg/m³
Material	PVC	PVC	PVC	PVC	PVC	PVC
Application	BOD/COD reduction in Trickling Filters, Anaerobic Filters/Digesters	BOD/COD reduction, Nitrification in Trickling Filters, SAFF systems, Anaerobic Filters/Digesters	Nitrification, water degassification, oxygen concentration in Trickling Filters, Scrubbers	BOD/COD reduction in Anaerobic Digesters, high rate Trickling Filters/Biotowers and in SAFF Reactors		BOD/COD reduction in Anaerobic Digesters

processes, BIOdek comes in 6 models: #FB10.12, # FB10.19 , #FB10.27, #FB 33.27, #FB 33.01 and #FB 53.01. To optimize the effectiveness of various applications of the trickling filter process, each media has been designed with unique product characteristics that meet specific performance requirements.

Installations of BIOdek have to-date totalled to nearly 50,000 cubic meters. There are over 250 installations all over the world currently in succesful operation. These range from small units of few hundred cubic meters to several hundred thousand cubic meters of media.

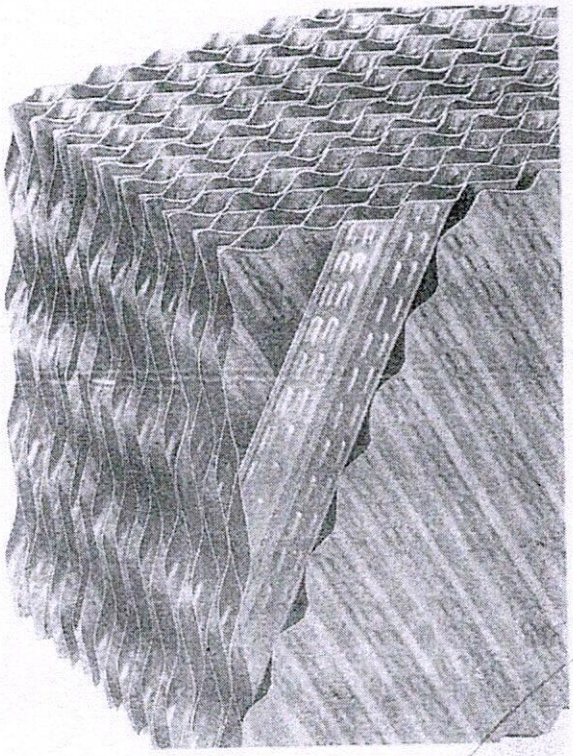
MMATL has developed vertical BIOdek FB33 and FB53 Anti-Fouling PVC Fill Media to minimize clogging for attached growth biological treatment specially in anaerobic systems. FB33 or FB53 sheets can be used alternatively with the well known cross-fluted FB10.27 sheets to form FB33.27(VX) or FB53.27(VX) and also with plain sheets to form FB33.01(VP) or FB53.01(VP).

Installation

The recommended BIOdek support system consists of steel "I" section beams or concrete beams installed parallel at 600mm or 900mm centers. Each full module on the bottom layer is centered across with the longer sides at right angles to support the beams. The bio-oxidation tower walls are not subject to any lateral loads and need only be designed for wind loads. A cladding with plastic/FRP/AC sheets would normally suffice.

For A.V. SYSTEMS

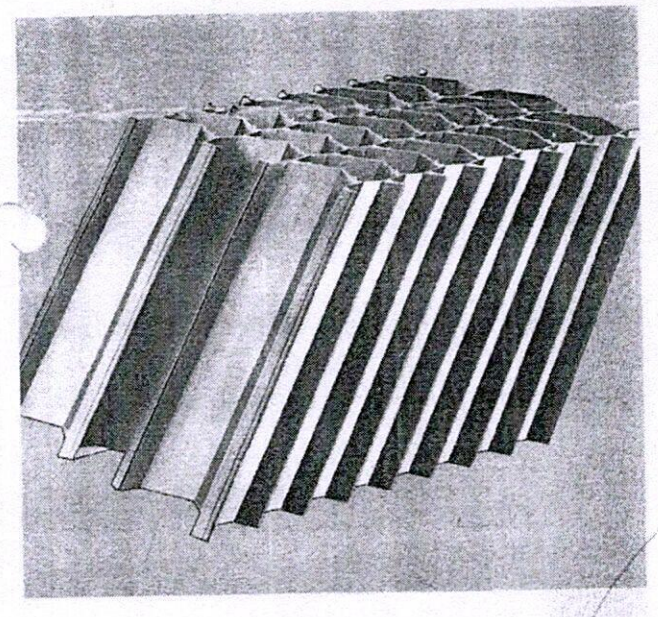
Outstanding Features inherent in the cross-fluted Design of Fill Media



