

CORZAN™ Industrial Systems

High-Performance Industrial Piping Systems
for Water and Wastewater Treatment Plants

CORZAN®



**More than an economical alternative...
the responsible solution for today's
tough water treatment piping challenges.**



Engineers and procurement officials with water and wastewater responsibilities are being challenged to find the best technology to ensure high-quality, reliable and low-cost water and sewerage service to their constituents. Tightening capital budgets. Increasing water prices. Plant repair and capacity issues. Stronger EPA piping regulations. Stricter discharge and odor standards. The challenges facing treatment process designs are mounting. The piping material specified for today's progressive treatment facilities needs to help solve these problems while reducing the life cycle costs of processes in all sizes.

Historically, municipalities have relied largely on steel and higher alloys for the piping that transports water and chemicals through their treatment facilities. Despite the perceived strength of steel, it has proven vulnerable to pitting, corrosion and leaks while failing to meet higher performance standards.

Corrosion typically found in a water plant:

- **Chemical corrosion resulting from strong acids and bases used for pH neutralization and attack from clarification polymers**
- **Microbial corrosion resulting from sludge streams and biological growth in water**

Simply dealing with the corrosion is an expensive proposition for the plant and for the municipality.



Metal pipe shown here exhibiting both internal and external corrosion.



After years of service, the Corzan® pipe shows no sign of corrosion, scaling or degradation.

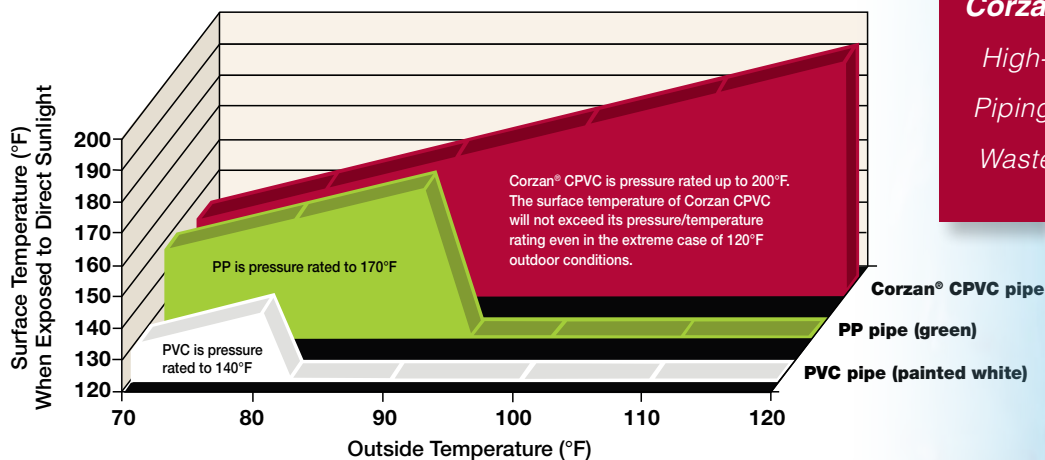
Today, more advanced piping technologies are available to address these issues and are quickly gaining inroads into progressive treatment plants. **Corzan™ Industrial Systems**, made from high-performance chlorinated polyvinyl chloride (CPVC), offer an excellent balance of properties — improving reliability and confidence while reducing capital and life cycle costs.

Consider all the benefits a high-performance Corzan® CPVC piping system offers:

- Resistance to chemical and microbial corrosion, pitting and scaling
- Superior mechanical strength (highest impact resistance of any CPVC compound)
- High heat tolerance (pressure rated up to 200°F, nearly 80° higher than PVC)
- Excellent hydraulic capability (optimum flow rates)
- Superior choice for double-containment piping (highest heat deflection temperature of any CPVC compound)
- Lightweight (approximately 1/8 the weight of steel)
- Excellent flame and smoke characteristics
- Ease of installation (solvent weld joining system eliminates the need for torches or complicated heat fusion techniques and reduces installation time)
- Lower total installed costs, resulting from stable material costs and minimal maintenance requirements
- Unmatched technical service, proper installation training and a support staff as reliable as the piping system
- Weatherable and resistant to UV degradation (ideal for outdoor applications)
- Excellent resistance to solar thermal effects – can be used in ambient conditions where other materials degrade and increase life cycle costs

