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ROTARY DISTRIBUTOR for TRICKLING FILTER *also called bacterial bed or biofilter*

The sewage treatment by means of Trickling Filters was used in England already in 1893, a long time before the active sludge treatment plants.

In the Trickling Filters the sewage, previously screened to prevent the clogging of the nozzles, is distributed over a mass of filling elements (crushed stone, plastic rings, etc.) to trickle through its surface.

Our production of Rotary Distributors includes: _____

Rotary Distributor without motorization

Motorized Rotary Distributor

The waste water is distributed over the filling material, trickles through its surface and produces a biologic film or membrane on it.

The biologic layer is 2-3 mm. thick and is made of bacteria, fungi, protozoa, algae but even of more complex organisms such as worms and insects which adhere to the material. The organisms of the membrane absorb and degrade the nutritional organic substances in the waste water.

When the biologic membrane reaches a considerable thickness, it comes off from the filling material and gets mixed with the waste water, then it will be separated in the secondary clarifier by sedimentation.

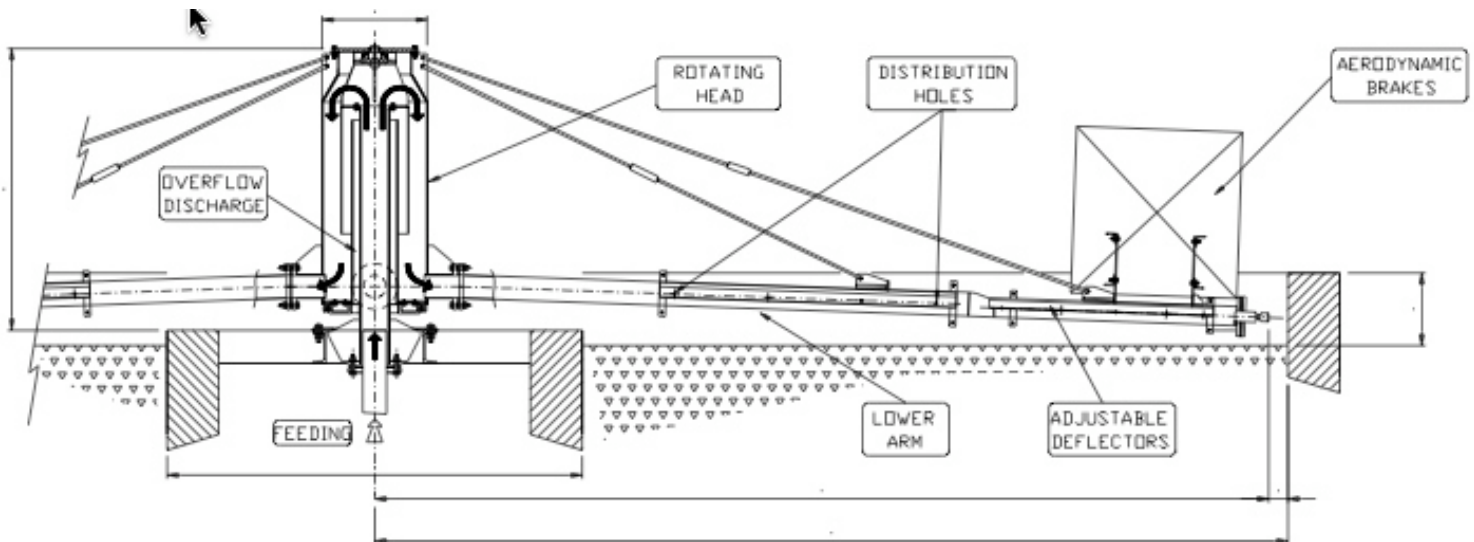
The waste water is equally distributed over the trickling filter surface by means of a distributing system applied on the rotary arms which rotate thanks to the effect of the dynamic reaction of the distributed liquid itself.

The rotation speed of the distributor depends on the flow rate and diameter of the tank.

The rotary distributor is sized according to the design flow rate and by checking the operation at a maximum and minimum flow rate, under which the machine cannot equally distribute the waste water over the trickling filter.

The range of application between the minimum and maximum flow rate of a rotary distributor can be widened by means of a careful study of the executive project and the use of special techniques.

TRICKLING FILTER-ROTARY DISTRIBUTOR WITHOUT MOTORIZATION Mod. EM46 A



Application	Waste water distribution over a circular surface
Characteristics	The machine is equipped with rotary arms which uniformly distribute the waste water all over the surface.
Operation	The waste water flows to the central part of the tank, into a rotary central group where it is equally distributed through the arms. The arms rotation is given by the water kinetic energy.
Materials	Hot dip galvanized or stainless steel
Installation	In a concrete tank
Tank diameter	From 4 to 40 m.