Fill Media Type FB10

The cross-fluted structure of our fill media contributes to the stability of the process and produces its high performance characteristics while also influencing the following:

- Uniform primary distribution of water flow over the whole surface area giving maximum decomposition of com pounds .
- Good redistribution of water flow leading to long retention times.
- Maximum contact of air, waste water and biomass due to the additional mixing caused at crossover points in the fill structure.
- Optimum aeration accorded by the regular structure of the contact surfaces
- High resistance to plugging thanks to the continuous redistribution of water flow.
- Resistance to erosion and mechanical damage due to our unique double folded edges.
- Flexibility of operation and design by employing fill me dia with correctly calculated specific surface areas for individual projects of between 102 and 243 m^2/m^3



Tube Settler Type FS41.50

The effective settling area in sedimentation tanks has a direct result upon the performance of the system.

- By installing our FS41.50 tube settler, the effective settling area is considerably increased.
- The effective settling area may be adapted to the specific project requirements, without interruption of the profile configuration, by utilising the variable block heights.
- The profile design ensures a uniform flow and encourages solids to slide down the profile surface.
- The length, width, depth and angle of profiles can all be altered to meet an individual projects require ments.

For A V SYSTEMS

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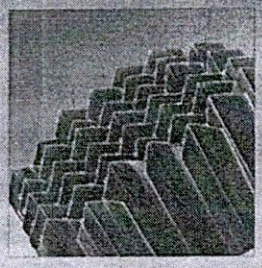
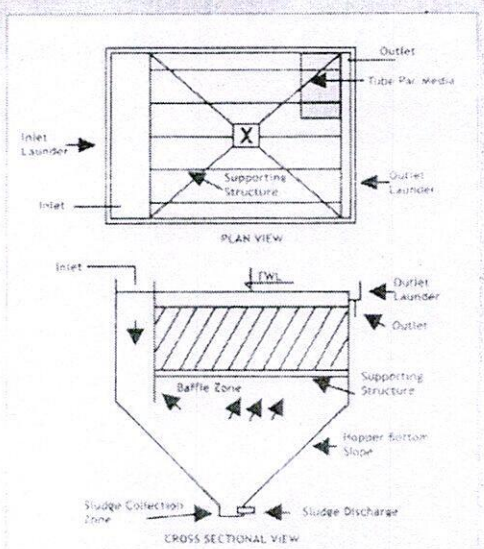
MM Aqua Fill Media, efficient - reliable in operation and economical.

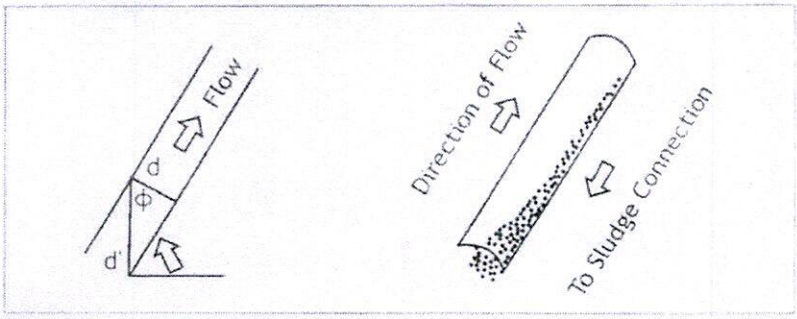


Tube Pac Media

Tube Pac Media utilize individual, isolated tubular channels, each sloped at 60° & 55° to expand the settling capacity of water and wastewater clarifiers. Engineered with the individual tubes rising in the same direction to eliminate mixing currents and unstable flow patterns. Constructed of flame-resistant, self-extinguishing PVC that is also inert to naturally occurring constituents in water and wastewater.



