

# Understanding CPVC Piping for Industrial Process Water Applications

The safety performance of industrial piping material cannot be overstated—these environments have hundreds, often thousands, of lives at stake, causing them to be closely monitored and regulated by government bodies, such as the U.S. Occupational Safety and Health Administration and the Environmental Protective Agency (EPA). Add cost and reliability to the list of important factors when considering industrial piping choices, and it's clear why material selection for process water applications is such an important one. Among the many piping choices in the industry, the superior strength, performance and safety of chlorinated polyvinyl chloride (CPVC) make it an ideal system for industrial process water applications.

Traditionally, engineers and procurement professionals have relied largely on steel and other higher alloys for industrial piping. However, an overall analysis reveals that CPVC often outperforms metallic systems, and is more cost-effective, over a longer period of time. Yielding an overall lower installation cost, fewer maintenance and safety concerns, and strong performance with a wide variety of chemicals, CPVC is a material that is gaining the attention of many. And the benefits don't stop there. CPVC offers numerous advantages that can and have improved the bottom line of industrial process water applications worldwide.

## Corrosion Resistance

Corrosion is a common, ongoing problem in industrial environments. CPVC pipe and fittings demonstrate superior resistance to internal and external corrosion, virtually eliminating process leaks, flow restrictions and, ultimately, premature pipe failure. Unlike metallic systems, CPVC industrial piping will never pit or scale, as it is inert to most mineral acids, bases, salts, and aliphatic hydrocarbons. CPVC is formulated to stand up to many of the same aggressive chemicals that corrode steel, and it does so in very extreme temperature environments.

## Ease of Installation

Because CPVC is lightweight—roughly one-eighth the weight of comparably sized steel piping—and requires less complex tools, installation and maintenance are simplified, reducing labor time. CPVC pipe and fittings are installed using a simple two-step solvent cementing process, which creates a highly reliable joint by chemically fusing the pipe to the fitting. When properly installed, a solvent-cemented CPVC joint becomes the strongest part of the entire system, offering more durability than either the pipe or fitting alone.

## Little or No Maintenance

A CPVC piping system requires little or no maintenance when properly installed. In addition, external pipe coatings are not necessary because CPVC remains unaffected by even the most aggressive soil and air conditions. However, should a portion of the piping need replacing, a repair can be made easily without the need for a welder or lifting device to hoist equipment into place.

## Optimum Flow Rates

CPVC piping offers optimum flow rates, meaning more liquid can be moved using smaller pumps and less energy. This type of industrial piping has a smooth inner surface that resists scaling and fouling, which minimizes friction pressure losses in the fluid flow from the beginning.

## Superior Mechanical Strength

Even at elevated temperatures at which industrial plants often operate, CPVC has exceptional mechanical strength, with a pressure rating 25 percent higher than standard CPVC at 180°F (82°C). In addition, most systems can be expected to maintain their pressure-bearing capabilities for 50 years or more, providing long-lasting performance.

## Additional Safety

Not only is CPVC safer than metal to install, but it is also often safer to operate. CPVC piping has a lower thermal conductivity; this not only reduces heat loss, but it keeps the surface temperature of the pipe lower, reducing the chance of burns to maintenance and operating personnel.

## Low Flame and Smoke

CPVC has a flash ignition temperature of 482°C (900°F), which is the lowest temperature at which combustible gas can be ignited by a small, external flame. Not able to sustain combustion, CPVC has an exceptionally low limiting oxygen index (LOI)—the

percentage of oxygen needed in the atmosphere to support combustion—of 60, performing exceptionally well in the harsh conditions of industrial plants.

### **Long Service Life**

CPVC starts with a C-factor of 150 and maintains that interior surface smoothness throughout its life by resisting the effects of corrosives. This leads to greater efficiency and reduced costs to facilities because smaller pipes, smaller pumps and less energy can be used to move fluids at the same rate. CPVC industrial piping can also withstand long-term exposure to even the harshest environments without significant adverse effects, making it ideal for long-term outdoor installations.

### **Not All CPVC Is Equivalent**

It's important to note that not all CPVC performs the same. CPVC products are made with base resins having different molecular weights and varying chlorine contents, as well as different compound additives that can affect compatibility and long-term performance. It's recommended that you check with your piping supplier to determine what specific tests the pipe manufacturer has performed on its finished product with regard to minimum burst pressure requirements, dimensional tolerances, residual stress requirements, drop impact requirements and fusion property testing to ensure the system's long-term performance.

CPVC industrial piping systems offer numerous benefits for industrial process water applications and can be safely used throughout nearly any industrial plant because of their durability, long service life and high-performance characteristics. With its excellent balance of mechanical strength, low thermal conductivity and limited flame propagation and low smoke generation, CPVC is a cost-effective material that provides an outstanding value in terms of safety.

While CPVC is resistant to a broad range of corrosive environments, it's important to note that not all chemicals are compatible for use with CPVC. Lubrizol CPVC, the manufacturer of the superior compounds that create Corzan® Industrial Systems, and its customers have tested hundreds of different chemicals to determine the system's chemical resistance with Corzan pipes and fittings and have developed a chemical resistance program to list the solutions that can be used with Corzan, providing installers confidence in the long-term performance of the system.

Corzan® HP pipe and fittings, a part of the Corzan pipe and fittings brand, are the first to meet ASTM F441 material classification 4120-06. By achieving the 4120-06 classification, Corzan HP pipe and fittings deliver 25 percent more pressure strength at 180°F (82°C) than standard CPVC, which gives you greater reliability and safety factor, making them an option to consider for industrial process water applications.

When choosing a material, it's important to look for support beyond the product. Lubrizol CPVC is dedicated to providing training and education for those who work with its CPVC piping systems, including its Corzan Industrial Systems. From job-site training, to cost-effective solutions, to market leadership, a partnership with Lubrizol CPVC can ensure project success. It's MORE INSIDE™.