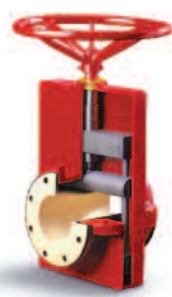
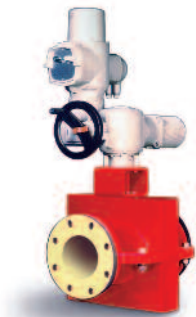


Red Valve

Valve Selection Guide for Wastewater Treatment



Red Valve: The Total Solution

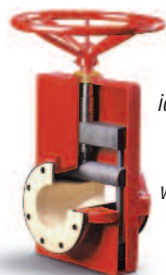


Left: Type A pinch valves are the only automated valves that need no actuator and close drop-tight on solids.



Over the past 30 years, the process of wastewater treatment has seen dramatic changes as world populations continue to increase and concern over the environment grows. Ever more stringent regulations for wastewater quality have been met with high-tech engineering. Red Valve Company has worked closely with the designers and operators of wastewater treatment plants across the globe to provide innovative solutions for the most difficult challenges faced in a treatment plant.

Unlike most valve companies who view water and wastewater as one and the same, Red Valve provides products specifically engineered for the rigors of use on slurries such as sewage, sludge and grit. Red Valve provides a Total System Solution for Wastewater Treatment that encompasses every step of the treatment process, from collection to final discharge. Our commitment is to provide dependable, cost effective products that offer the best possible solution for their particular application.



Red Valve's Series 75 Manual Pinch Valve is an ideal replacement for plug or ball valves. The valve's full ported sleeve is the only wetted part, eliminating clogs and packing replacement.



The Tideflex® Check Valve offers unparalleled backflow prevention. The heavy-duty elastomer construction yields dependable, long-term, maintenance-free performance. Available in sizes 1/8 -96 .

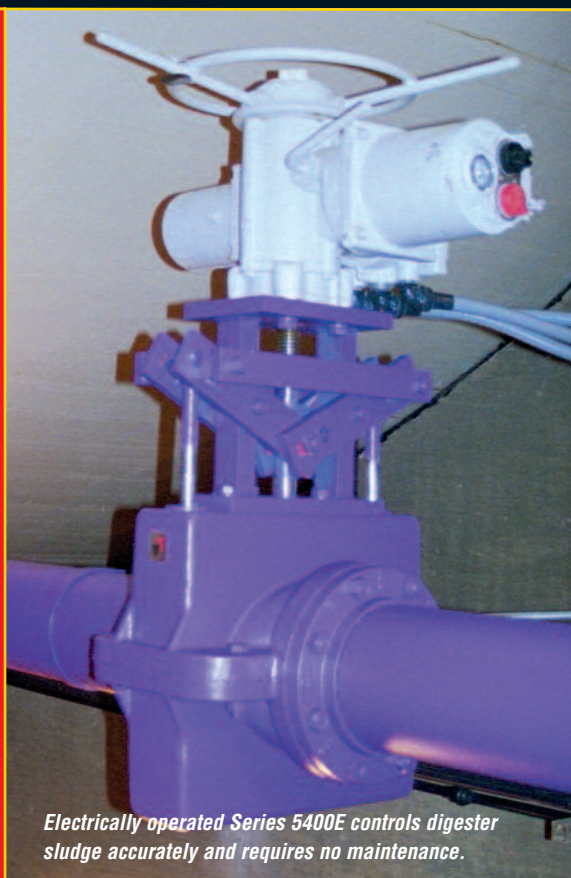


Providing a full 360° pressure reading, Red Valve pressure sensors are the industry standard for protecting instrumentation and ensuring accurate, dependable pressure measurement.

solution for Wastewater Treatment.

Red Valve Products Are Ideal for:

- ▶ Influent Control
- ▶ Grit Removal
- ▶ Sludge
- ▶ Raw Sewage
- ▶ Digester Control
- ▶ Sodium Hypochloride
- ▶ Scum
- ▶ Lime Addition
- ▶ Digester Gas
- ▶ Backflow Prevention
- ▶ Effluent Discharge
- ▶ CSO/SSO Systems



Electrically operated Series 5400E controls digester sludge accurately and requires no maintenance.

The Series 75B buried service valve is the ideal choice for below-grade service because there is no packing to maintain, no seats and no bonnets.



Right: Series 75 and pressure sensors with Hypalon® sleeves are the ideal choice for sodium hypochloride and other corrosive chemical additives as the sleeve is the only wetted part providing long-term corrosion-resistant service life.



The Series G Knife Gate is an economical solution for isolation applications throughout a plant. With stainless-steel wetted parts and a heavy-duty gate, the Series G is designed for use on clean water or slurries. Available in sizes 2 -144, manual or automated.