Technical and dimensional data:

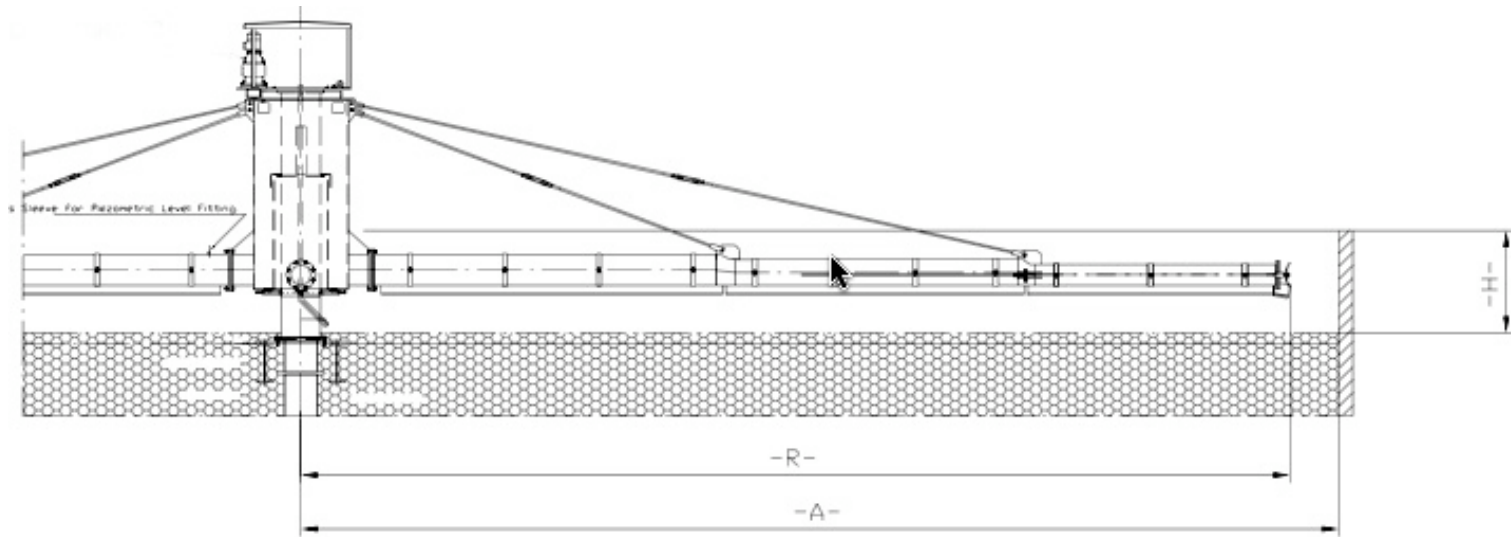
The waste water is equally distributed over the Trickling Filter surface thanks to a distributing system by rotary arms which rotate thanks to the effect of the dynamic reaction of the distributed liquid itself.

The rotation speed of the distributor depends on the flow rate and diameter of the tank.

The rotary distributor is sized according to the design flow rate and by checking the operation at a maximum and minimum flow rate, under which the machine cannot equally distribute the waste water over the Trickling Filter.

1.1	Trickling filter diameter	:mt	(*)
1.2	Maximum flow rate	:m ³ /h	(*)
1.3	Regular flow rate	:m ³ /h	(*)
1.4	Minimum flow rate	:m ³ /h	(*)
1.5	Available head above the nozzles level	:m.c.a.	(*)
1.6	Inlet pipe diameter	:DN	(*)
1.7	Number of rotary arms	:n°	
1.7	Total number of nozzles	:No.	
1.7	Nozzles diameter	:mm.	
1.7	Head at the maximum flow rate	:m.c.a.	
1.7	Head at the rated flow rate	:m.c.a.	
1.7	Head at the minimum flow rate	:m.c.a.	

(*) to be advised when asking for a quotation



Application	Waste water distribution over a circular surface
Characteristics	The machine is equipped with rotary arms which uniformly distribute the waste water all over the surface.
Operation	The waste water flows to the central part of the tank, into a rotary central group where it is equally distributed through the arms. The arms rotation is given by a drive unit.
Materials	Hot dip galvanized or stainless steel
Installation	In a concrete tank
Tank diameter	From 4 to 40 m.

Technical and dimensional data:

The waste water is equally distributed over the Trickling Filter surface thanks to a distributing system by rotary arms moved by a drive unit.

The rotation speed of the distributor is calculated depending on the diameter of the tank and the flow rate to be distributed.

In this case, a variation of the flow rate has no influence on the rotation speed but it can affect the distribution efficiency. In fact, each rotary distributor, under a certain flow rate, does not allow the waste water flow down to the arms periphery in a uniform way.

