



# BIC Water and Wastewater Treatment

## BIC DYNAMIC SBR SYSTEMS



**Bauer Dynamic Sequencing Batch Reactor(SBR)  
With Dissolved Air Flootation(DAF)**

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## **BIC Water and Wastewater Treatment** **DYNAMIC SEQUENCING BATCH REACTORS** **For Advanced Waste Treatment**

### **INTRODUCTION**

**Bauer International Corporation Dynamic Sequencing Batch Reactor (SBR)** is an environmental technology leader specializing in the design and supply of domestic and industrial wastewater treatment plants.

The Sequencing Batch Reactor is a reliable biological treatment for waste water discharge. This is ideal wastewater treatment for hotels, office buildings, small towns, hospitals, convention centers, industrial facilities and housing developments.

The Bauer International SBR package includes all process equipment components; including pretreatment, disinfection, tertiary treatment, effluent recycling in a coated steel tank or in concrete basins built locally.

The scope of supply shall include the following main equipment and accessories.

- Pretreatment screen and optional influent Equalization
- Aeration blowers
- Aeration diffusers assemblies
- Decanter System with automatic valve for treated effluent discharge
- Sludge disposal system
- Chlorination feed system
- PLC based control panel with touch screen panel view
- Tertiary filtration system (Optional)
- Membrane process secondary waste recycling (Optional)
- Complete System engineering design

### **Benefits:**

- Lower cost than conventional biological treatment methods.
- Less land requirement versus conventional methods. The processes are carried out sequentially in the same tank.
- Capable of handling wide swings in hydraulic and organic loading.
- Easier to control filamentous growth and settling problems.
- Less equipment to maintain. Require only air blower, and air diffuser assemblies and decanting device.
- Fully automatic operation for less operator attention required.
- Greater operator flexibility. PLC control with touch screen panel view operation adjustment.



## BIC Water and Wastewater Treatment

### Bauer International Sequencing Batch Reactor (SBR)

A sequencing batch reactor (SBR) is a fill-and-draw activated-sludge treatment system. The unit processes involved in the SBR and conventional activated-sludge systems are identical. Aeration and sedimentation/clarification are carried out in both systems. However, there is one important difference. In conventional plants, the processes are carried out simultaneously in separate tanks, whereas in SBR operation the processes are carried out sequentially in the same tank. The SBR is no more than activated sludge system which operates in time rather than in space.

### Bauer International (SBR) Process Application

With the development of the new technology and equipment, interest was revived in the fill-and-draw systems. Improvements in aeration devices and control systems have allowed the development of fill-and-draw systems to achieve their present level of efficiency, which now enables SBR technology to compete successfully with conventional systems. All wastewaters commonly treated by conventional activated-sludge plants can be treated with SBRs.

### Process Description

The SBR system technology shall consist of the following components:

- A. Preliminary Treatment
- B. Secondary Treatment
- C. Tertiary Treatment
- D. Sludge Process

The Preliminary treatment will consist of inlet pump station, inlet flow measurement, fats, oils and grease removal and automatic screen.

The Secondary treatment shall consist of Bauer Dynamic Sequencing Batch Reactor and disinfection.

The Tertiary treatment shall consist of filtration, disinfection and effluent storage tank.

The Sludge Process shall consist of sludge thickening and sludge dewatering.

For the wastewater treatment plant to work effectively, it must follow a specific sequence of stages of treatment process. The degree of treatment required in each step or process and the total number of process used depends on the effluent quality required.



**Slaughter House  
SBR with DAF  
Capacity :100 m<sup>3</sup>/day.**



**University  
Sewage Treatment Plant  
Capacity :85 m<sup>3</sup>/day.**



**Commercial, Convention  
and Entertainment Center  
SBR Process  
Capacity :300 m<sup>3</sup>/day.**



## Primary Treatment

The wastewater generated from different sources of the project development or community are gravity flow into a lift station wherein a non-clog Submersible pumps are installed. The pumps are automatically controlled by a level controller. These pumps will automatically transfer the wastewater to the main sewage treatment plant.

Before it reaches the secondary treatment, the wastewater will pass through a bar screen required to capture all solid and dump it in a screening bin.



**Pharmaceutical Laboratory  
SBR Process  
Capacity: 48 m<sup>3</sup>/day**

## Secondary Treatment

The pretreated wastewater will now be treated in a biological treatment process called Bauer Dynamic SBR. SBR requires smaller footprint on the site. The tanks are acting as the equivalent of several components in a single tank such as aeration, secondary clarifier and sludge return system.

There will be four to six cycles of SBR process per day. Each cycle shall be 4-6 hours, 2-3 hours aeration, 1-2 hour settling and 1 hour decant. The effluent from the wet well shall be treated in a continuous flow.

The waste water will be fed continuously into the inlet pre-aeration chambers of the SBR basin and is directed down through openings at the bottom of the baffle wall into the main aeration chamber. The inlet pre-aeration controls the incoming flow and prevents short-circuiting and provides the pre-treatment of the waste water before it enters the main aeration chamber. The same main chamber used for aeration shall be used for sludge wasting and decanting process.