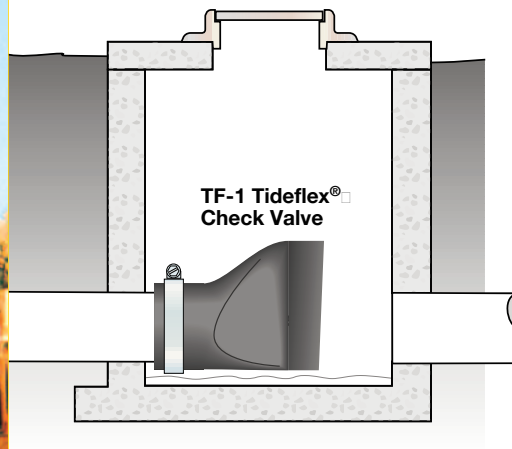
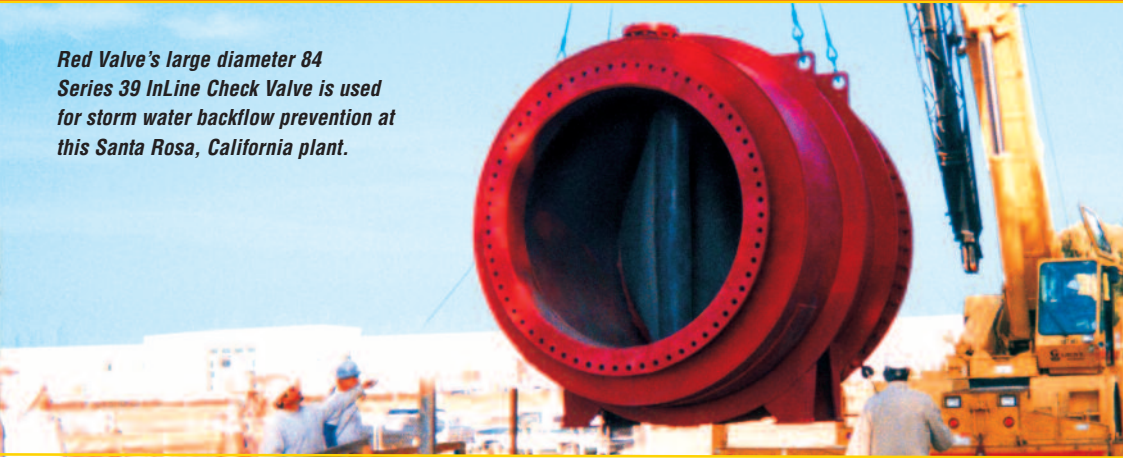
The Series 39 InLine Check Valve is ideal for lift stations and backflow prevention throughout a plant. The Tideflex® Check Sleeve eliminates levers, springs, and flappers that require maintenance and become clogged.



The Series 5200E Electric Valve provides accurate, repeatable control on slurries. An elastomer sleeve is the only wetted part, for long-term throttling, even on abrasive or corrosive material.

Tideflex® Is the Reliable Choice for Collection Systems.

Red Valve's large diameter 84 Series 39 InLine Check Valve is used for storm water backflow prevention at this Santa Rosa, California plant.



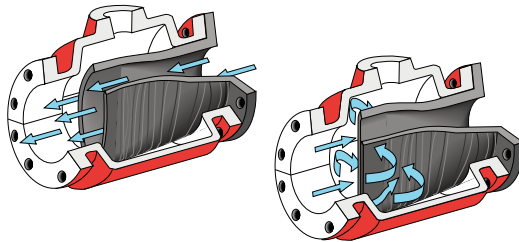
Red Valve's revolutionary Tideflex® Check Valves are often used in combined sewer overflow (CSO) systems to protect collection pumps from backflow during times of high tide and heavy rainfall. The all-rubber construction is resistant to rust and corrosion, unlike flap-gates with hinge-pins and seats that can mis-align. The Tideflex® provides long-term and maintenance-free service life in any municipal environment.

All Tideflex® Check Valves operate on the same principle – forward hydraulic pressure opens the valve's bill to allow flow, and reverse pressure seals the bill, preventing backflow.

For in line installations, Red Valve offers a variety of products. The Series 39 is made up of a fabricated steel or cast-iron body with an

integral rubber check sleeve, which handles flow with low head loss. The valve's operation is passive, requiring no outside energy source, levers or counter weights.

The Tideflex® Series 37G In Line Check Valve is manufactured to be installed inside the pipe. The valve is often used to prevent odors, rodents and raw sewage from entering residences and businesses.



Engineered rubber check valves have memory: forward hydraulic pressure opens the valve, and reverse pressure seals the valve and prevents backflow.

For ground-level installation in existing structures such as interceptors, manholes and vaults, the Tideflex® Series TF-1 features a flat bottom that allows easy installation without modification to the structure. The TF-1 offers low cracking pressure to eliminate standing water and very low head-loss that is not affected by rust, corrosion or lack of lubrication. Like all Tideflex®, the TF-1 features a long, dependable service life, reducing overall costs and eliminating inconvenient maintenance requirements.



Above: Series 37G designed for in-pipe installations.




Right: Series 37G installed for odor control from a manhole in Charleston, W. Va.