1.1	Trickling filter diametre	:mt	(*)
1.2	Maximum flow rate	:m ³ /h	(*)
1.3	Regular flow rate	:m ³ /h	(*)
1.4	Minimum flow rate	:m ³ /h	(*)
1.5	Available head above the nozzles level	:m.c.a.	(*)
1.6	Inlet pipe diametre	:DN	(*)
1.7	Number of rotary arms	:n°	
1.8	Total number of nozzles	:No.	
1.9	Nozzles diametre	:mm.	
1.10	Rotation speed	:rpm	
1.11	Drive unit power		

(*) to be advised when asking for a quotation

API SEPARATOR

The waste water, containing solids and oily substances, coming from the washing of tanks, yards, working areas, are stocked in some tanks and then sent to the API treatment. A first removal of the floating substances is made in these tanks by means of oil skimmers.

Information about the API SEPARATOR sizing.

In the API tank a natural separation of the heavy substances takes places, as they tend to sediment while the light substances go up to the surface.

The sizing of the API tanks is made according to the API (American Petroleum Institute) standards.

The main factors which influence this sizing are:

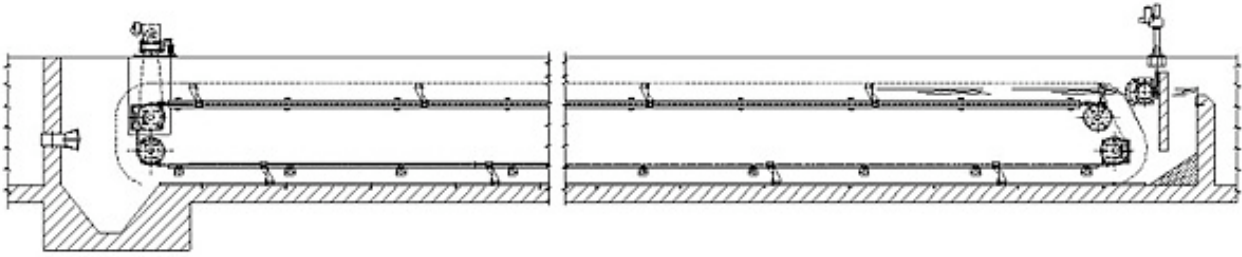
- flow rate
- temperature of the liquid
- density of the particles
- size of the smallest oil particles to be separated.

The equipments installed in the API Separator tank are dredging chains with bottom and surface scrapers.

The API tanks are equipped, at the entry, with:

- distribution chamber
- baffles to improve the liquid distribution into the tank

DREDGING CHAIN FOR API TANK Mod. EM53



Application	Scraping of settled solids to convey them to a drain well, removal of floating materials to convey them into a collecting pipe.
Characteristics	The equipment consists of a dredging chain equipped with bottom and surface scrapers and an oil removal pipe.
Operation	The settled sludge is conveyed into a hopper while the floating material is conveyed into a slotted pipe (oil removal pipe).
Materials	Hot dip galvanized carbon steel or Stainless steel.
Installation	In a concrete tank.
Tank width	From 2 to 14 m.
Optional	Scum collecting system.

Normally the API tank is installed in a plant area where the risk of fire or burst is very high. Such areas are defined and classified according to special regulations (ATEX).

The equipment must be designed and manufactured in compliance with the classification of the installation area.

For instance, the use of Eexd IIT4 electric motors is allowed in the areas classified as “zone 1”, while no type of electric motor is allowed in the areas classified as “zone 0”.

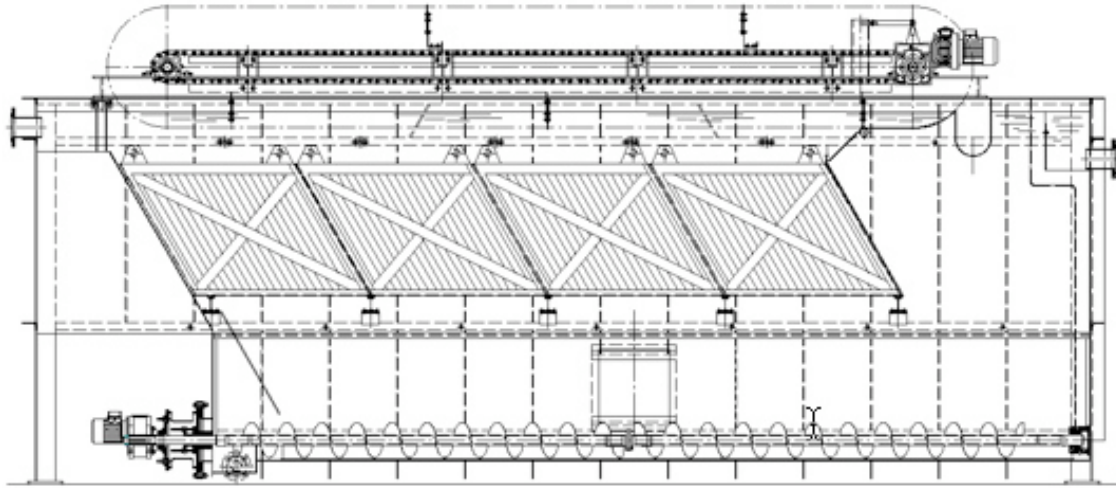
The API Separators, if installed in hazardous area, must comply with ATEX regulations and be certified in compliance with these regulations.

