

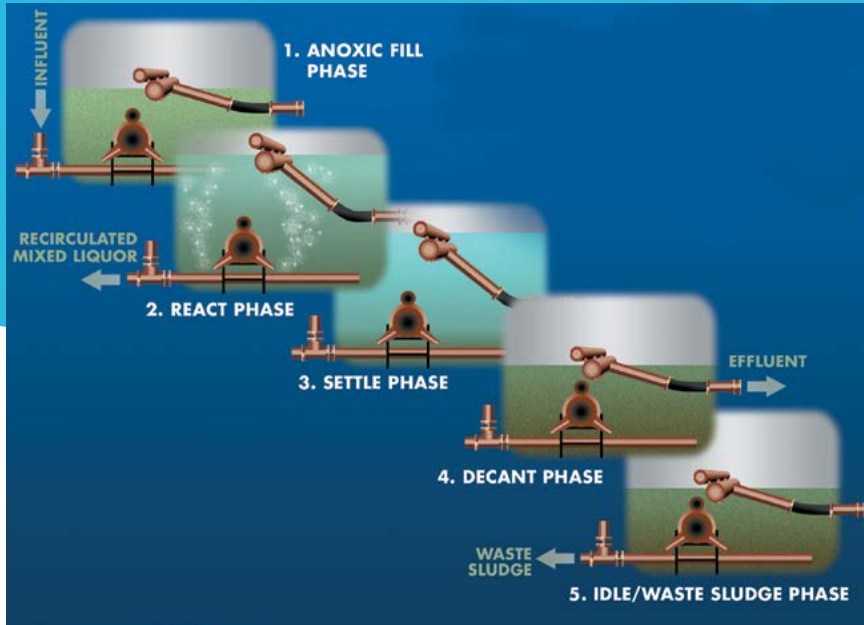


evoqua
WATER TECHNOLOGIES



OMNIFLO® SEQUENCING BATCH REACTOR (SBR) JET TECH SBR TECHNOLOGY

PROVEN PERFORMANCE UNDER DEMANDING CONDITIONS



The OMNIFLO® SBR Cycle effectively utilizes a single reactor

OMNIFLO® SBR Benefits

- Biological Nutrient Removal (BNR)
- High quality effluent at widely varying flows and loadings
- No sludge recycle system
- Perfect quiescent settling
- Optimum energy efficiency
- No clarifiers
- No short circuiting
- Small footprint
- Flexible design
- Retrofits of existing tanks
- Biological phosphorous removal

SUPERIOR TECHNOLOGY IN WASTEWATER TREATMENT

The OMNIFLO® Sequencing Batch Reactor (SBR) utilizes state-of-the-art equipment and controls to deliver superior performance under the most demanding conditions, while offering important benefits to plant owners and operators.

Operating Principles

The OMNIFLO SBR is a fill-and-draw, non-steady state activated sludge process in which one or more reactor basins are filled with wastewater during a discrete time period, and then operated in a batch treatment mode. In a single reactor basin the OMNIFLO SBR accomplishes equalization, aeration, and clarification in a timed sequence. In a conventional continuous flow process, multiple structures are required to obtain the same treatment objectives.

A single cycle for each reactor consists of five discrete periods, Fill, React, Settle, Decant, and Idle. The OMNIFLO SBR system is unique in its ability to handle influent flows and a wide range of organic loads and industrial pollutants. The OMNIFLO SBR is ideally suited when nitrification, denitrification and biological phosphorous removal are necessary.

The operating strategy provides process control over a wide range of flows. By varying the operating strategy, aerobic or anoxic conditions can be achieved to encourage the growth of desirable microorganisms. Microorganisms can also be acclimated to a wide range of industrial and chemical processing wastes.

OMNIFLO® SBR Cycle

Anoxic Fill Phase

During Anoxic fill influent is distributed throughout the settled sludge through the Influent Distribution/Sludge Collection Manifold (ID/SC) and biodegradation is initiated. The reactor is filled with wastewater and fill can be aerated, anoxic, or a combination of aerated and anoxic.

React Phase

Influent flow is terminated. Aeration and mixing continue in the full reactor until complete biodegradation is achieved.