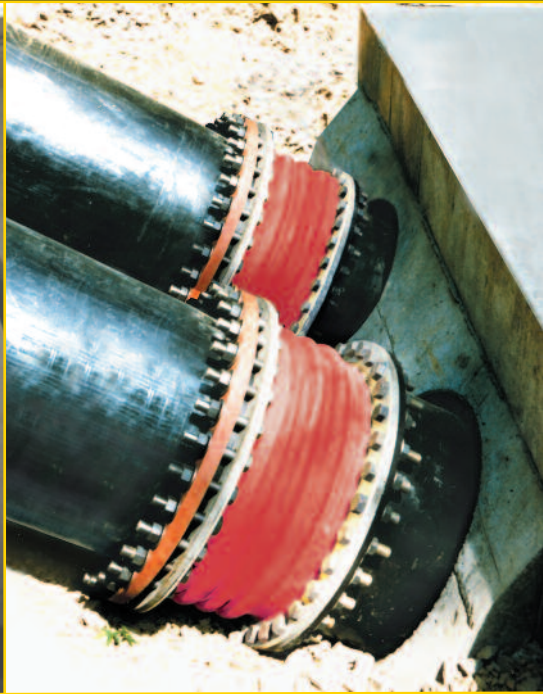


A slip-on connection makes Tideflex® installation easy, using simple hand tools in this interceptor system.

Pumping and Lift Stations Rely on Red Valve.



This pump station includes Series 39 Check Valves, Series 75 Manual Pinch Valves, Redflex® Expansion Joints to absorb vibration and pressure sensors that give accurate readings and can be integrated with SCADA systems.



These 72 triple-arch J-1 Expansion Joints compensate for thermal expansion on a large diameter water pipeline in California.

Wherever pumps are being used to move or lift water, Red Valve products can be found providing solutions for a range of applications. Backflow prevention is critical to keep the drainage lines empty, and prevent potential flooding. Red Valve's Tideflex® Check Valve can be used at the discharge point to prevent floodwaters or tidal surges from entering the pipeline.

Wastewater is most often collected by gravity sewers, and then lifted by pumps to allow it to flow through the treatment process. Raw sewage is, by its very nature,

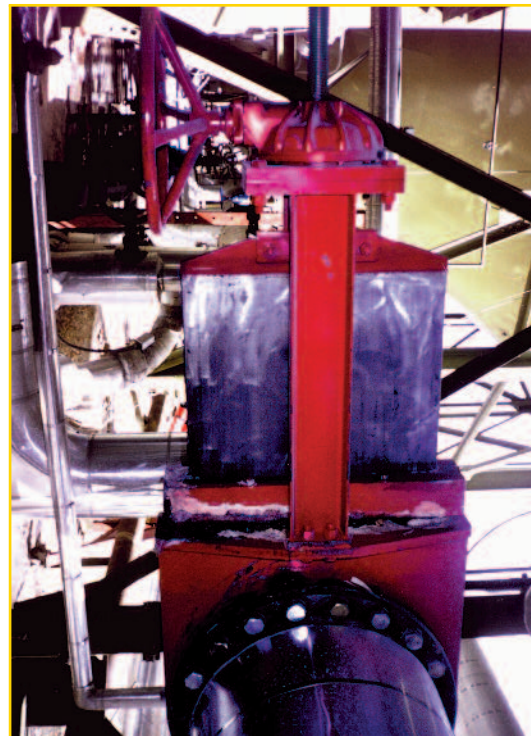
a difficult material to control. Red Valve products are designed to handle slurries such as raw sewage by using full-port designs and abrasion resistant materials. Red Valve Pinch Valves feature no changes in the direction of the flow, and no cavities or dead spaces where material can build up. Red Valve Knife Gates with their thin profile also feature a rugged design that is ideal for pump isolation or bypass lines.

Redflex® Expansion Joints on pumps will absorb vibration, compensate for pipe misalignment and movement. Red Valve offers Redflex expansion joints in sizes from 1 to 108 to meet any application requirement. Red Valve pressure sensors are used to protect pumps from running dry or over-pressuring the line by providing accurate, dependable pressure movement. Red Valve sensors are the only sensors that will stay operational on difficult process fluids such as sewage, sludge, and scum.



These large diameter Knife Gate Valves have been installed in the City of Houston, Southwest Pumping Station since 1987.

Red Valve manufactures Knife Gate Valves from 2 to 120



Specify Red Valve for Reliable Influent Flow Control.



66 air operated Type A Megaflex on a flow equalization system in Texas.



Type A Megaflex, with fabricated steel body and Neoprene® sleeve controlling raw sewage entering wastewater treatment plant in Georgia.

A typical inflow line is full of twigs, rags and other debris that can clog traditional valves. This calls for a large valve that can remain open for long periods of time and still close drop-tight when actuated, even on entrapped solids.

One of the most difficult applications in wastewater treatment is influent flow control. In these large diameter systems, long-term reliability is essential. It is crucial that the valve be able to handle anything that can flow into the sewer lines, including tree branches, plastic bags, bottles, sand and grit, chemical spills and aluminum cans.

Red Valve's large-diameter pinch valves have a full-port opening with no obstructions and no change in the direction of flow. There are no crevices or dead spots where debris can collect, and the soft walls of the elastomer sleeve not only prevent buildup, they can actually seal around entrapped solids for a drop-tight shutoff.

Even if the influent flow control valve is installed after initial screening, it must still deal with concentrated sewage and abrasive grit, which often moves at a considerable velocity as it enters the treatment process.

Red Valve founder Spiros G. Raftis with 36 Series 5400 influent flow control valve.



30 Series 5200E influent flow control valve used at Columbus, Georgia wastewater treatment plant.



Full-port opening



Centerline closure



Drop-tight seal

Red Valve Is the Workhorse for Grit Removal.



Air operated Type A Valves on distribution column.



Series 75 in de-grit chamber.