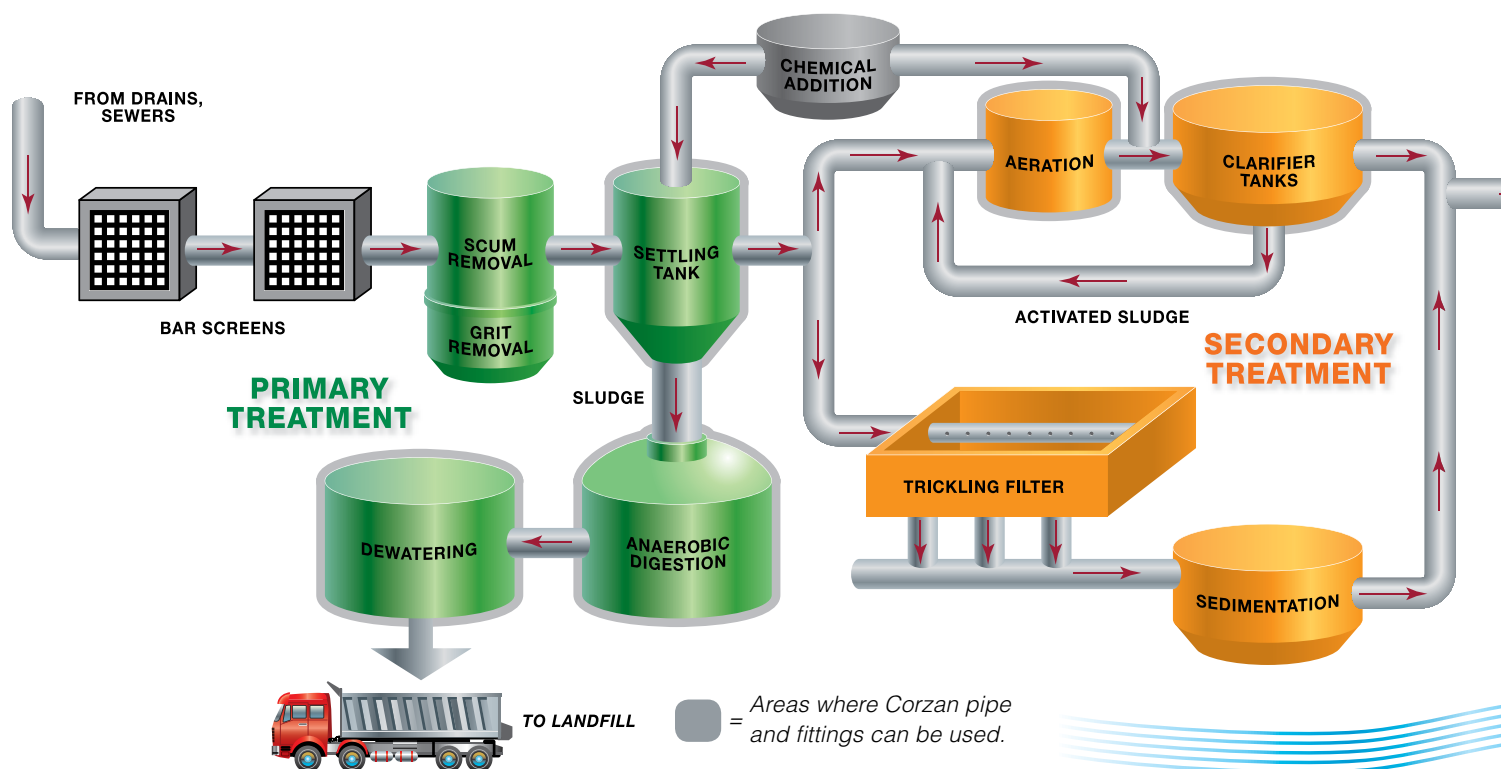


Effect of Direct Sunlight on Material Temperature and Pressure Rating using ASTM D4803



Corzan™ Industrial Systems

High-Performance Industrial Piping Systems for Water and Wastewater Treatment Plants



Primary Wastewater Treatment

Corrosion is a costly concern in primary wastewater treatment using steel piping. Pinhole leaks spring up in water lines that feed clarifiers and settling tanks. Even the outside of these pipes often appears corroded. The environment at a wastewater treatment plant adversely affects the steel used in these water pipes.