Settle Phase

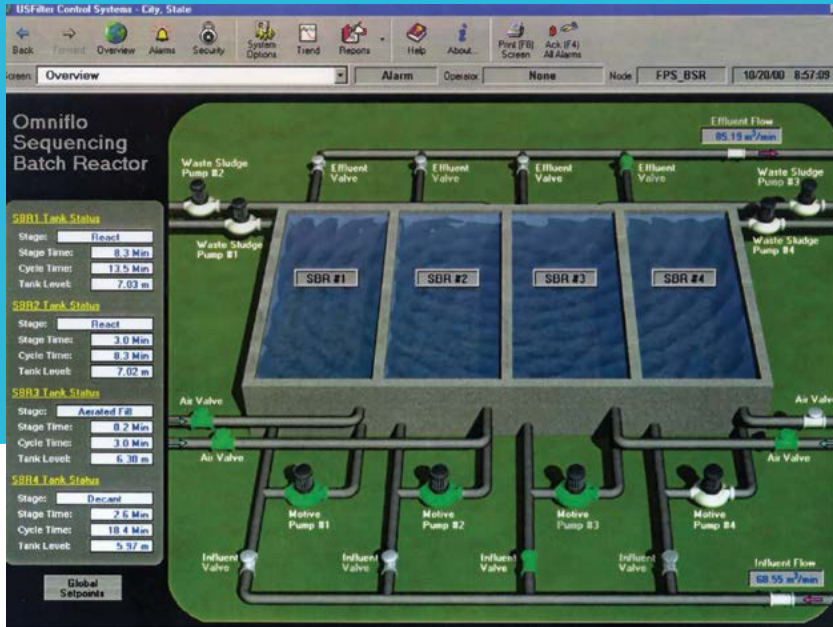
Aeration and mixing are turned off and perfect quiescent conditions allow the biomass to settle, leaving the treated supernatant above.

Decant Phase

Effluent is removed from just below the liquid surface by the Floating Solids Excluding Decanter.

Idle/Waste Sludge Phase

The reactor waits to receive flow. Settled sludge is drawn through the ID/SC and removed from the SBR reactor.



These types of state-of-the-art control strategies meet specific needs.

OMNIFLO® SBR Control Features

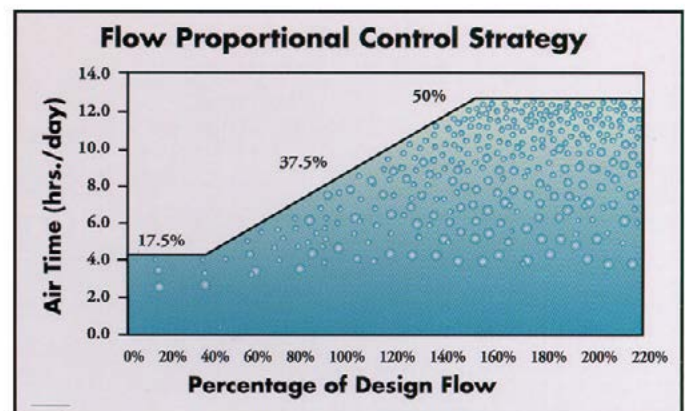
- Reduction of operator time (fully automated)
- Consistent, efficient process
- Additional PC/SCADA systems (optional)
- Equipment failure alarms and automated responses
- Phone modem for remote process service capability (standard)
- Continuous liquid level indication (standard on flow proportional)
- D.O. control (optional)
- Surge protection
- Flexibility for operator to change set points

OMNIFLO® SBR System Controls

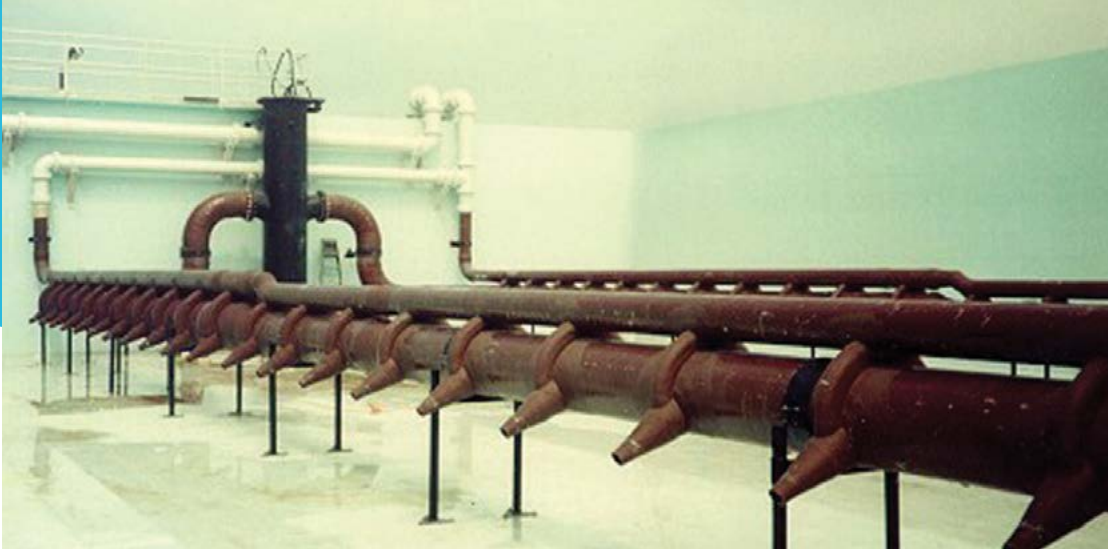
The heart of the OMNIFLO® SBR is the control system. The control system focuses on an operating strategy that optimizes the SBR process capabilities while minimizing required operator time and decision making. We currently offer three types of control systems:

Flow Proportional Control - This state-of-the-art control system features a PLC with a simple to use operator interface. Pressure transducers are used to continuously monitor the rate of fill in each SBR reactor. As the flow changes, the aeration time is adjusted proportional to the flow. This strategy ensures that oxygen is available when needed, but does not waste power during low flow periods. The flow proportional control system also provides automatic alarm and failure response. For example, if an influent valve fails to open, the influent pump station would be pumping against a closed valve. This feature would place the affected reactor out of service and divert the flow to another in-service basin until the failure is manually acknowledged and corrected. The controls adjust the operating strategy and setpoints to provide optimal treatment with the remaining reactors.

Slug Feed Control - The slug feed control strategy utilizes intermittent, rapid fill periods, which maximizes available aeration time during each cycle. This PLC based control system is applicable for treatment plants that have adequate influent holding capacity (influent equalization basin) prior to the SBR.



Aeration time is adjusted proportionally to flow to ensure the right amount of oxygen is available when needed.



VARI-CANT® Jet Aeration System

SUPERIOR EQUIPMENT FOR PROCESS PERFORMANCE

Jet Aeration Designs

The VARI-CANT® jet aeration system from Evoqua utilizes proven principles of jet aeration, combined with state-of-the-art design and materials, resulting in a system with superior performance, efficiency and trouble-free operation. The jet aeration system operates by intermixing air with a motive liquid and injecting the stream into the wastewater. The motive liquid – recirculated mixed liquor – is discharged from an inner nozzle into an outer nozzle. Compressed atmospheric air is introduced, and sheared into tiny bubbles which are entrained in the motive liquid stream and injected back into the basin.

Diffused Aeration Designs

We offer both fine and coarse bubble SBR installations with fixed and retrievable diffuser assemblies available. Most fine and coarse bubble designs used in SBR's require some sort of mixing device to achieve complete mix in the basin during aeration. OMNIFLO® SBR systems are designed without a mixing device when the density of the diffusers achieve full floor coverage and the ID/SC manifold is used to distribute the influent evenly across the basin floor. Reliable and durable floating surface aerators and mixers are also available for special applications with SBR technology.

AERATION/ MIXING OPTIONS

- Jets with submersible or dry pit pumps
- Full floor coverage with fine & coarse bubble diffusers
- High-speed floating aerators
- Fixed fine and coarse bubble diffusers with mixers
- Mixers
- Retrievable fine and coarse bubble diffusers with mixers



OMNIFLO® SBR with Fine Bubble Diffusers



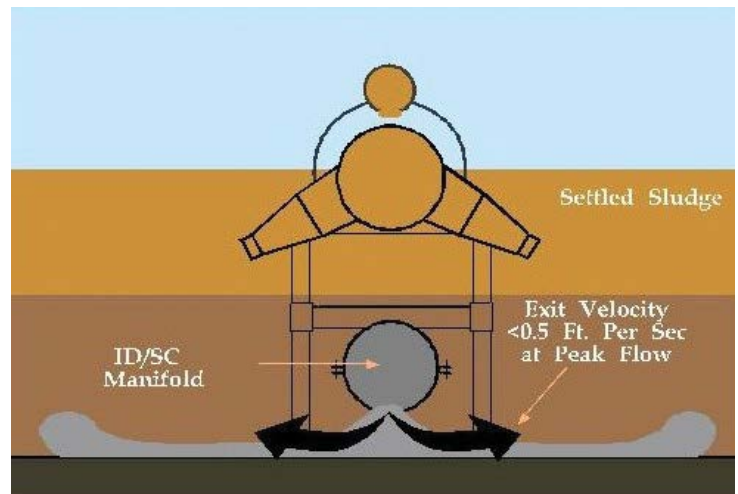
OMNIFLO® SBR with Fine Bubble Diffusers



Influent distribution manifold

Influent Distribution/ Sludge Collection Manifold (ID/SC)

The ID/SC manifold allows intimate contact of the influent (food) with the settled biomass in the sludge blanket throughout the length of the basin. During this time, the soluble BOD is absorbed and stored by the facultative biomass until air is received to metabolize the food. The selective pressures exerted on the biomass assists in good settling and facultative organisms to predominate. The ID/SC manifold is also used to withdraw sludge from multiple points across the basin floor. This yields the thickest sludge possible, reducing side stream sludge treatment operation and maintenance. Finally, the ID/SC prevents disruption of the sludge blanket during Filled Decant periods necessitated by high flow rates or emergency single tank operation.