During the pretreatment stage, wastewater is passed through a bar screen to remove large debris. It then moves on to a de-grit chamber, where small solids, such as stones, gravel and metal particles, are removed. This grit is extremely abrasive and will wear metal-seated valves quickly. The Series 75 Manual Pinch Valve uses an elastomer sleeve that absorbs the impact of the particles. The sleeve lasts longer than even expensive metal alloys and is easy and inexpensive to replace.

Caustic and chemical solutions, such as carbon, ferric chloride and lime, are used to equalize wastewater in the first stage of treatment. These materials present tough problems for metal valves, but Red Valve's Control Pinch Valves are equipped with hand-selected elastomer sleeves that resist abrasion and corrosion. The flexing action of the sleeve breaks apart dewatered solids each time the valve is actuated, even after long periods of inactivity.



Large-diameter manual pinch valves.



Near right: Series 40 pressure sensors can withstand the rigors of grit removal.



Far right: The Series 5400E electrically operated control valves have been specified in this automated grit system.

Pinch Valves Resist Plugging, Abrasion and Corrosion on Chemicals.



Electrically operated 2 Series 5200E Control Valve on pH control lime system.

Pinch Valves Are Ideal for:

- | | | |
|-----------------------|---|-----------------------|
| • Lime Addition | ➔ | Pure Gum Rubber-180°F |
| • Lime Elevated Temp. | ➔ | Viton®-400°F |
| • Carbon Slurry | ➔ | Neoprene-230°F |
| • Sodium Hypochloride | ➔ | Hypalon®-230°F |
| • Ferric Chloride | ➔ | Hypalon®-230°F |
| • Polymers | ➔ | EPDM-300°F |

Sleeve Trim Selection:

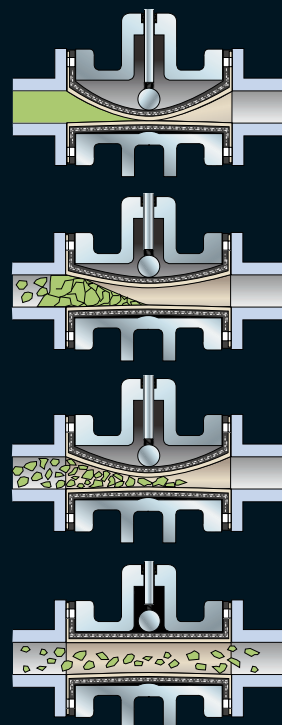
What sets Red Valve products apart from traditional metal valves is their elastomer technology. In addition to giving the valves a superior flow pattern, the rubber sleeve of a pinch valve provides unsurpassed abrasion and corrosion resistance. As the only wetted part of the valve, the synthetic elastomer sleeve completely isolates the process fluid from the metal body and operating mechanism. Since chemicals are never in contact with any metal surfaces, there is no need to resort to expensive alloys such as stainless steel.

Lime is a popular chemical used in wastewater treatment for pH control, but it can be difficult to control. Lime can also scale along the walls of a valve, eventually building up and reducing flow capacity or hindering valve operation. Red Valve pinch sleeves are constantly flexing, preventing lime buildup. The closing and opening action of a pinch valve breaks up dewatered lime by changing the physical shape of the valve.

Right: Series 75 valve on this hot lime recirculation system provide dependable pH control.

Red Valves Self-Clean

The pinch valve sleeve's flexing action breaks away any solid or dewatered slurry buildup. The full-round port sleeve has no pockets for slurry to plug in or erode.



Self-cleaning design breaks up even dewatered lime.



Red Valve Performance on Sludge with Egg Digesters.

Egg digesters eliminate dead spots and reduce surface area for optimum mixing.

The newest trend in wastewater treatment, egg-shaped digesters provide more efficient mixing of waste-activated sludge. Unlike conventional digesters, egg digesters contain much smaller spots for solids to collect. The reduced surface area creates a smaller scum blanket so that a higher percentage of the waste is continuously mixed. To match this performance excellence with the most efficient and reliable process equipment available, designers of egg digesters have standardized on Red Valve Manual and Control Pinch Valves.

700 manual and control pinch valves operating at a 200 mgd Seletar wastewater treatment plant in Singapore.

Below: Manual Series 75 pinch valves on reactivated sludge provide years of maintenance-free operation.

Wastewater treatment plants handle digester gases comprised of methane, water and other compounds that create sulfurous and sulfuric acids that can quickly corrode metal plug valves. Corrosion occurs not only in the valve's interior but also in the closing mechanisms, affecting the valve's ability to achieve positive shutoff and causing additional maintenance problems. Plug valve manufacturers have tried to provide various solutions, such as aluminum, stainless steel and rubber-lined valves, but have had only minimal success.

Red Valve's rugged pinch sleeves are constructed of hand-selected, non-permeable and corrosion-resistant elastomers. The sleeve isolates the valve body by keeping the process medium completely enclosed. For isolation applications, the Red Valve Manual Pinch Valve features bidirectional, drop-tight shutoff that yields reliable service time after time, year after year.



Series 75 outperforms plug valves on sludge. ANSI B16.10 face-to-face full port, no packing to maintain ever.

Series 75 RAS and WAS shutoff valves.

Pressure Sensors Ensure Accurate Measurement and Eliminate Instrument Fouling.



