

WASTEWATER



Sequencing Batch Reactor (SBR)



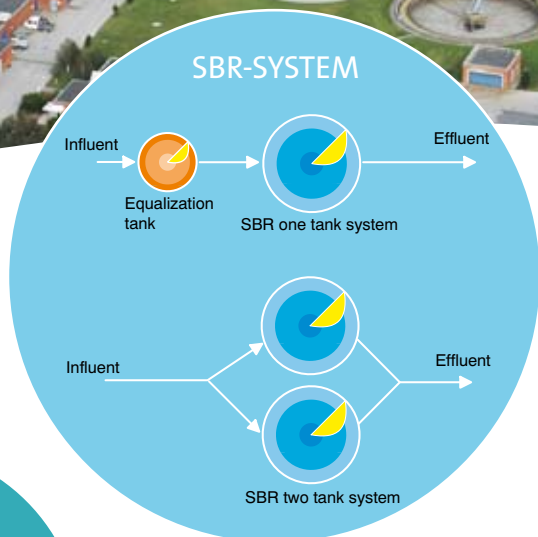
The Sequencing Batch Reactor (SBR) is an activated sludge process in which one or more tanks are filled with wastewater and then operate in a batch mode. The influent and effluent from each tank are discontinuously allowing for the full treatment to take place in the same tank. If only one reaction tank is used an equalization tank is required in front of the reaction tank in order to store the wastewater during the period in which the reaction tank does not receive any inlet. After the treatment in the SBR system the water is discharged.

SBR is ideally suited to

- ▶ Small or medium sized plants
- ▶ High sludge ages (N or N/DN purpose)
- ▶ Cold wastewater
- ▶ Flexibility demand (ex :industrials)
- ▶ Concentrated water (ex :industrials)
- ▶ Low SVI



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1 Fill Phase

In this phase wastewater is admitted to the reaction tank. The phase can last until the tank is full or it can be time controlled. During the fill phase the reaction tank can allow for nitrification or denitrification.

2 React Phase

During this phase nitrification takes place. The phase is time controlled, however it can be omitted during high hydraulic loading.

3 Settle Phase

In this phase sedimentation of the sludge takes place. The phase is time controlled. If needed hauling of excess sludge can be initiated in the middle of the phase.

4 Decant Phase

In this phase the treated water is decanted through a decanter. The phase is controlled by the capacity of the decanter. Hauling of excess sludge takes occurs throughout the entire phase.

5 Idle Phase

In this phase there is no inlet and outlet and no aeration. The phase is time controlled, however, it can be omitted during high hydraulic loading. Hauling of excess sludge is performed throughout the entire phase.

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The SBR system accomplishes equalization, biological treatment and settling in a timed sequence. A sequence consists of five main phases:

- 1 Fill
- 2 React
- 3 Settle
- 4 Decant
- 5 Idle

These main phases can be divided further into sub phases depending on the treatment. The result is a very simple and flexible system that can be adapted to the specific conditions.

In the system the reaction tank is filled with raw wastewater. During the fill phase and the subsequent react phase, the wastewater is treated biologically. The reaction tank can perform both nitrification and denitrification which means that the plant can offer the needed conditions where the water is instead of pumping the water to another tank with the right conditions. As a result, the need for an internal recirculation is eliminated.

After the biological treatment a settling phase is initiated. As the system includes internal sedimentation, the need for an external clarifier with recirculation of sludge is also eliminated. After sedimentation the treated water is discharged from the system before new wastewater is admitted. As it is seen the water volume in a SBR system varies during a sequence.