OMNIFLO® SBR KEY ADVANTAGES

- Licensed plant operators available for customer service 24 hrs/day, 7 days/week
- Choice of aeration / mixing devices
- Influent distribution / sludge collection manifold (ID/SC)
- Non-Electro mechanical solids excluding floating decanter
- State-of-the-art controls
- Retrofits available for any basin geometry
- Experience, Reputation, & Reliability



Floating solids excluding decanter



Draw tube with solids excluding plug valves.

Floating Solids Excluding Decanter

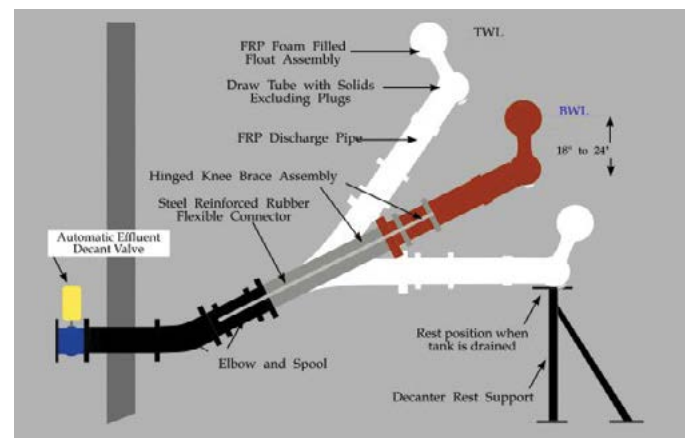
The Jet Tech™ floating solids excluding decanter is the only true solids excluding decanter in the industry that does not utilize electro-mechanical equipment in the basin. This state-of-the-art design utilizes multiple orifices to keep velocities at a minimum, and pulls treated effluent from below the surface to eliminate the possibility of entraining floatables. The decanters are constructed of high quality, durable, corrosive resistant materials with a manual override that is unique in the industry and requires no routine maintenance.

Fixed Decanter

The fixed decanter operates similarly to the floating decanter, except it is attached to the basin wall at a fixed elevation below the bottom water level. This eliminates the flexible hose connector, knee brace and decanter rest support. In SBR systems, the fixed decanter requires the availability of a longer settling time since the solids must settle below the bottom water level before decanting.

Non Solids Excluding Decanter

The non solids excluding decanter is constructed similarly to the solids excluding decanter, however it does not contain the spring loaded valves. This type of decanter is installed in applications when it is not important if some solids are left in the decanted effluent.



Jet Tech™ decanters are unique in the industry and require no routine maintenance.

DECANTER ADVANTAGES

- Innovative designs, engineered specifically for each project.
- Simple safe operation
- No in-basin electromechanical devices requiring maintenance
- Consistent quality performance
- Years of reliable operating experience in the field with installations worldwide



The 2.4 MGD Pima Utility Wastewater Treatment Plant meets Title 22 effluent quality standards.

PROVEN TECHNOLOGY AND EXPERIENCE

Pima Utility

The Pima Utility Wastewater Treatment Plant located in a retirement community in Arizona was designed to treat 2.4 million gallons per day (MGD), and produce a high quality effluent with disinfection, low turbidity and nitrogen levels to meet Title 22 effluent quality standards. The rectangular process basins were designed to be low profile and covered for environmental aesthetics with mechanical equipment installed in an enclosed building to eliminate any noise.

Rahr Malting

The Rahr Malting Company located in Shakopee, MN is one of the world's largest malt producers. Since 1999, an OMNIFLO® SBR has been installed which has consistently met their wastewater treatment requirements. The Rahr Malting Co., also worked with the Minnesota Pollution Control Agency in cleaning up the river where the wastewater effluent is discharged to make sure oxygen consuming compounds were removed.

Fruitland, Maryland

The City of Fruitland, Maryland installed an OMNIFLO® SBR system to expand its capacity of its wastewater treatment plant and to meet the requirements for the Chesapeake Bay initiative. The OMNIFLO SBR system was selected because of its compact footprint and ability to achieve enhanced nutrient removal within a two-tank layout. This system also includes the patented VARI-CANT® Jet Aeration system from Evoqua as well.

OMNIFLO® SBR PRIMARY MARKETS

- Municipal
- Food & Beverage
- Pulp & Paper
- Petrochemical & Oil Refining
- Pharmaceutical
- Chemical / CPI
- Landfill /Leachate Applications
- Textile Industry



OMNIFLO® SBR installed at Rahr Malting



Fruitland, Maryland Wastewater Treatment Plant



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