Primary and secondary clarifiers remove heavy metals, dense sludge, oils and grease from the wastewater. The solids sink to the bottom of the clarifiers where they are collected and added to the oils and grease that are skimmed from the top. This very thick combination is sent to solids processing tanks for further treatment.

Pumping costs are usually increased in order to move this sludge through restrictive valve designs. The smooth, laminar flow pattern of a Red Valve Control Valve allows the thick material to pass freely, and

the precise pinching design provides accurate, long-term throttling.

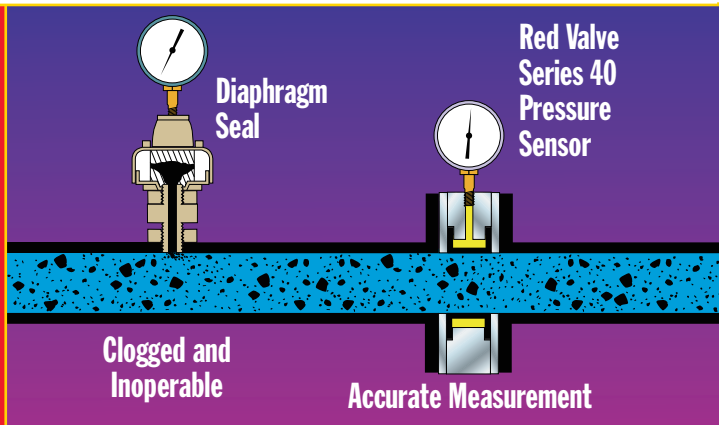
The viscous nature of wastewater creates problems with accurate pressure measurement. Traditional gauges and diaphragm seals clog quickly and do not signal the pump to stop when a blockage is encountered, often damaging the pumps and other process equipment. To solve this problem, Red Valve pressure sensors feature a full-port opening and a 360-degree sensing element to ensure an accurate pressure reading, regardless of conditions.



Above left: Pressure sensors are used on this application with a pressure gauge and transmitters to send a signal to protect the pump from running dry.

Left: Sensors used for accurate reading of polymer feed system.

Right: Red Valve Series 40 and Series 42 pressure sensors won't plug and foul like traditional diaphragm seals on slurries.



Accurate Tank Level Measurement

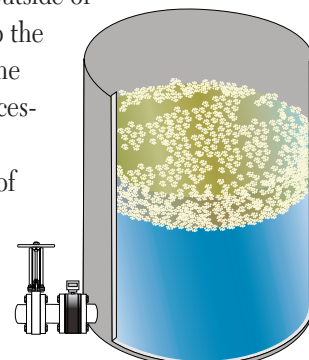


The Red Valve Tank Level Sensors are not affected by foaming, ice and other conditions that can cause errors in Ultrasonic and capacitance Level Sensors. The Red Valve Tank Level Sensor uses a high-sensitivity, solid-state pressure transmitter that is completely isolated from the process fluid by an elastomer sleeve that transmits pressure through a fluid fill and is accurate to ± 2 .

The pressure transmitter is available to sense gauge pressure for vented tanks and differential pressure for pressurized tanks. It can easily be calibrated for process fluid density or specific gravity in any height of

tank. The output signal is 4~20 mA. An integral LED display is available and can be calibrated in virtually any units, e.g. percentages, inches H_2O , etc.

The elastomer diaphragm provides maximum surface area with minimum diameter allowing installation close to the bottom of the tank. The sensor can also be "rodded" from the outside of the tank to the inside of the tank, if necessary, in the event of severe blockage.



The Series 42TL sensor provides accurate level measurement on a variety of applications such as equalization basins, sludge tanks and chemical systems.

Add Flexibility to Your Plant with Redflex® Expansion Joints.



Redflex® Expansion Joints and rubber fittings are designed to alleviate piping stress, compensate for movement, reduce noise and isolate vibration. Made in the U.S.A. by Red Valve Company, Redflex® Expansion Joints can be custom-built in a variety of styles and configurations to accommodate pipe size reduction, misalignments and offsets. Red Valve offers flanged and slip-on connections, single or multiple arches and a range of elastomers to meet process conditions, including Teflon®-lined joints for severely corrosive applications.

Redflex® Products:

- ▶ Expansion Joints
- ▶ Rubber Fittings
- ▶ Vibration Pipe
- ▶ Flanged or Slip-On
- ▶ Rubber Elbows
- ▶ Ducting Joints
- ▶ Teflon® Lined
- ▶ Sizes 1 -108



Above: Large diameter square and round ducting joints on an air handling system.

Right: Filled arch J-1 Redflex Expansion Joint on lime pumping system.