Over the last few years, to reduce the extension of the areas classified as “zone 0”, the API tanks have been covered with floating covers.

These covers float on the liquid and prevent the production of odours and gases.

In such cases, the dredging chains must be designed and manufactured by taking into account this special system applied, as the forming of a thick layer of oily substances under the cover must be avoided.

LAMELLAR PLATES CLARIFIER



INFORMATION ABOUT WASTE WATER CLARIFYING

We have given a short account of the theory of sedimentation in the chapter “Clarifiers”. In the process of sedimentation with flocculation, the particles do not maintain their individuality, but they tend to agglomerate, thanks to the action of the coagulant reagents. The size of the sludge floc becomes larger and, as a consequence, the sedimentation speed increases.

SEDIMENTATION WITH FLOCCULATION

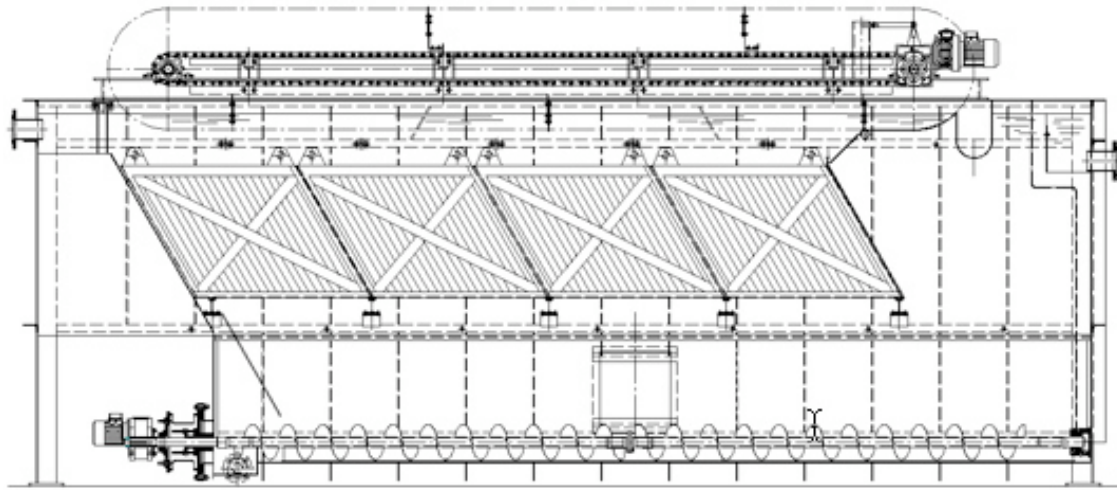
A thorough clarifying process generally consists of three phases:

1. Mixing of the water to be treated with the reagents
2. Flocculation
3. Sedimentation

Before sending the water to be clarified to the lamellar plates, there should be a good mixing-flocculation to form and make the sludge flocs become larger.

The mixing with the reagents must be made very quickly and with a high degree of agitation. While the flocculation phase must be slow in order to make the flocs agglomeration easier.

LAMELLAR PLATES CLARIFIERS



Application	Water clarification.
Characteristics	The equipment consists of a steel tank with lamellar plates and a sludge conveying screw.
Operation	The water to be clarified flows into the tank, is distributed in the lamellar plates and collected by the ditches in the upper part. The sludge settled on the tank bottom is conveyed and evacuated by means of a screw.
Material	Painted carbon steel.
Installation	Concrete base.
Optional	Scum collecting system.

LAMELLAR PLATES CLARIFIERS MOD. EM87

Similarly to the other clarifiers, in the Lamellar Plates Clarifiers the clarification-sedimentation must take place under a perfectly calm condition, trying to avoid any turbulent motions.

The clarified water, after passing through the lamellar plates, is collected by the ditches in the upper part, while the sludge settled on the tank bottom is conveyed into a drain well by a screw.

We recommend the installation of a vertical cylindrical flocculation tank with a slow mixer.

The first part of the Lamellar Plates Clarifier is a feed chamber with a grating towards the lamellar plates chamber, having the function of:

- holding any coarse materials which may damage the plates;
- rectifying the threads of the incoming flow.

There must be a considerable distance left between the settled sludge level and the bottom base of the lamellar plates.

We recommend the installation of a horizontal conveying screw on the tank bottom to evacuate the settled sludge.

If the waste water contains oily substances, we suggest to apply a surface dredging chain to remove the floating materials.