Water/Wastewater Filter Backwash

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Backwashing (Cleaning the Filter)

Although filtration has been used for a long time in water treatment, it is fairly new to wastewater treatment. Today, filtration is used extensively to remove supplemental suspended solids from wastewater effluent and reduce turbidity. In the process of filtration, cleaning the filter is paramount. This is referred to as backwashing.

There are two types of backwashing, semicontinuous and continuous. Air from blowers is used in a semicontinuous pulsed-bed filter. When the suspended solids in the effluent cease to filter to an acceptable level or the head pressure begins to increase, backwashing begins.

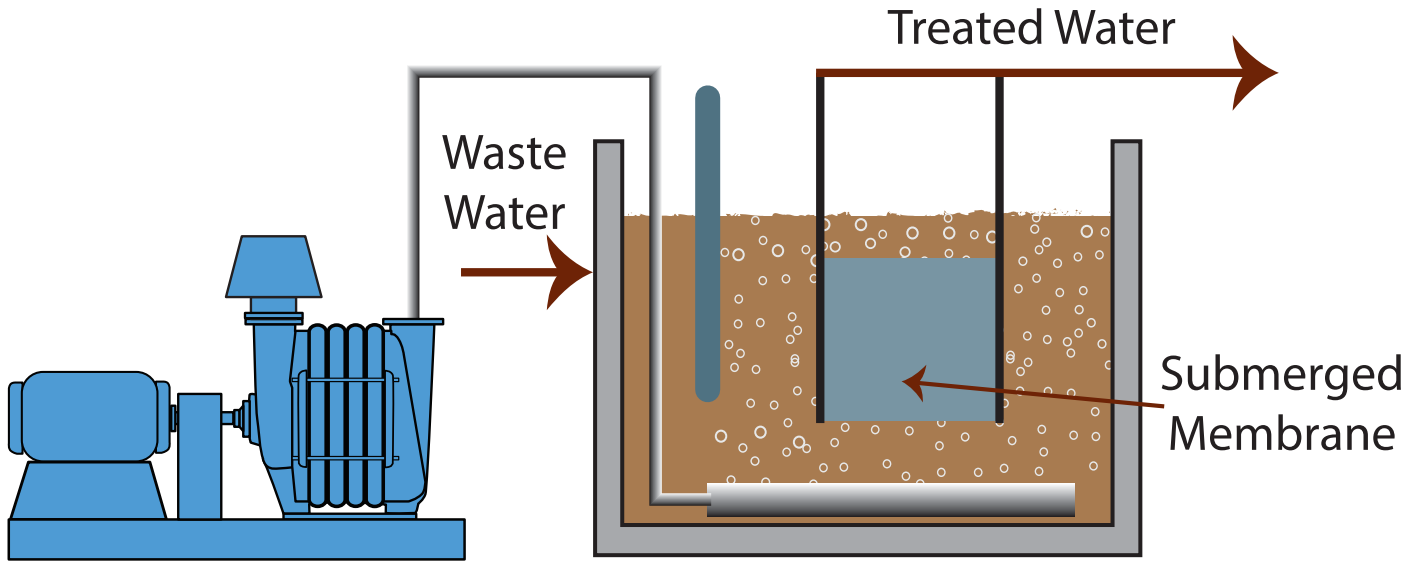
One reason why air assist is preferred in backwashing is that it provides a more vigorous washing action. Air and water are applied for several minutes as the bed is agitated. The washwater that has risen up from the backwashing process is removed. Then a second, lower pressure backwash, without air assist makes sure bubbles are removed from the filtering media.

Gardner Denver multistage centrifugal blowers provide the air for backwashing in this process. The typical arrangement is one blower per filter. The amount of air required depends on the depth of the water and surface area and the depth of the filter media.

Membrane Filtration

Membrane filtration is most common in water treatment, but occurs in wastewater treatment facilities as well. Membranes are indispensable in meeting stricter regulatory requirements by removing or reducing a wide range of contaminants, including pesticides, pathogens, disinfection, metals, arsenic and radionuclides. The removal rate can be as high as 99.9999%. Membrane technology can be microfiltration, ultrafiltration, nanofiltration or reverse osmosis.

To backwash the membranes, air is introduced at the bottom of the membrane and water and air move upward, causing vibration and friction of the membrane. The backwash water is removed. Backwashing is normally done while the process continues and is usually automated.