Redflex® Expansion Joints Are Ideal for:

- ▶ Aeration Systems
- ▶ Pump Vibration Elimination
- ▶ Grit Pumps
- ▶ Chemical Feed Pumps
- ▶ Odor Control Systems
- ▶ Blower Vibration Elimination

Redflex® Elastomer Selection:

- ▶ Pure Gum Rubber-180°F
- ▶ Viton-400°F
- ▶ Neoprene-230°F
- ▶ Hypalon-230°F
- ▶ EPDM-300°F
- ▶ Butyl-250°F
- ▶ Teflon® Lined-250°F



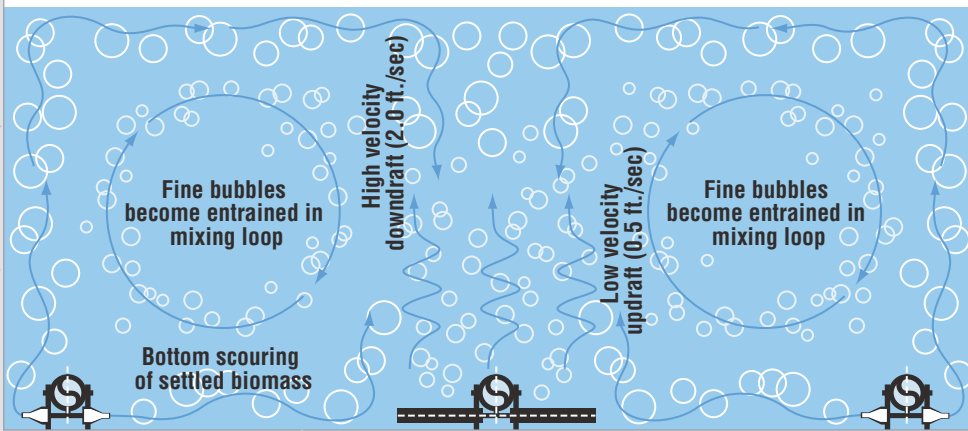
Red Valve Is the Better Solution for Aeration and Mixing.

For optimum performance in aeration and mixing, Red Valve's Coarse and Fine Bubble Air Diffusers incorporate Tideflex® technology to increase jet velocity of the diffusing air and to eliminate damage caused by backflow and clogging.

The Tideflex® Coarse Bubble Air Diffuser **completely eliminates** settling by offering the best possible mixing technology. With Red Valve's signature "T" configuration, the diffusers can be installed very low in the tank to prevent any collection of solids at the bottom of the tank. The all-rubber construction lowers maintenance costs, and the patented Duckbill® design prevents backflow of sludge during a power failure or routine shutdown.

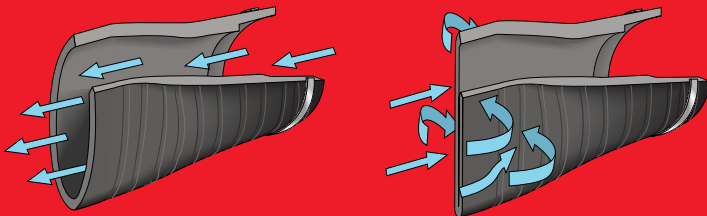
Red Valve's Domeflex® and Tubeflex® Fine Bubble Air Diffusers offer the same backflow prevention and maintenance-free service and are designed to provide maximum oxygen transfer. This efficient aeration keeps microorganisms alive in the tank and ultimately yields a higher quality of effluent.

Combined Aeration



Combining coarse bubbles for mixing with fine bubbles for oxygen transfer increases efficiency, enhances scouring and improves performance.

Engineered Tideflex® duckbill has memory; forward pressure opens the valve; reverse pressure seals the valve and prevents backflow into the header pipe.



Tideflex coarse bubble diffuser easily replaces stainless steel diffusers by incorporating the same end connection in its design.

Coarse Bubble and Fine Bubble Diffusers Combined for an Optimal Aeration System.



Historically, there have been two options in air diffuser systems. Fine bubble diffusers could provide the biological system requirements at a low airflow rate, but generally the airflow had to be increased to provide sufficient mixing. Coarse bubble diffusers provided high mixing power, but needed twice the airflow to meet oxygen requirements.

Fine Bubble Systems

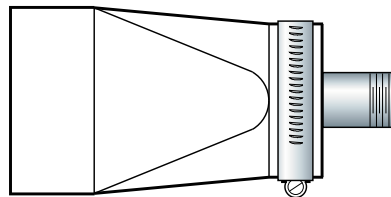
- High O₂ transfer efficiency
- Low mixing energy
- High maintenance cost
- High capital cost
- Low operating cost

Coarse Bubble Systems

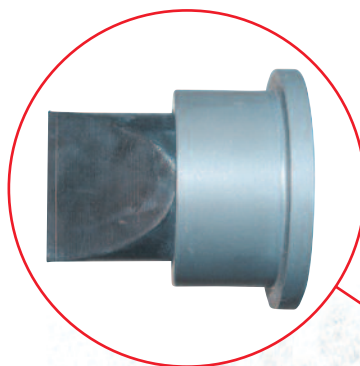
- Low O₂ transfer efficiency
- High mixing energy
- Low maintenance cost
- Low capital cost
- High operating cost

Red Valve has developed a unique approach to aeration-system design by combining the aeration benefits of our fine bubble product line with the mixing benefits of our coarse bubble product line. A combined system can meet the biological system requirements for oxygen and still provide sufficient mixing at a lower total airflow.

