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Engineering Design Manual

Thorpe Plant Services Turns to +GF+ Corzan CPVC Industrial Piping Systems to Meet Customer Demands for Reliable Handling of Hydrochloric Acid

Jorge Solorio June 13, 2016 News No Comments

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CASE STUDY: SAFELY HANDLING HYDROCHLORIC ACID

Insights from an industry leader

By Bryan Hutton, Corzan® Industrial Piping Systems, part of The Lubrizol Corporation

Chlor-alkali plants create some of the most corrosive environments imaginable. The transport of harsh chemicals at extreme temperatures in combination with the high voltage electrolysis process can quickly compromise the integrity of most piping systems. So when one of the largest producers of chlor-alkali products in the world needed a proven-effective solution for transporting and storing its hydrochloric acid, it turned to [Thorpe Plant Services](#) in Houston which turned to Corzan® Industrial Systems from [The Lubrizol Corporation](#).

Maintaining a Strong Reputation

Thorpe has a well-established reputation as one of the premier industrial solutions providers in the country, fabricating and installing high-performance pipes, tanks and vessels for various chemical manufacturers. The company prides itself in providing cost-effective, long-lasting non-metallic solutions that address corrosion problems in an array of manufacturing environments, including chlor-alkali plants. Thorpe's in-house engineers and technical experts understand the unique demands of chlor-alkali processing plants. Over time, they have seen a number of different piping materials fail in that type of aggressive environment as the result of corrosion, which continues to

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be one of the most costly issues facing the chemical industry.

Thorpe helps customers of all sizes and industries effectively battle corrosion through an array of thermoplastics. But when it comes to chlor-alkali plants specifically, Thorpe almost always recommends Corzan Systems consisting of pipe, fittings, valves and sheet which are available through a network of high-quality manufacturers, such as [Georg Fischer Piping Systems \(+GF+\)](#), that choose to partner with Lubrizol to provide complete corrosion-resistant systems. In this case for Thorpe, +GF+ was able to provide Corzan CPVC system consisting of piping up to 8". +GF+ is an industry leader in their abilities to produce large diameter Corzan Systems up to 24".

"When CPVC (chlorinated polyvinyl chloride) is the choice, it's always the Corzan technology that we use," said Mr. Kim Raymond, vice president of operations for Thorpe. "Some customers actually specify Corzan by name because they know it will perform for them over the long-term. Many years ago, we stocked generic CPVC but have been using Corzan CPVC exclusively since about 2000. It's a great product that is backed with tremendous technical support from Lubrizol, and it never lets us down."

Thorpe has discovered that Corzan CPVC, which is available in many forms such as pipe, fittings, sheet, duct, welding rod and tower packing, is especially ideal for hydrochloric acid and caustic service in chlor-alkali plants. "It offers great chemical resistance even at the higher temperatures," said Mr. Raymond. "And that's important for the large number of chlor-alkali customers that we serve."

Corzan CPVC has a long track record of reliably handling hydrochloric acid, as well as such other commonly used corrosive chemicals in the chlor-alkali industry as sulfuric acid, sodium hypochlorite, sodium hydroxide (caustic soda), concentrated sodium chloride (brine) and demineralized/deionized water.

Although 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. As the manufacturer of the compounds for Corzan Industrial Systems, Lubrizol has tested hundreds of different chemicals to confirm chemical compatibility, providing installers with confidence in the long-term performance of the system. According to Mr. Raymond, whenever a customer comes to Thorpe inquiring about the suitability of Corzan Technology with a specific chemical application, the question is turned over to Lubrizol's field support team who jointly works with manufacturing partners, such as +GF+, to provide consulting and technical assistance in verifying compatibility.

Creating Custom, Cost-Effective Solutions

Thorpe possesses the unique ability to fabricate all of the necessary Corzan components and provide a turn-key solution with the help of its field

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construction crews. The company excels in both its technical and engineering capabilities, self-manufacturing many of its customers' solutions. The result is better communications across trades, faster project turnaround and enhanced safety.

As a custom shop with full fabricating capabilities, Thorpe then creates customized solutions for its customers, including butt-fusing its own fittings. The company also creates flange faces for CPVC tanks, including two of the largest Section X vessels equipped with a Corzan liner in the world (measuring 14 ft in diameter by 50 ft in height) for the storage of hydrochloric acid at two large Midwest chlor-alkali plants. In this application, Corzan CPVC is being subjected to up to 35% HCl at temperatures ranging from ambient to the upper limit of 150°F in the Texas heat and pressures up to 60 psig. "We systematically evaluate material science, engineering principles and construction requirements to develop solutions that meet specific customer needs," said Thorpe President Mr. Greg Geisen.



Leveraging the Full Corzan Advantage

What has proven effective for them is the utilization of Corzan CPVC pipe and fittings either used alone or in dual laminate construction wherein the CPVC is used as a corrosion-resistant liner in combination with FRP.

"Corzan CPVC has great physical properties on its own, but we find we can effectively enhance its structural integrity and limit the number of hangers we need by using it in combination with fiberglass," said Mr. Raymond.

According to Mr. Raymond, the combination of Corzan CPVC and fiberglass provides major cost advantages over high-end metallic alternatives. "Most metals aren't even an option in an aggressive chemical environment because they would be eaten up in a matter of days," noted Mr. Raymond.

"Manufacturers would need to invest in something like titanium, nickel alloys or stainless (304, 316, 316L, etc.) in order to achieve the same level of chemical resistance and long-term performance. Not only are these options roughly three times as expensive as Corzan CPVC, but they are also difficult

to source in the right sizes of pipe and fittings. On the other hand, a customer could choose a non-metallic option with a lower upfront cost, like polypropylene or fiberglass, but would be disappointed and likely need to spend more money over the long-term in repairing and replacing corroded components. Corzan pipe and sheet stand up to the unique challenges of the chlor-alkali industry like few other piping materials can, providing facilities an affordable and reliable long-term solution.”

In addition, Corzan products are easy to install. They are lightweight, averaging about one-eighth the weight of comparably sized steel piping, and can be quickly and easily solvent-welded to create a chemical fusion, thus reducing installation time and labor costs. It is also possible to join Corzan products through hot-gas, extrusion, butt fusion, or solvent cement welding when fabricating something like a storage tank.

From a safety standpoint, Corzan CPVC performs equally well as it offers high flammability resistance with its limiting oxygen index of 60. That means CPVC requires 60% of oxygen in order to sustain a flame when burning. Since our atmosphere only consists of 20 to 21% of oxygen, CPVC will not burn on its own and will not contribute to flashover. When tested according to EN 13501-1:2002 to determine its fire classification, CPVC achieves a rating of B-s1-d0 (low flammability – no smoke development – no burning drops). That means Environmental Health & Safety (EH&S) professionals can use Corzan systems to lower their overall fire load and provide a fire-safe environment for their operations and employees. Even insurance organizations, such as Factory Mutual (FM), recognize Corzan as a fire-safe material.

“We employ highly trained professionals throughout North America all working together to provide turn-key solutions that solve some of the toughest industry challenges,” said Mr. Raymond. “With Corzan CPVC, we are confident that the solutions we deliver are reliable over the long-term, contribute to a safer work environment, and offer lower life cycle costs, including reduced maintenance and replacement requirements.”

Industry Partners:



Global Technical Support: Contact us for a free process suitability and technical consultation at +1-216-447-7397 or by e-mail corzan@lubrizol.com