General Arrangement Drawing of Clarifier with Tube Pac Media

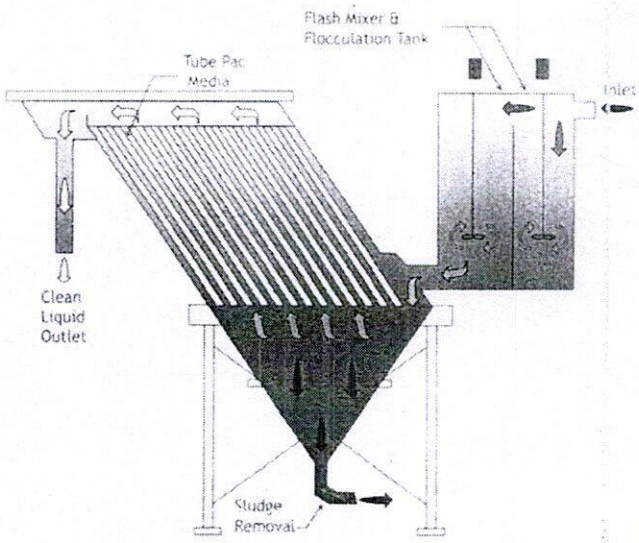


Enhanced Efficiency

The shape and configuration of Tube settler media is engineered to create laminar flow for rapid settling of solids. This enhanced settling reduces chemical coagulant use and downstream filter backwash requirements. For plant design and upgrading less settling area is needed.

Technical Details:-

TYPE OF MEDIA	TUBE-PAC MEDIA
Model	60TSM
MOC of Media	UV Stabilized Virgin PVC base
Structure	Hexagonal Chevron Shaped self-supporting
Straight Height Of Media	750mm (Standard)/as per requirement
Plan settling Area	12 m^2/m^3 (at 60°C slope)
Colour	Black
Media Usage	Tube Settler
Laying angle	60 Deg. From Horizontal
Thickness	1.0 mm
Max. Continuous Working Temperature	55°C
Fitting Arrangement	Tongue and groove.



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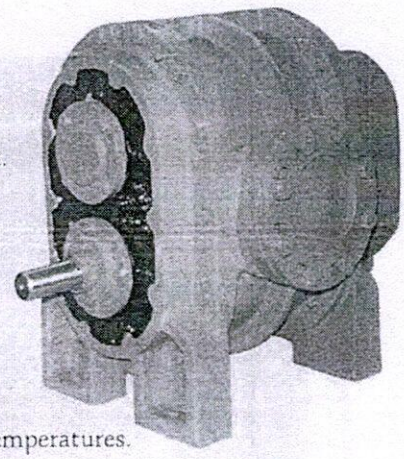
EVEREST TWIN LOBE ROTARY AIR COMPRESSORS

A complete range of Standard Blowers is available for flow rates from 25 m3/hr through 7,000 m3/hr in single stage and upto any capacity in parallel configurations, for working pressures upto 1 kg/cm2. They are available as total package units, ready to install or as bare blower units for replacement.

Our technology is so flexible, we can custom manufacture "Special Air Blowers" by altering and cross linking diverse designs to suit individual requirements and import substitutes.

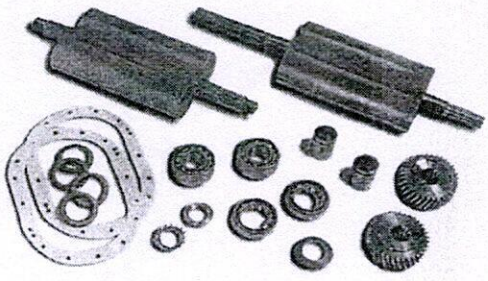


STANDARD DESIGN AND CONSTRUCTION FEATURES

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

APPLICATIONS

- ***Water Treatment Plants*** For backwashing of filter/mixed beds.
- ***Effluent Treatment Plants*** For diffused aeration and agitation of effluent.
- ***Cement Plants*** For Blending, Aeration, Fluidization, Conveying.
- ***Aquaculture*** For maintaining the dissolved Oxygen level.
- ***Chemical Plants*** For supplying of process air.
- ***Electroplating Plants*** For Oil Free air agitation of electrolyte.
- ***Paper Plants*** Knife edge coating, Drying, Conveying, Vacuum pickup.
- ***Yarn Drying*** Vacuum/Pressure Drying of Yarn.
- ***Vacuum Moulding*** For creating quick vacuum.
- ***Polyster Chip Conveying & drying*** For transfer of polyster Chips and other similar materials.
- ***Bag Filters*** For reverse cleaning of Filter bags.
- ***Pneumatic Conveying*** Vacuum, Pressure and Combination Conveying of cereals, cement, husk, baggase, granules, powders and other similar material.
- ***Regeneration of Dryers & Molecular Sieves.***



THE EVEREST ADVANTAGE

Retain your advantage with factory genuine replacement parts.