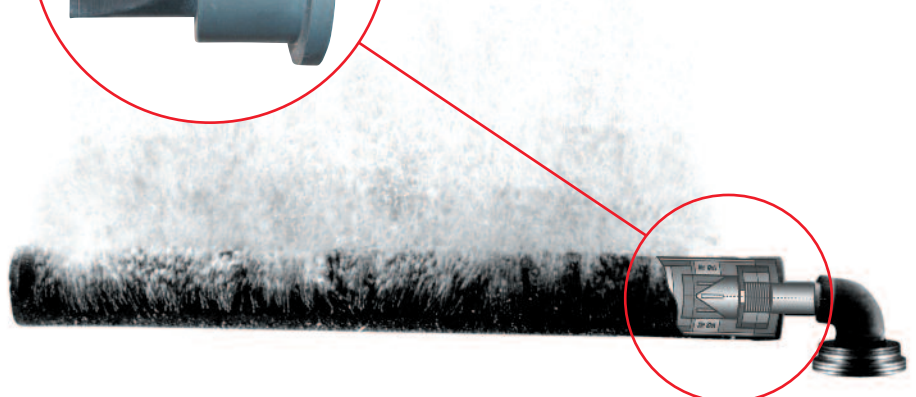
Tideflex® – Coarse Bubble



Tubelex® – Fine Bubble Air Diffuser



At the heart of the Tubelex® is an integral Tideflex® check valve that prevents backflow.



Combined System Benefits:

- ▶ Median O₂ Transfer Efficiency
- ▶ Excellent Mixing Energy
- ▶ Reduced Maintenance Cost
- ▶ Reduced Capital Cost
- ▶ Median Operating Cost

Engineered Effluent Diffuser Systems.



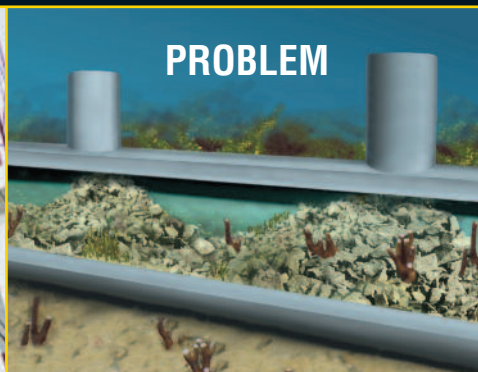
(12) 6 Tideflex® diffuser valves with integral 3-ft.-long risers discharging to a shallow river.



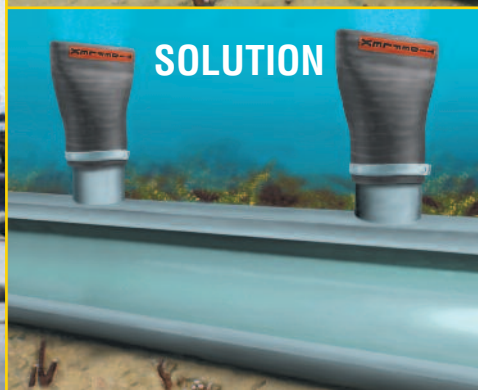
(20) 250mm Tideflex® diffuser valves on a 1.5km outfall in Viña del Mar, Chile.

Red Valve also provides complete effluent diffuser systems to improve the quality of discharge and help protect the environment. Tideflex® Effluent Diffuser Valves increase jet velocity of discharging effluent to enhance mixing while preventing backflow into the header pipe. Red Valve's effluent diffuser systems are custom built to customer specifications and can come equipped with Redflex® Rubber Elbows and Risers, which increase flexibility and reduce the possibility of breakage.

Each diffuser system is unique. Red Valve Company has conducted extensive tests in Tideflex® Diffuser Valves from 2 (50mm) to 48 (1200mm) and has developed an exclusive computer program to assist engineers in designing multiport diffusers. The program includes data analysis of headloss, total headloss, jet velocity and effective open area. This data can be compared to conventional fixed-orifice diffuser designs to illustrate the hydraulic advantages of Tideflex® Valves. For a diffuser nozzle analysis, please contact our engineering department.



PROBLEM



SOLUTION

Tideflex® Diffuser Valves:

