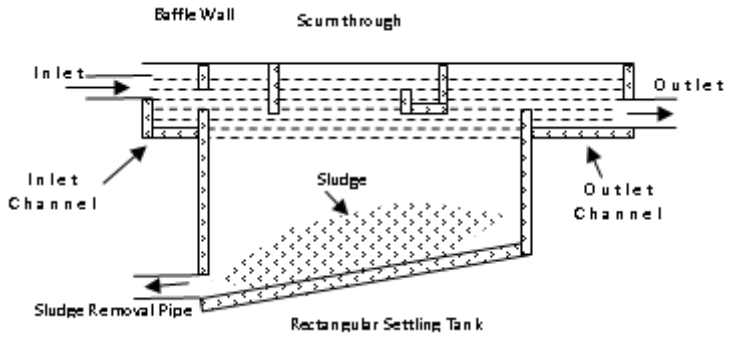
PRIMARY SEDIMENTATION TANK

Primary sedimentation tank is also known as primary clarifier and is located just after grit chamber. It may be rectangular, circular or square shape. The principle and construction details are same as that of plain sedimentation tank of W.T.P.



Design Specifications of Primary Sedimentation Tank

1. Hydraulic loading rate (surface overflow rate)/settling velocity V_s = (0.3 – 0.7) mm/sec (1 – 2.5 m/hr)
2. Detention time / retention time T_d = 1 – 2 hrs
3. Depth of Tank = (1 – 5) m
4. BOD removal (20 – 40) %
5. Suspended solids removal (30 – 60) %
6. Minimum number of tanks = 2
7. Sludge accumulated = 2.5 Kg of wet solids / m^3 of flow.

Types of Primary Sedimentation Tanks

1. Typical primary sedimentation tank
2. Circular Radial Flow Tank
3. Up Flow Tanks

It consists of removal of floating material (like dead animals, tree branches, papers, plastics, wood pieces, vegetables peels etc) and also the heavy settleable inorganic solids (grit etc). Preliminary treatment includes:

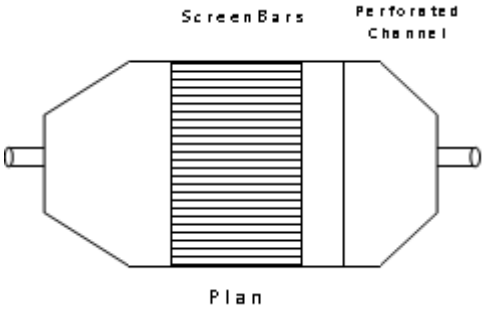
1. Screening
2. Comminutors
3. Grit Chamber
4. Detritus Chamber
5. Skimming Tank

Screening

Screening is the removal of large size floating matters by a series of closely spaced bars placed across the flow inclined at $30^o - 60^o$. These floating materials, if not removed, will choke the pipes or adversely affect the working of the sewage pumps.

Screens should preferably be placed before the grit chambers, however, if the quality of grit is not important, as in the case of land sliding. Screens may be placed after the grit chamber or something within the body of the grit chamber.

The screens may be cleaned manually or mechanically, the waste accumulated is removed periodically which can be disposed of by burial, disintegration or used as fertilizers.

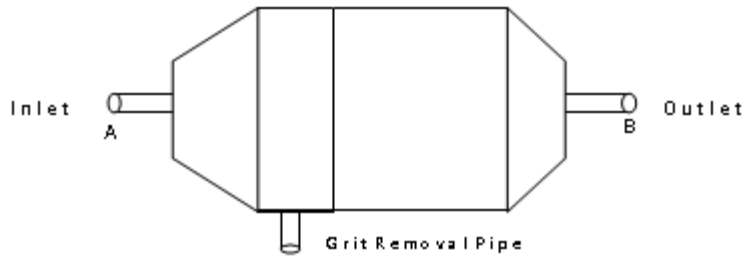


Comminutors

The larger suspended solids are reduced to smaller size by comminutors rather than removing by screens. The comminutors are usually provided in large plants. Comminutor consists of a fixed screen and a moving cuter or curved screen with rotating or oscillating cutter. A typical comminutor shown in the figure consists of rotating hollow cast iron drum about its vertical axis. Comminutors should be installed on the d/s end of grit chamber to avoid its excessive wear.

Grit Removal

Grits are heavy inorganic solids such as sand, metal fragments, egg shells of specific gravity ranging from 2 -2.65. They cause excessive wear during different treatment stages and therefore must be removed. A grit chamber may be horizontal flow or vertical flow and is manually or mechanically cleaned. Grit of a properly designed and operated chamber is free from organic matters which may be used as land fill. If grit contains organics in high proportion, it is disposed of by burial or used as manure.

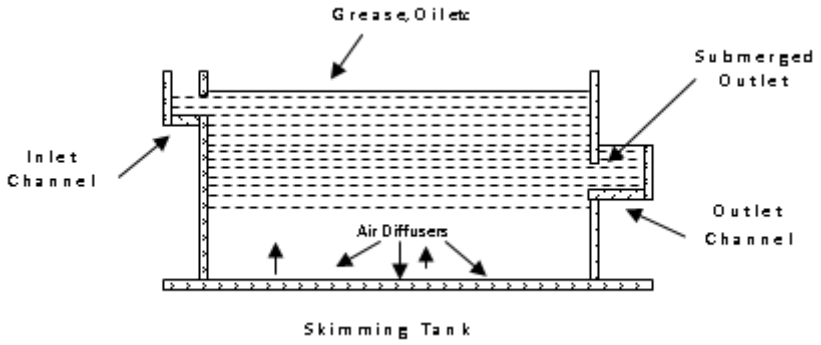


Detritus Chamber

They are installed to remove finer particles which are left from grit chamber.

Skimming Tank

It is used to separate grease and oil and other floating matters which may adversely affect the efficiency of the treatment facilities. Grease may tend to trap trickling filter and coat the biological flock in the activated sludge process. The floating matters may be collected by continuous mechanical process or by hand manually. They have baffled entrance and outlet.



Designing criteria

Horizontal velocity = 5 – 25 cm/sec

Retention / detention time ≤ 15 min

Depth of tank = 1 m

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