- All parts meet original manufacturing specifications and tolerances for guaranteed fit and function.
- Pre-packaged overall kits with detailed service manuals are available on request.

For A. V. SYSTEMS

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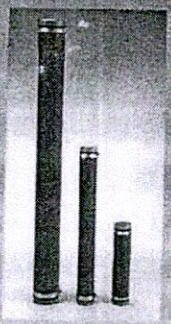
WE JUST DON'T OFFER BLOWERS, WE OFFER SOLUTIONS!

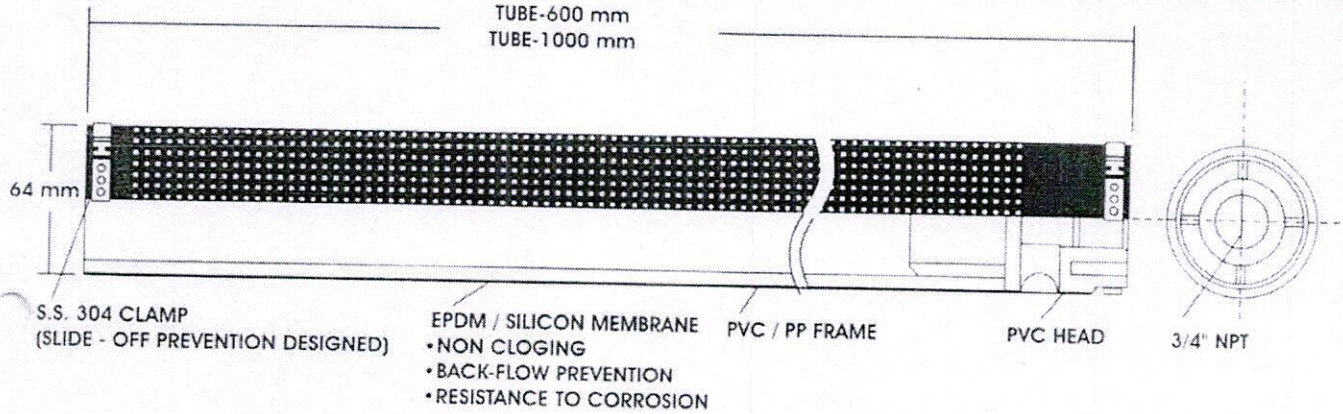
EVEREST Transmission

PRODUCT RANGE

Air Blowers~Water Cooled Blowers~Gas Blowers~Vacuum Booster Pumps~Acoustic Hoods and Enclosures

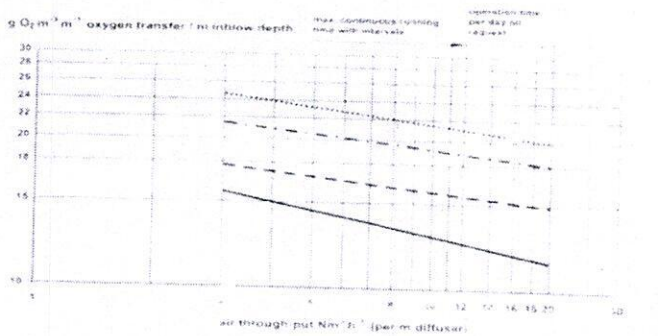


Fine Bubble Tube Aerator



Specifications:-

Buble Size	1.0 to 2.0 mm
MOC of Membrane	EPDM/SILICON
MOC of pipe support	PVC/PP/Stainless Steel
Optimal Fumigation range	3-12Nm³/hrXm
Loss of Head	35-65 mbar ± 10mbar
Oxygen transfer efficiency	OTE values upto 24.5g O_2/Nm³Xm have been measured by an independent institute for the tube diffusers.



Sizes Available :-

Dia (mm) - 63, 73, 93.