**Catering Services  
SBR System  
Capacity: 60 m<sup>3</sup>/day**



## BIC Water and Wastewater Treatment

In the inlet pre-aeration chamber, a high concentration of soluble BOD is available to microorganisms in a relatively small basin volume which creates a high “Food to Microorganisms” (F:M) ratio and encourages the maximum biosorption of food by the microorganisms. This also acts as a biological selector encouraging the proliferation of the most desirable organisms and eliminates the growth of filamentous bacteria that cause sludge bulking and poor settling.

The aeration stage involves the utilization of Biological Oxygen Demand (BOD) and ammonia nitrogen, where applicable by microorganisms. The length of the aeration period is two hours and the sludge mass determines the degree of the treatment. This aeration period will depend on the strength of the raw sewage and the degree of nitrification provided for treatment.

During the settling stage, aeration is stopped and the sludge settles leaving the clear, treated effluent above the sludge blanket. The duration of the sludge settling is 60 minutes.

During the decanting stage, the process effluent is removed from the top of the tank through the floating decanter without disturbing the settled sludge.

Excess sludge is wasted periodically during the SBR operation at the time with the decanting stage. As with any activated sludge treatment process, sludge wasting is the main control of effluent quality and microorganism population size. This is how the operator exerts control over the effluent quality by adjusting the mixed liquor suspended solids (MLSS) concentration and the Mean Cell Residence time (MCRT).

The SBR chambers have a complete air distribution system using fine bubble diffusers. Air is supplied from the three-lobe type air blowers through these diffusers to be installed equidistant at the bottom of the tank. The blower system is designed to provide sufficient airflow to meet the system process requirements. The blower will be allowed to operate during aeration phase to mix and oxygenate the wastewater to produce biomass or sludge. The blower stops after completion of the aeration time and the biomass formed are allowed to settle to the bottom of the basin leaving a layer of clear water on top based on the programmed period of time.

The uppermost clear water is discharged from the top of the basin while the basin is continuously receiving the influent using a rugged, corrosion resistant stainless steel floating type decanter located on the basin center end opposite from the inlet reaction chamber. The decanter is parked on the top water level (TWL) during the aeration and settling phases of the cycle, a scum / sludge exclusion installed to eliminate any possibility of solids/biomass carryover during these periods and also allow an easy access and service without the need to enter the basin. The floating decanter is always under pressure both during aeration and settling as well as 3-5 minutes before decanting to assume that no solids will carry-over with the treated water. After the five (5) minutes time, the decanter motorized valve open to continuously discharge the effluent to the chlorine contact tank while the air solenoid valve from the finish line will closed. Excess sludge will be removed using non-clog submersible pump during decant phase to maintain the mixed liquor suspended solids (MLSS) requirement.



## **BIC Water and Wastewater Treatment**

The amount of biomass present in the system can be checked by getting the Sludge Volume Index (SVI). The sludge waste pump run can be adjusted to obtain the average MLSS and MCRT by adjusting the time of run at the Human Machine Interface (HMI) mounted on the control panel . The decanted wastewater from the SBR basin shall be disinfected at the chlorine contact chamber provided with baffles to avoid short-circuiting of flows with a minimum retention time of 30- 60 minutes of the peak-flow. The chlorine shall destroy the disease-causing microorganisms. The liquid chlorine with an appropriate dosage of 5.0mg/li shall be fed automatically and mixed with the effluent of the SBR basins. Generally, a chlorine residual of 0.5 mg/li. after contact time indicates effective disinfections. The chlorine dosing system shall be operated automatically by synchronizing with the decanter operations. The effluent volume will be monitored by a flow meter and will now proceed to the water re-use treatment plant.

The chlorinated water effluent water from the chlorine contact tank/effluent storage tank shall be pumped to the filter. The pump shall deliver a pressure and flow sufficient to run the automatic backwash screen filter even during the backwash mode.

The Automatic backwash filter shall reduce the total suspended solids to 5 mg/l. The screen filter can reject the total suspended solids particulates larger than 20 microns.

The whole system is “time-based” operated and controlled using a programmable logic controller (PLC). The control system consists of a control panel including a human machine Interface (HMI), programmable logic controller, control switches, pilot lights and motor starters. The control panel is factory tested prior to shipment. During the start up of the Bauer Dynamic SBR, our authorized field representative will check the operation and make necessary field settings and program adjustments. After the system has been placed into the service, there are minimal adjustments required by the operator such as sludge pump start and wasting times and blower adjustments.

### **Sludge Dewatering System**

The stabilized and digested sludge from the aerobic digester shall be dewatered using a sludge dewatering system equipment. The dewatered sludge cake shall have a dryness of 15-20 % . The dewatered sludge can be used as an organic fertilizer or for landfill used.