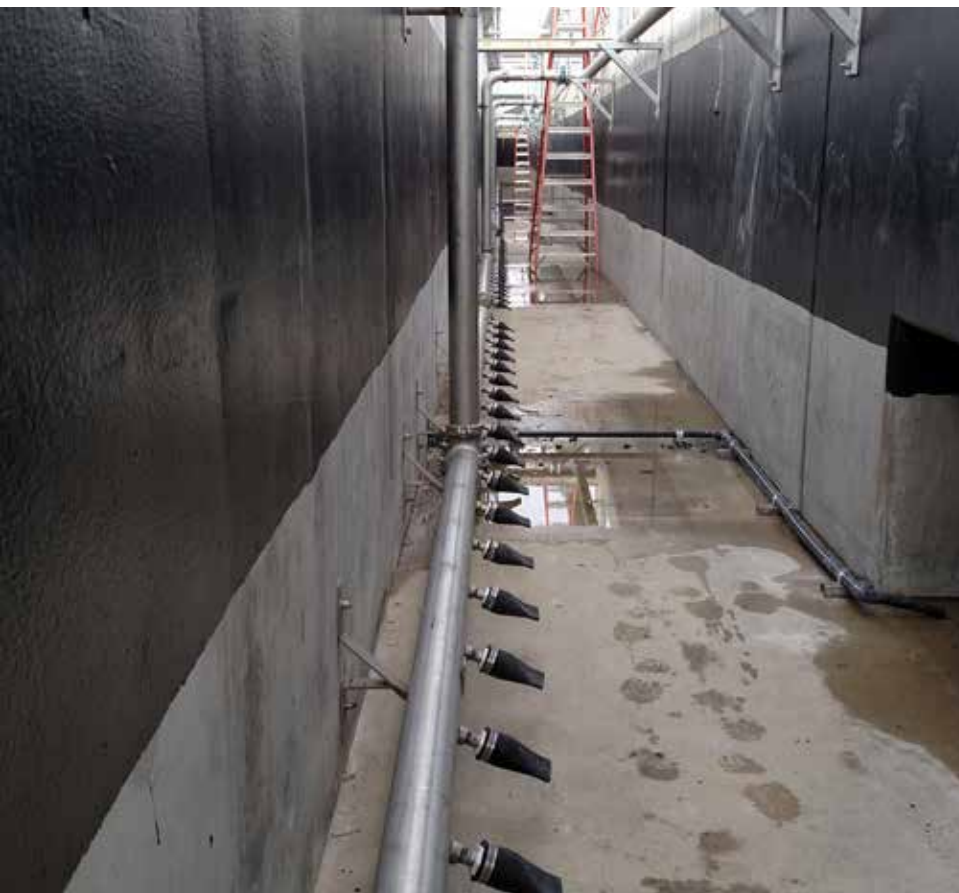




Red Valve

Tideflex® Aeration Mixing Systems



How the Tideflex® Aeration Mixing System Works



ON/OFF Blower Operational Mode

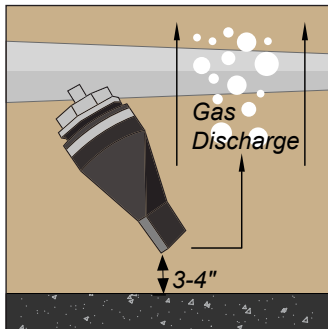
The Tideflex® Aeration Mixing System is a sealed system that prevents surrounding wastewater and solids from entering into diffusers and manifold piping. This provides the capability to cycle the blower on and off as the process requires. For sludge storage processes, this allows for decanting and thickening of the storage residuals as well as denitrification. Most Tideflex® Aeration Mixing Systems that work in ON/OFF operational mode reduce blower operating costs by at least 35%.

These Tideflex® Aeration Mixing Systems are preferred in high solids applications because the clogging potential is significantly increased. Wastewater treatment sludge applications range from 1-5% solids and water treatment alum sludge applications from 5-9% solids.

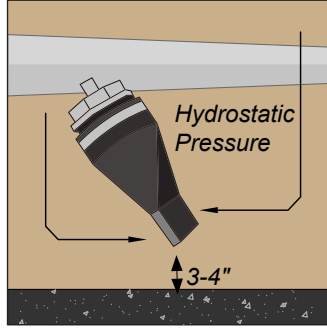
The Tideflex® Aeration Mixing System is the only air mixing system rated for these high solids applications, while at the same time providing virtually maintenance-free operation.