Length (mm) - 500, 750, 1000, 1250, models upto 16,200

Structure:-

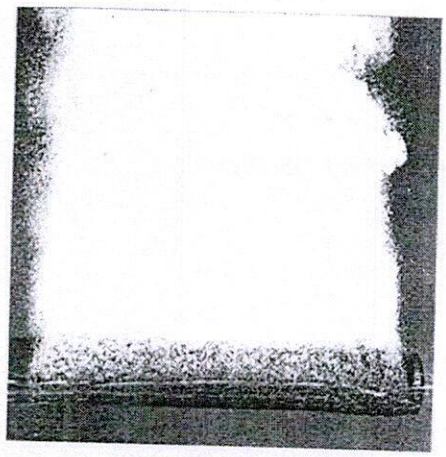
- Membrane with EPDM or SILICON rubber compound.
- Buoyancy elimination with Non buogant design.
- Air Inlet with modled injection ABS adapter
- Supporting frame with PVC/PP pipe
- Clamp with stainless steel.
- Saddle connecting mounting options
- Stainless steel nipple end connector

Application :-

- Municipal wastewater treatment
- Industrial wastewater treatment.
- Clean water treatment
- Sludge stabilization
- Wastewater ozone diffusion
- Aeration of fish ponds.
- Aeration of streams and lakes.

Advantage :-

- High oxygen transfer efficiency.
- High resistance to clogging
- High resistance to corrosion
- Wide air flow range
- Low pressure loss
- Low energy cost
- Easy installation
- Uniform fine bubble
- Back flow prevention
- Self cleaning operation
- Intermittent operation capability.
- Buoyancy elemnated
- Slide-Off prevention designed



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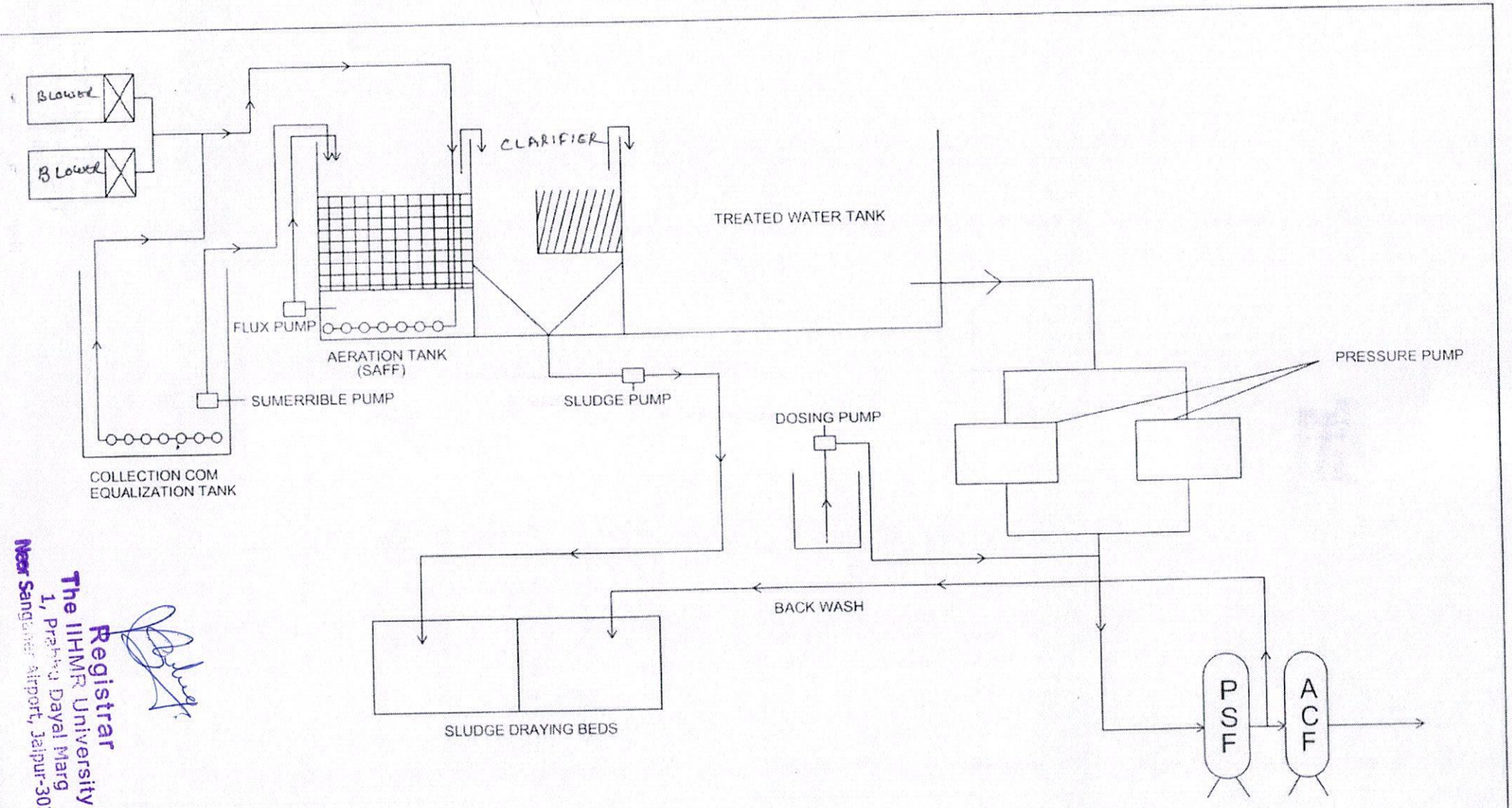