Gravity Sand Filters

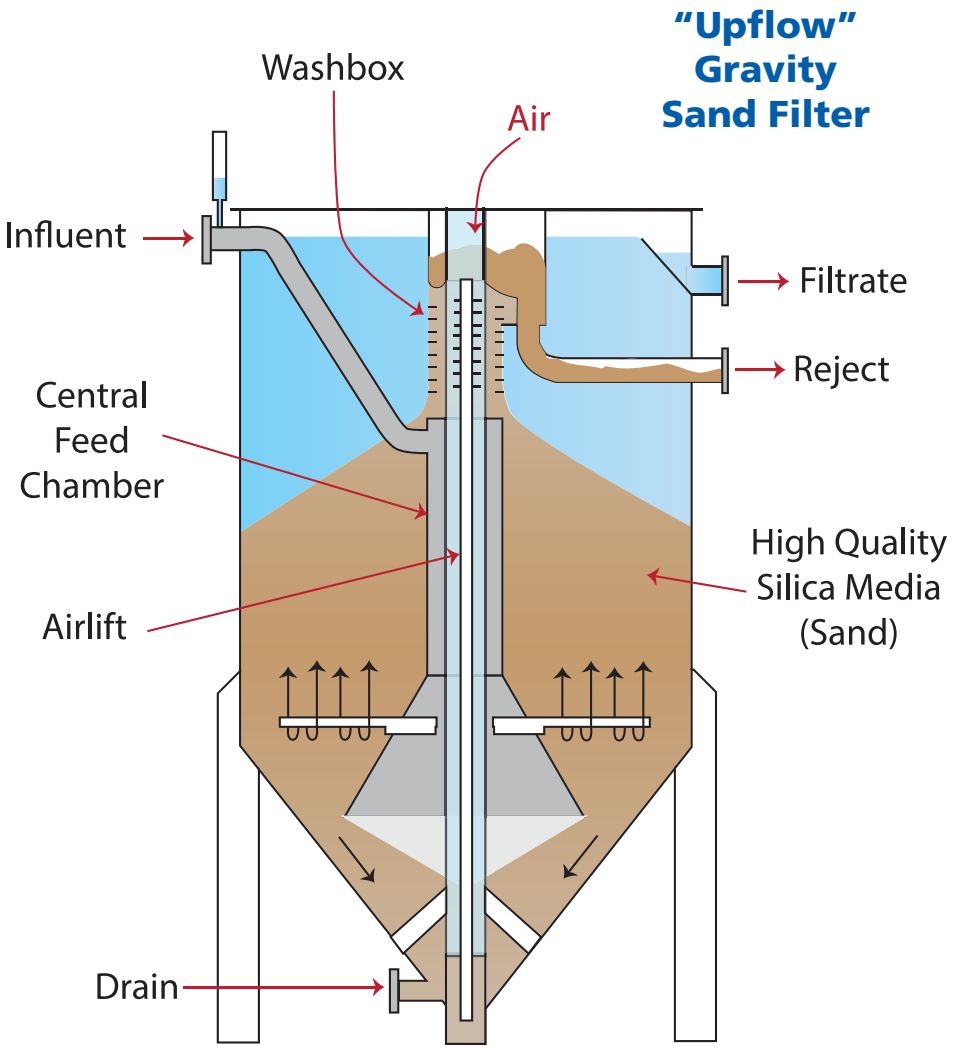
There are three main types of sand filters, which are used for water purification:

- rapid (gravity) sand filters
- upflow sand filters
- slow sand filters

All three are used extensively in the water industry throughout the world. The first two methods require the use of flocculant chemicals to work effectively while slow sand filters can produce very high quality water without the need for chemical aids.

A sand filter is a type of depth filter, where particulates are captured within a porous body of material. They are usually used to separate small amounts of fine solids from aqueous solutions. In addition, they are used to purify the fluid rather than capture the solids as a valuable material. Therefore they are most commonly used in liquid effluent treatment.

Sand filters can be operated with either upward flowing fluids or downward flowing fluids, the latter being much more common. For downward flowing devices, the fluid can flow under pressure or by gravity alone. Pressure sand bed filters tend to be used in industrial applications and are often referred to as rapid sand bed filters. Gravity fed units are used in water purification, especially drinking water, and they have found wide use in developing countries (slow sand filters).



Sand Filters – How They Work

The dirty sand is continuously removed from the active sand bed thanks to an air-lift pump, which sucks the contaminated sand from the bottom of the filter body. A mixture of sand, dirty particles and water is transported upward through the air-lift pipe into the washing chamber at the top of the filter.

The separation of impurities from the sand takes place in the washing chamber through the simultaneous action of both counter-current water and injected air. The sand is returned by gravity to the top of the active sand bed after being directed downward through a labyrinth of several settling steps.

The feed water is fed into the filter at the base of the active sand bed. It then flows upward through the downward moving sand bed where the solids are intercepted. The clean filtrate exits the filter through the overflow weir. The continuous flow of reject washing water is discharged through a separate outlet.

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