ON/OFF Blower Operation

Blower ON



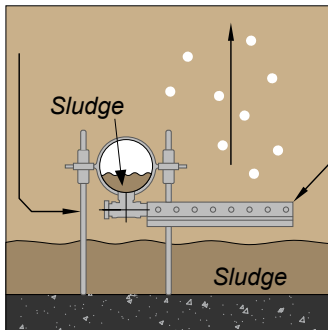
Blower OFF



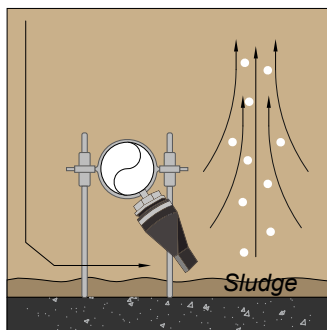
Blower ON - Gas travels vertically due to buoyancy. Fluid is educted into vertical flow path. Diffuser tip is located 3-4" (80-100mm) off the floor.

Blower OFF - Hydrostatic pressure on external sides of diffuser forces a closed seal.

Open Pore Style Diffuser



Tideflex Aeration Mixing



During blower operation, the Tideflex® Check Valve discharges air at near-floor elevation for complete vertical mixing. The benefit of the Tideflex® Diffuser is the prevention of sludge build-up in the bottom of the tank, eliminating backflow of the process fluid into the upstream internal pipe. Open pore style diffusers have no backflow prevention and pipes fill with sludge when the blower is off.

Biological Selector Capability



These systems can be operated as a biological selector using ON/OFF aeration and mixing. Utilizing ORP Control (Oxygen Reduction Potential), these systems can be operated at 70% less applied airflow.

Anoxic Process Zone Mixing



The Tideflex® Aeration Mixing System can be applied in anoxic process zones using the ON/OFF operational mode. Most anoxic zones only require periodic mixing of the bio-floc. The Tideflex® Aeration Mixing System can achieve complete mixing in about one minute of operation. This short operational period results in very little oxygen transfer. These anoxic processes are in a negative Oxidation Reduction Potential (ORP) state where the presence of this low oxygen residual has little effect on the ORP state.

Aerobic Digesters & Sludge Holding Tanks



Check Valve Air Diffusers

More than 40 years ago, Red Valve developed the Tideflex® Duckbill Check Valve. This fabric-reinforced elastomer valve allows flow in one direction only and seals closed when the external hydrostatic pressure exceeds the internal pipe pressure.

With diffused aeration systems, preventing the wastewater and biomass from entering into the air distribution system is critical to ensuring continual operation of the mixing system and the elimination of solids build-up and clogging inside the pipeline.

Tideflex® Aeration Mixing Systems include a proprietary compression molded Tideflex® Check Valve Air Diffuser designed by Red Valve Engineers to prevent wastewater and biomass from getting into these air distribution systems.

Two important performance features of the Tideflex® Aeration Mixing System are: 1) backflow prevention at the diffuser and 2) air discharge location within a few inches from the floor. These features allow the system to be operated in an ON/OFF blower mode for nutrient removal, which in turn provides significant energy savings.

Multi Level Configurations for Conical Tanks



Red Valve can design and fabricate multi-level mixing systems configured for conical tanks. This provides optimized mixing within the conical area.

Mixing System Construction Materials



Tidflex® Aeration Mixing Systems are constructed of either 304 or 316 stainless steel piping and supports. Joint connections can be flanged or RX roll grooved for 316 stainless steel rigid couplings. Thermal expansion couplings are utilized at the base of the drop pipe with silicone gaskets for heat control. The pipe supports use 5/8" minimum-diameter threaded rod anchored with seismic-rated epoxy adhesive designed for submerged anchoring.

Channel Aeration & Mixing Systems



Channel Mixing Assemblies

Common channels in wastewater treatment facilities service multiple tanks. Once put into service, they are impractical to drain and access. These channels are susceptible to solids accumulation as the linear velocities are typically very low. The residence time in these channels can also be extended to the point where the process wastewater transitions to an anoxic state.

Tidflex® Channel Aeration and Mixing addresses these two issues. Solids are re-suspended by the mixing loops and the residual dissolved oxygen is increased for aerobic conditions. Tidflex® Channel Assemblies are designed for lift-out removal when the channels are full of water and re-insertion into the channel after inspections. The lower wall brackets act as cradles to receive and hold the horizontal distribution pipes.

Wet Well Mixing



Tideflex® Aeration Mixing Systems are fabricated from schedule 10 stainless steel piping, either 304L or 316L. The rigid joint couplings are all roll groove type for easy field assembly. Assemblies are available in various modular lengths for the horizontal manifold section.



Wastewater pump station wet wells can utilize periodic mixing and oxygen supply. Modular mixing assemblies can be applied in wet wells to break up the floatables (oil and grease) and the settled solids near the pump inlet. Often these systems are operated prior to the transfer pumps coming on-line.



