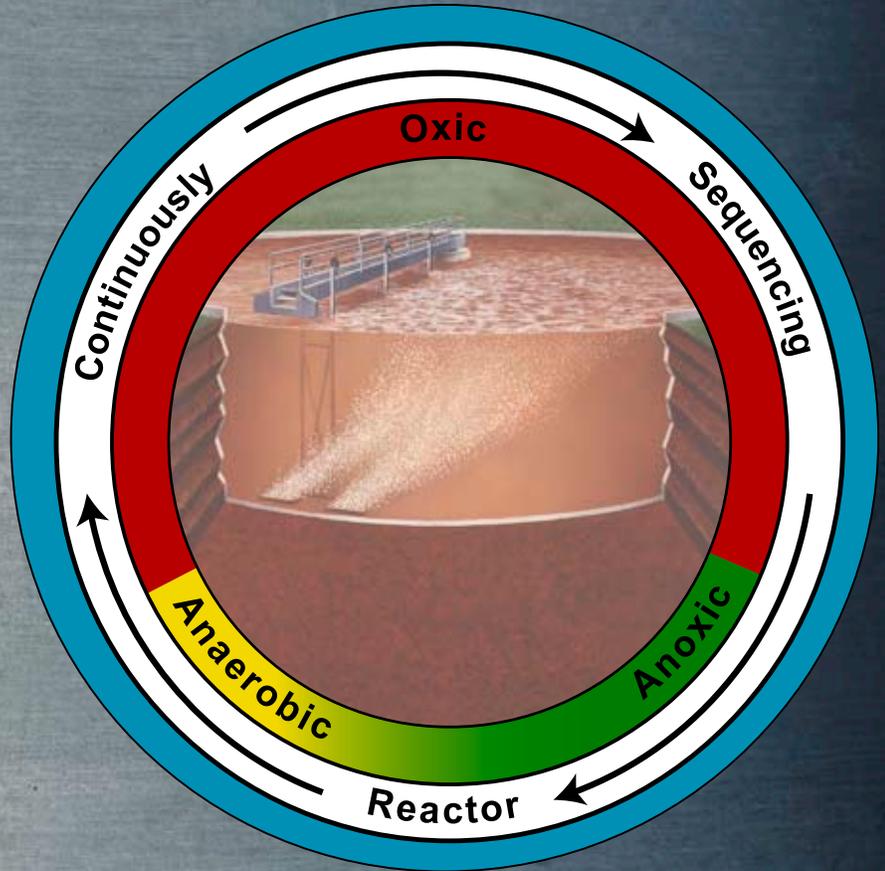




CONTINUOUSLY SEQUENCING REACTOR



A Biological Nutrient Removal (BNR) system utilizing continuous flow in a single basin.



The Schreiber Continuously Sequencing Reactor, or CSR, is a Biological Nutrient Removal (BNR) system contained in a *Single Basin*. It sequences through the 3 process phases required for BNR – Oxidic, Anoxic and Anaerobic – in one basin. The 3 phases do not occur at the same time in the basin. They occur sequentially – one after the other, repetitively, over time. During the Oxidic phase, the entire basin is Oxidic (i.e. aerobic). When the air is turned off, the entire basin becomes anoxic and then ultimately anaerobic. After the anaerobic phase is completed, the air is turned back on and the cycle repeats –over and over - i.e. a Continuously Sequencing Reactor.

For the CSR, the secret to this “phase sequence-ability” lies in its unique design for *complete separation of aeration and mixing*. It has a *100% aeration turndown capability*! This important feature allows the aeration to be turned completely off while the CSR applies its low energy mixing without aeration. Through the use of Schreiber FlexControls, the CSR process can be advanced to meet the most stringent of requirements for today and the future.

### HIGH OXYGEN TRANSFER

High Oxygen Transfer depends on maximizing air bubble surface area and contact time. Conventional diffused air systems mix via air lift pumping, which produces vertical circulating currents that are detrimental to Oxygen transfer since they actually reduce contact time. With CSR, since the diffusers are constantly moving through the water, there is minimum coalescence of the small bubbles (coalescence decreases total bubble surface area). Consequently, optimum surface area is maintained and the rise rate of the air bubbles provide maximum contact time. The resulting CSR oxygenation efficiency amounts to over 4.65 lbs. O<sub>2</sub> / hr per wire horsepower. Compared to 2.5 to 3.5 lbs. O<sub>2</sub>/hr per wire horsepower for conventional diffused and mechanical aeration systems, the efficiency of the CSR results in savings of 35% to 50%.

#### CONVENTIONAL DIFFUSED AIR



Stationary diffusers alone create a vertical updraft of water, increasing bubble rise rate, reducing contact time, and leading to a coalescence of bubbles that reduces available O<sub>2</sub> surface area for low oxygen transfer.

#### ROTATING DIFFUSERS ONLY



The CSR utilizes rotating diffusers that distribute small air bubbles in a uniform pattern, leading to well dispersed free-rising bubbles that maximize contact time and yield high oxygen transfer.

#### ROTATING & STATIONARY DIFFUSERS



By moving the water horizontally over stationary diffusers, the CSR’s rotating diffusers eliminate the updraft problem created by stationary diffusers alone. The combination of rotating and stationary diffusers can greatly increase aeration capacity for higher basin loadings.

### LOWER ENERGY COSTS FOR MIXING

The contents of the basin are mixed as the rotating bridge moves around the basin. Retrievable diffuser support components, and diffuser units suspended from the bridge, provide the driving force for complete mixing. Close proximity of these components to the tank bottom provides localized scouring to maintain suspension of solids. As a result, the power requirement for mixing is 2.5 to 3.5 HP/MG.

### ADVANCING LEVELS OF PROCESS CONTROL

The Schreiber *FlexControl* process control system can be as simple as a DO system with timers or as sophisticated as online monitoring of BNR process parameters. As the name Schreiber *FlexControl* implies, the Schreiber process control system is very flexible, yet simple to operate.

### DESIGN FLEXIBILITY

Schreiber aeration systems are suitable for aeration designs ranging from basic secondary treatment to advanced nutrient removal processes such as MLE, VIP, etc.