Corzan CPVC is ideal for primary wastewater treatment because it is not susceptible to microbial corrosion and offers excellent chemical resistance properties. It is a perfect choice for transporting ferrous chloride, ferric chloride or alum. Corzan CPVC has been effectively used in alkaline lime slurry systems used to neutralize the acid generated during the nitrification of ammonia. Since it is also resistant to scaling and fouling, a Corzan CPVC piping system maintains its friction factor throughout its entire service life. With a constant Hazen Williams C Factor of 150, smaller piping can often be specified, resulting in significant cost savings. That also means less energy or horsepower is required to transfer fluids.

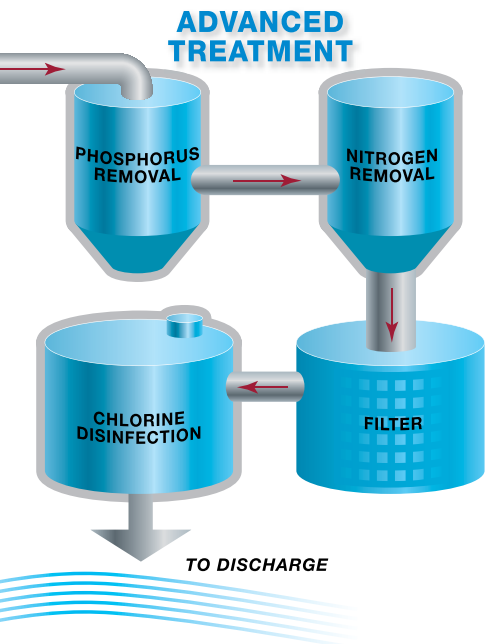


Secondary Wastewater Treatment

In secondary wastewater treatment processes, piping is exposed to high concentrations of microorganisms when excessive biological growth washes out and is collected in a clarifier. The by-products of these microbes (namely acids or hydrogen sulfide) may create corrosive conditions in activated sludge systems. Disinfection processes that employ hydrogen peroxide or sodium hypochlorite with a dechlorination chemical such as sodium bisulfite can further reduce the reliability and service life of a metallic piping system.

Corzan CPVC Industrial Systems offer a more dependable alternative. With a nearly 50-year track record in industrial applications, it has proven that it can stand up to the effects of both chemical and microbial corrosion – even when used to transport highly concentrated acids and caustic solutions used for pH control. And, Corzan CPVC Industrial Systems have proven reliable in outdoor applications, where radiant heat can create external piping temperatures that could cause many other non-metallic materials to sag, deflect or fail.





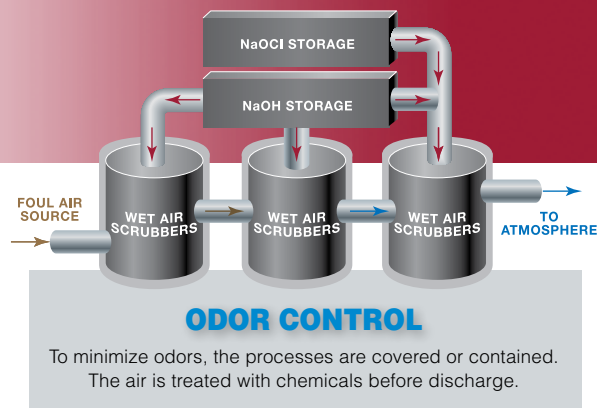
Advanced Treatment Systems

Advanced treatment processes may be required to meet discharge quality mandates. Depending on the chemical makeup of the wastewater, such processes may be designed to remove additional organic and suspended solids, nitrogenous oxygen demand (NOD), nitrogen, phosphorous and, sometimes, toxic materials.

Even in these extremely harsh applications, Corzan CPVC Industrial Systems have a proven service life that includes reliable performance over the long term. Not only are Corzan Industrial Systems excellent for exposed cooling tower applications, but they have also proven effective in handling nominal concentrations of methanol for biological denitrification. Its corrosion resistance stands up to many of the harshest disinfection chemistries. Corzan Industrial Systems are ideal for a double-containment piping system, which is often required to transport treatment chemicals underground. And since Corzan pipe and fittings are pressure rated to 200°F (which is well above most water treatment application requirements), they provide an added level of confidence for the treatment facility.



Where can Corzan® CPVC pipe and fittings be used?