Aeration Grit Tank Mixing Systems



Optimizing Grit Tank Geometries

Aerated grit tank designs have been used for the last 100 years but have not been validated for performance optimization. With computerized evaluations, primarily Computational Fluid Dynamics (CFD) programs, these older designs have been evaluated for enhancement of performance. Red Valve engineers have incorporated these enhancements into their system designs and recommendations, resulting in performance increases of at least 20%.

Red Valve engineers will determine the quantity of mixing zones required within the process. An evaluation should be performed for optimal operation to address storm surge capacity system needs. Grit removal systems should also provide a means for washing the biomass from the grit. This is achieved in the high-rate mixing zones at the beginning of the process. The mixing zone's energy requirements are decreased longitudinally through the grit tank for removal of various particle diameters.

Design Standards for Aerated Grit



Tideflex® Aeration Mixing Systems provide excellent zone mixing. Each assembly has a flow regulator valve to control the mixing loop velocity. Maintenance periods and downtime for aerated grit tanks typically result in temporary accumulation of grit within the tank, to the point where the grit blanket covers the diffusers. Plastic type diffusers fail in these loading conditions. Tideflex® Check Valve Air Diffusers are extremely durable and withstand these conditions without disruption or downtime.



Red Valve engineers have partnered with several consulting engineering firms in conducting CFD modeling of existing structures as well as optimized enhancements, allowing for the development of new design standards and guidelines for grit tank optimization. These guidelines include mixing zone quantities, energy rates, baffle locations, diffuser locations, and inlet channel configurations. Tideflex® Aeration Mixing Systems include the mixing assemblies, throttling valves, support brackets, anchors and diffuser assemblies.

Stormwater Containment, Mixing & Aeration



Stormwater Management

Stormwater containment, testing and treatment regulations have to be implemented. Storage is required to capture the initial stormwater run-off and test for treatment requirements. This stormwater can contain accumulated pollutants and debris, requiring coarse bubble mixing systems in these storage tanks to re-suspend the accumulated solids, as well as provide residual dissolved oxygen to keep the fluid from going anaerobic.

Tideflex® Aeration Mixing Systems are coarse bubble mixing systems with elastomer nozzles that are very durable and can be fully exposed to weather conditions (open lagoon structures) or contained within a buried storage vault. The nozzles are non-clogging devices, making the system virtually maintenance-free, with no need for regimented service. They are ideal for these applications that are typically located away from the primary wastewater treatment facility and its operational staff.



Concrete Tank Structure



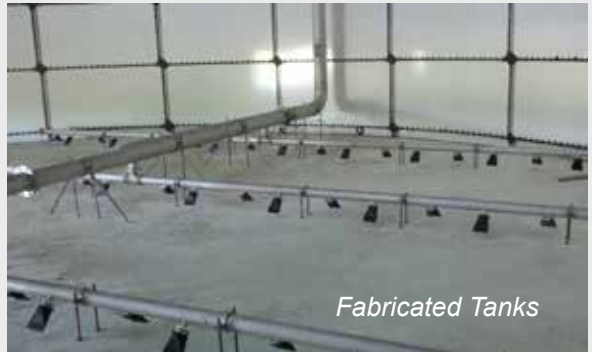
Buried Tank Structure

Tideflex® Aeration Mixing Systems can be operated in ON/OFF mode for periodic mixing as required to significantly reduce energy usage. The check valve diffusers prevent waste and debris from entering the manifold piping. The Tideflex® design models produce the most efficient configuration of piping and diffusers for optimizing controlled loop mixing and fluid momentum. Controlled loop mixing provides better mixing of heavy solids as compared to full floor coverage configurations.

Equalization Tank Mixing



Tideflex® Aeration Mixing Systems have been installed in all tank construction variations; concrete tanks, bolted steel tanks, and lined lagoons.



Fabricated Tanks

Equalization tank mixing systems are very similar to the design and operation of stormwater containment systems. They can be operated in a variable volume mode where the mixing system provides solids suspension and residual dissolved oxygen adequate to keep the process fluid aerobic. If the anoxic process comes after the equalization tank, a Tideflex® Hydraulic Recirculation and Mixing System (HRMS) should be considered.

Durable and Dependable

Mixing systems are required in most storage tanks to re-suspend the accumulated solids as well as provide some residual dissolved oxygen to keep the fluid from going anaerobic. These mixing systems must be durable and dependable as they can sit idle for long periods and then require immediate operation during a storm event.



Red Valve offers a worldwide, world-class custom service network. With corporate offices in Pittsburgh, PA, manufacturing facilities in Gastonia, NC, and a network of sales representatives around the globe, Red Valve has the sales engineering team to help you select the best choice of valves and related products for your applications.



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