Wastewater Treatment
Aeration Locations

HOFFMAN LAMSON

Aeration Basins & Aerobic Digesters

An aerated lagoon or aerated basin is a holding and/or treatment pond provided with artificial aeration to promote the biological oxidation of wastewaters. As with all other biological processes for treatment of wastewater, these use oxygen (or air) and microbial action to biotreat the pollutants in the wastewater.

Aerobic digesters and aeration basins are very similar. The basin is generally considered to be a large, open earthen lagoon or pond. The large surface areas involved cause more drastic temperature variations than found in aerobic digesters, causing variations in sludge retention times. If solids are returned to the aeration basin process, there is no difference between an aeration basin and the activated sludge process.

Aerobic digesters are better described as a tank than as a pond. They are generally constructed of concrete and are rectangular so multiple tanks can share common walls. They are usually 15-25 ft. (5-8 m) deep so that the diffusers can work properly. The rectangular dimensions vary greatly, but large aerobic digesters can be 100 ft. x 500 ft. (30 m x 152 m). Tanks this large would have two diffusers. Most plants have at least two digesters, with large plants having 30 or 40. The aerobic digestion process can be continuous or batch.

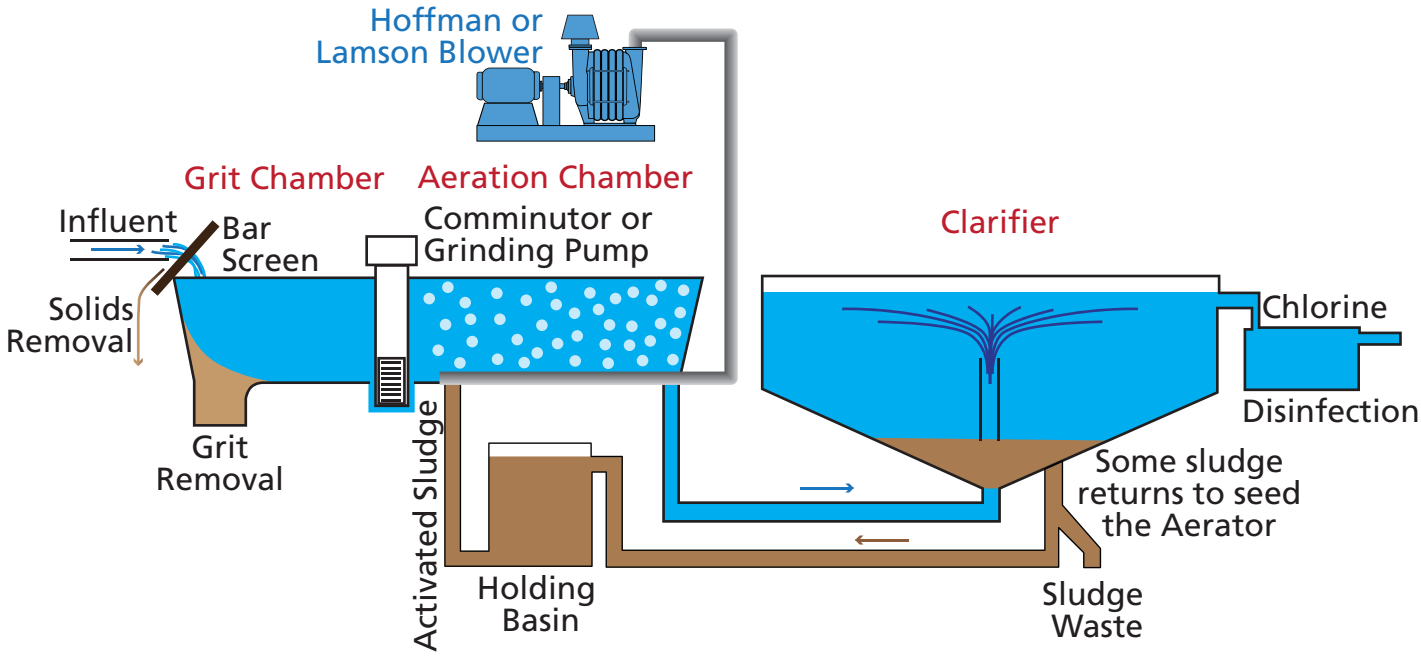
Suspension Mixed Lagoons

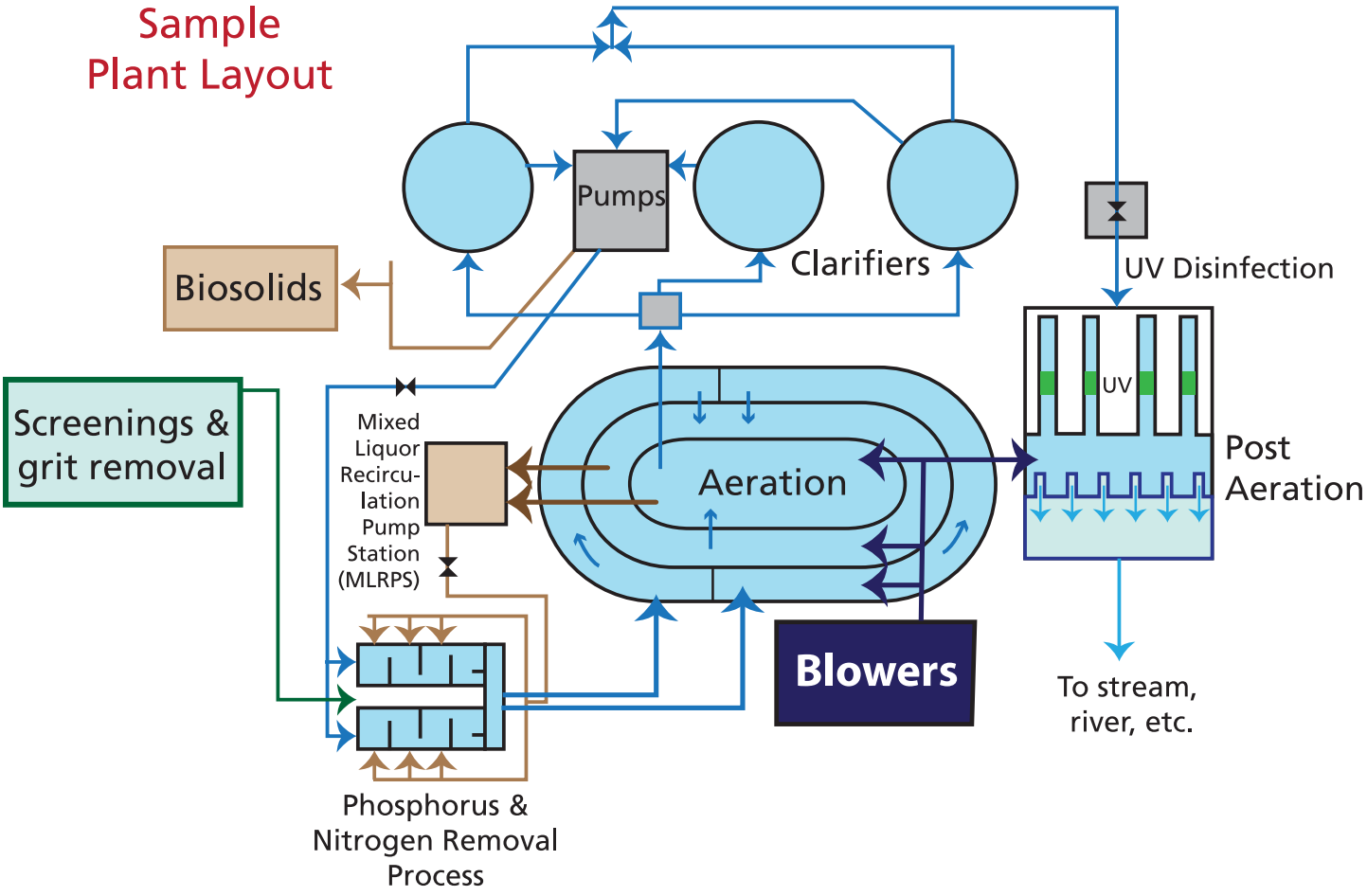
The objective of the lagoon is to convert the soluble, biodegradable organics in the influent into biomass that can settle as sludge. Usually, the effluent is then put in a second pond where the sludge can settle. The effluent is-then removed from the top with a low chemical oxygen demand (COD), while the sludge accumulates on the floor and undergoes anaerobic stabilization.

Floating surface aerators