Wastewater Odor Control

Today's municipal plants are not only facing greater scrutiny when it comes to the quality of the water they discharge, but also the impact they have on air quality. Odor control, which was not a priority less than a decade ago, is now at the top of a long list of mandates plants must follow. Since Corzan CPVC can easily be fabricated into scrubbers and ancillary odor control equipment (including ducting systems) – in addition to pipe, fittings and valves – it has proven to be as effective a material for odor control processes and equipment as it has in more traditional wastewater treatment operations.

So whether a plant is using sodium hydroxide and sodium hypochlorite in its wet air scrubbers at temperatures as high as 200°F, or using metal chelating agents, such as EDTA, in a liquid redox process, Corzan CPVC Industrial Systems offer the necessary chemical resistance, as well as superior high-temperature performance.





Make the responsible choice.

Desalination Systems

Corzan CPVC is an ideal choice as a material of construction in desalination systems. It will handle the chemical feeds for reverse osmosis processes, including strong acids and bases, salts and reducing agents that are used to rinse ion exchange resins or in post-treatment pH adjustment and re-hardening. Since Corzan CPVC is not susceptible to attack from high chloride levels, there is no need to pickle or passivate the piping system, and no need for expensive cathodic protection against corrosion. And with its ability to resist ozonated water, high temperatures and UV rays, Corzan CPVC Industrial Systems are a cost-effective solution for providing clean potable water to harsh coastal and desert environments with growing water shortages.

Water Treatment

Corzan CPVC Industrial Systems are well suited for use where raw water is treated with corrosive chemicals or where chloride levels exceed the limitations of 316L stainless steel. Raw water can cause pinholes in the pipe wall or crevice corrosion at the bends. Corrosion-resistant Corzan CPVC has demonstrated reliable long term performance even in aggressive saltwater environments typical in coastal areas. In fact, Lubrizol CPVC technology has been successfully used for potable water distribution systems for nearly 50 years. Backed by third-party certification from NSF International, Corzan CPVC piping systems meet or exceed strict drinking water standards – assuring that water quality will stay as high as the treatment plant can provide.





Corzan® CPVC case study:

One of the largest water treatment plants in the United States reduces maintenance by converting metallic system to Corzan® CPVC piping

Originally constructed in the early 1900s, a water treatment plant serving one of the country's largest metropolitan areas identified the need to update much of its piping and feedlines. The city's water department was looking for a cost-effective, low maintenance industrial piping system to replace rubber-lined steel pipes used in the chemical treatment of the water. The department's engineers specified a Corzan CPVC Industrial System.

Many of the nation's largest water treatment systems have moved to Corzan CPVC piping because it provides a solution that is low maintenance and corrosion resistant. In this case, the city converted half of its main system to Corzan CPVC and completed the second half one year later.

For this facility, as well as other plants around the country, sodium hypochlorite had replaced chlorine in the treatment process. At the plant, it was being pumped through rubber-lined steel pipes, but the city water department wanted to update their system and replace the steel piping system. The steel pipes were not holding up to the daily usage demanded by the plant and required a level of maintenance that cut into the team's productivity.

The plant needed a solution that would stand the test of time, transport the sodium hypochlorite and other chemicals without interruption and require little maintenance. Due to the chemicals and high temperatures involved, Corzan CPVC provided the plant with a long-term solution to replace the steel pipes for treatment operations that run 24 hours a day, 365 days a year.

The water treated by the plant is pumped out of a nearby river through an intake structure into a holding reservoir, which is replenished from the river as the water moves into the city's treatment system. The water from the reservoir enters first into the pretreatment phase where it is treated with chemicals, including sodium hypochlorite, and then sent into large settling baskets, where more than 100 filters strain out any remaining debris. Once the treatment process is complete, the water is then stored until it is distributed to city residents.

The plant installed just under 5,000 feet of Corzan CPVC piping, including 1/2", 1-1/2", 3" and 4" diameters to fit different applications. Installing and maintaining a CPVC system has made a significant difference for the facility in terms of maintenance, labor and time. With no welding required, the system's installation was much quicker, minimizing downtime at the plant. The fact that the pipe will not pit or corrode means there will be virtually no maintenance required on the system.

As a result of the plant's positive experience with Corzan CPVC Industrial Systems, the city's water department is planning to convert its other plants to Corzan CPVC Industrial Systems in the future.





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CZWATER
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