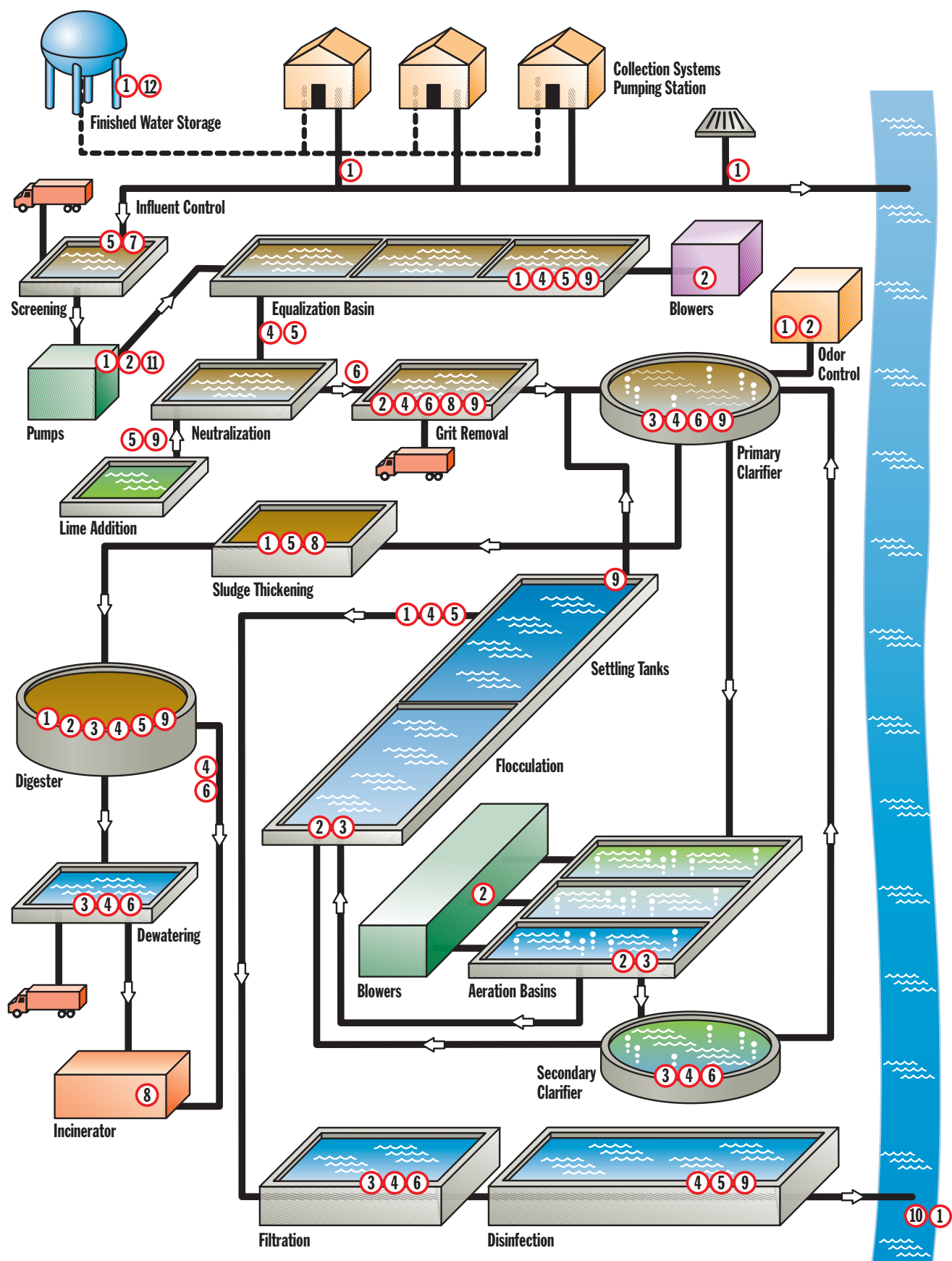
- ▶ Prevent Intrusion of Debris, Sediment, Saltwater and Aquatic Life
- ▶ Provide Proven Long-Term, Maintenance-Free Service Life
- ▶ Enhance Jet Velocity
- ▶ Improve Initial Dilution
- ▶ Provide a More Uniform Flow Distribution Across Ports
- ▶ Promote Significant Improvement in Saltwater Purging

Proven Performance On:

- ▶ Marine Outfalls
- ▶ Inland Outfalls
- ▶ Retrofit Outfall Pipelines

Far left: (12) 1,050mm Tideflex® Diffuser Valves installed on emergency outfall in Hong Kong.

Red Valve Provides the Total System Solution for Wastewater Treatment Plants



- | | | | | | |
|-----------------------------|---------------------------|-----------------------------|-------------------|-----------------------------|----------------------------|
| ① Tideflex® Check Valves | ③ Tideflex® Air Diffusers | ⑤ Control Pinch Valves | ⑦ Megaflex Valves | ⑨ Pressure Sensors | ⑪ Butterfly Valves |
| ② Redflex® Expansion Joints | ④ Manual Pinch Valves | ⑥ Air Operated Pinch Valves | ⑧ Knife Gates | ⑩ Effluent Diffuser Systems | ⑫ Tideflex® Mixing Systems |

A Complete Line Of Quality Products . . . Built To Beat Slurries



The revolutionary Tidelex® Check Valve stands alone as the product of choice for backflow prevention, replacing high-maintenance flap gates.



Providing a full 360° pressure reading, Red Valve pressure sensors are the industry standard for protecting instrumentation and ensuring accurate, dependable pressure measurement.

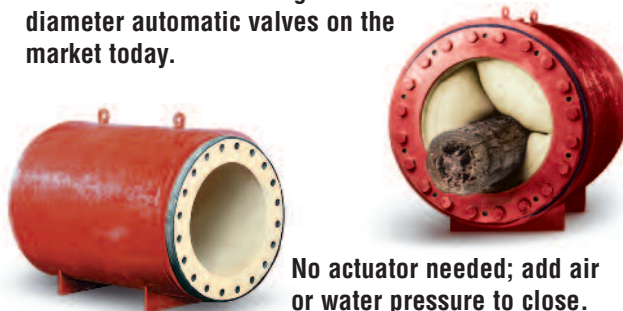
The Series 5200 Control Pinch Valve provides accurate, repeatable control on slurries. An elastomer sleeve is the only wetted part, for long-term throttling even on abrasive or corrosive material.



Red Valve's 5200E electrically actuated Control Pinch Valve provides economical, reliable and precise control.



First introduced by Red Valve, the Type A Miniflex and Megaflex Pinch Valves are the most economical large- and small-diameter automatic valves on the market today.



No actuator needed; add air or water pressure to close.



Redflex® expansion joints, reducers, rubber pipe, vibration pipe and rubber fittings are the industry standard and are manufactured to 96 inches in diameter.



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PAPER