In a surface aerated system, the aerators provide two functions: they transfer air into the basins to facilitate the biological oxidation reactions and they provide the mixing required for dispersing the air and for contacting the reactants (that is, oxygen, wastewater and microbes). Typically, the floating surface aerators deliver the amount of air equivalent to 1.8 to 2.7 kg O_2/kWh. However, they do not provide mixing equivalent to that normally achieved in activated sludge systems and, therefore, aerated basins do not achieve the same performance level as activated sludge units.

Biological oxidation processes are sensitive to temperature and between 32° and 104° F (0°-40° C) the rate of bio-reactions increase with temperature. Most surface aerated vessels operate between 39° and 90° F (4°-32° C).





Submerged diffused aeration

Submerged diffused air is essentially a form of a diffuser grid inside a lagoon. There are two main types of submerged diffused aeration systems for lagoon applications: floating lateral and submerged lateral. Both of these systems utilize fine or medium bubble diffusers to provide aeration and mixing of the process water. The diffusers can be suspended slightly above the lagoon floor or may rest on the bottom.

Channel Aeration

In large wastewater plants, channels that distribute wastewater to the primary sedimentation tanks are aerated to keep the solids in suspension, independent of the water flow rate. The amount of air required ranges from 2-5 cfm per linear foot of channel (0.2-0.5 m^3/linear meter/minute). Frequently, the mixed liquor to activated sludge settling tanks are also aerated.

Post Aeration

Recent requirements for effluent demand high dissolved oxygen levels (4 to 8 MG/L). The intent of the regulation is to ensure that low dissolved oxygen level effluent is not mixed with a receiving stream.

One method is cascade aeration, where the effluent is aerated by the turbulence of a series of waterfalls. But, as noted above, the temperature of the water greatly affects the water's ability to absorb oxygen. Mechanical aeration is more commonly used, including low speed surface aerators and, for higher oxygen transfer rates, submerged turbines.

In larger treatment plants, non-porous (coarse bubble) and porous (fine bubble) diffuser aeration is used. The coice of diffuser is dependent on the oxygen transfer rate required by the effluent.

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