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SEWARAGE TREATMENT PLANT CAPACITY AT IIHMR JAIPUR (40 KL/DAY)

Steps in treatment of waste water from STP

1.0 Waste water come from all sources collected in collection / Equalization tank in which aeration tubes are submerged for aeration.

2.0 Water from collection tank enter into aeration tank @ 2000 lit/Hour , retained 8 hour in aeration tank where it is passed through SAFF(SUBMERGED AREATED FIXED FILM FILTER) having biological culture on it. In Aeration Tank Effluent passed through culture & aeration .

3.0 From aeration tank it enter in to Clarifier / Tube settler. Where the surface area for settlement of sludge particles increased by introduced tubes. Big particles settled in tube settler & directly send to sludge bed. The treated water from aeration tank enter in to storage tank from Tube settler.

4.0 Storage Tank, Treated water from aeration tank collected in to storage tank .

5.0 On line chlorination :On line chlorine is mixed on to treated water comming from storage tank @ 2 ppm/lit.

6.0 Treated water from on line chlorination passed through Pressure Sand Filter for retention of 30 micron particles .

7.0 Water from PSF passed through Activated Carbon Filter for checking of odour and colour etc.

8.0 Treated Water from ACF used for gardening & Sanitary purpose

Maintenance 15
Oil required ~~1.5~~ lit in 3 month
Belching Power 50 kg per month for dosing purpose
Glanze 2 feet per month for pressure pump.

A detailed diagram of STP is enclosed herewith .

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Flow digram of the STP

Note : For operation requirement

1 Bleaching powder - 40 Kg per month
2 Oil - 500 ml in three months
3 Greece - Nil/as per requirement

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SEWAGE TREATMENT PLANT IN IIHMR, JAIPUR

The institute has 180 hostellers, 30 families, kitchen & mess, day-scholars guests and students. The existing water tank has a capacity of 50,000 liters. which is consumed in half a day. Considering total users as 400 and consumption per head as 150 liters, the total is around 60,000 ltrs. per day.

Sewerage Treatment Plant (STP) designed to treat 50000 liters effluent water per day has been installed in the institute in May, 2007 and is in use since August, 2007.

Particulars	Prescribed limits	As per contract	Actual test dt 9.8.07	Remarks
pH	5.5-9.0	7-8	7.78	O.K
Bio-chemical oxygen demand (BOD) (mg/lit)	30	250	26.43	O.K
Chemical oxygen demand (COD) (mg/lit)	250	600-800	123.79	O.K
Suspended solids TSS (mg/lit)	100	200-450	82.92	O.K
Colour	Clear	-	Clear	O.K

The results are found satisfactory .

Cost calculations

CAPITAL COST

Construction & installation charges - Rs.10.75 lacs

RECURRING COST

Interest 12% p.a for 1 month	-	Rs. 10,750
Electricity consumption	-	Rs. 9,000
Skilled man power	-	Rs. 6,000
Oil & Grease etc.	-	Rs. 2,000
Total	-	Rs. 27,750

Out Put calculations

Water treated	-	50 Kilo liters per day 50x30 = 1500 Kilo liters per month
Treated water cost for 1 Kilo liters	-	27700/1500 = Rs.18.50 per Kilo liters
Municipal Water commercial rate	-	Rs.8/- per Kilo liters

We have saved valuable water.

sewage.doc

Send this report to IIHMR

21/11/07

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