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## Coatings Help Control Condensation

A new insulation coating solution manages condensation problems in water tanks and water treatment plants. **BY JOHN H. STRINE AND ANDY HOFFMAN**

**C**ONDENSATION ON metal surfaces can, at first, seem like nothing more than an unwanted but inevitable inconvenience. However, when considering the effects of daily condensation inside a water treatment plant or elevated water tank, persistent moisture can lead to much bigger issues, especially corrosion.

### ADDRESSING A COMMON CONCERN

To control excessive condensation, some US water utilities are applying a new technology: an aerogel-filled thermal insulation coating from Tnemec called Series 971 Aerolon, which limits condensate on steel and ductile-iron surfaces. Among the utilities adopting the technology are The York Water Company in York, Pa., and City Corp. in Russellville, Ark.

**The York Water Company.** Incorporated in 1816, The York Water Company is the oldest US investor-owned utility. The utility also has the distinction of having the longest continuous dividend of any US

corporation. The York Water Company serves approximately 68,000 water and wastewater customers in Pennsylvania's York and Adams counties.

The York Water Company was working on a project to rebuild its existing filters and piping at its 39-mgd surface water treatment plant. The York plant had a significant condensation issue on its filter supply piping in the basement pipe gallery. At certain times of the year, differences between the temperatures of the water and the ambient air would cause unwanted condensation on the piping. Because of the condensation, corrosion and dampness were frequently present in the space. The dampness had a negative effect on electronic equipment in the area and was accelerating general rust and corrosion on the piping.

York's operators wanted to address the condensation problem as part of the project but hadn't had good experience with wrap-on pipe insulation. They found that the pipes would still

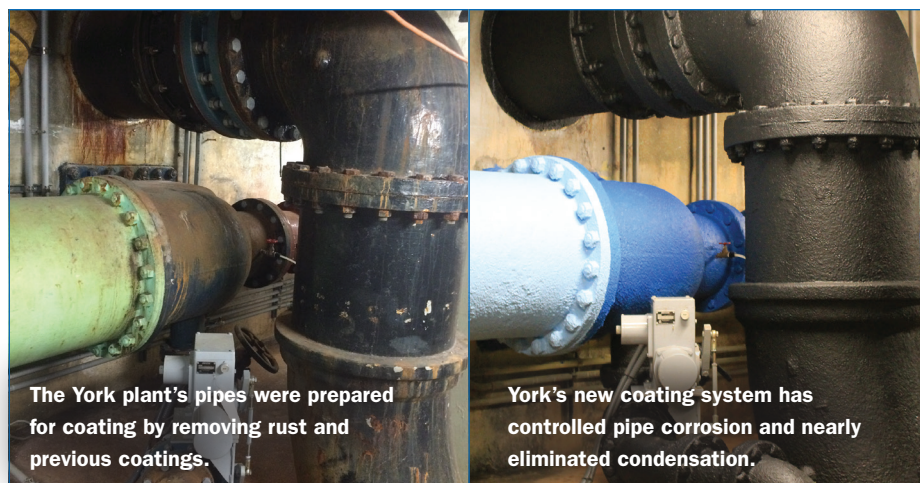
have condensation under the insulation, and the insulation was easily damaged during maintenance.

The operators began to search for a paint product that might hold up better on the damp piping. In the process, they discovered a coating that seemed to offer the solution for York's condensation problem. The coating technology is a spray-applied product formulated with aerogel, an insulating solid that reduces moisture by insulating cool substrates from warm, moist air. The product's low thermal conductivity helps keep the pipe surfaces above the dew point, thereby controlling condensation formation.

The new product is thought to be the first insulation coating to effectively use an aerogel additive. Although insulation coatings have been used in water, wastewater, and oil and gas facilities for decades, the aerogel particle additive coating improves thermal efficiency while requiring fewer coats, saving on application costs.

Before application, the operators used an insulation software program to calculate the necessary thickness needed to combat the condensation under the project's specific environmental conditions. Created by the North American Insulation Manufacturers Association, the software program uses an insulating material's K-value, which measures thermal conductivity, to provide a recommendation for personnel protection, condensation control, or thermal efficiency. Using the coating's K-value of 35 mW/mK, the operators determined that two coats at 80–100 mils would best resolve the utility's condensation issues.

Pipes throughout the York water treatment plant were prepared for



The York plant's pipes were prepared for coating by removing rust and previous coatings.

York's new coating system has controlled pipe corrosion and nearly eliminated condensation.

PHOTOGRAPHS: TNEMEC



To reduce moisture buildup in its treatment plant's filter gallery, the city of Russellville, Ark., chose to use an insulation coating system on the pipes rather than installing dehumidification equipment in the space.

coating by removing loose rust and previous coatings. They were then coated with a one-component, micaceous iron oxide- and zinc-filled primer, Tnemec's Series 394 PerimePrime. By applying a high-performance primer, the pipes were protected from other common corrosion problems for years to come, thanks to a triple-barrier mechanism of zinc, micaceous iron oxide, and urethane.

Next, the pipes received two coats of the aerogel-filled acrylic insulation coating, Aerolon, spray-applied at 40–50 mils dry film thickness (DFT) each. The operators then applied a topcoat of a water-based acrylic polymer coating, Tnemec Series 1028 Enduratone, in various colors, according to AWWA-recommended identifying color codes. The two coatings are low odor with low volatile organic compounds, making it easier and safer for them to be applied in an enclosed space like a pipe gallery or a storage tank's interior dry areas.

The insulation coating succeeded, nearly eliminating condensation on the piping. And as a result of the coating, secondary corrosion in the space was almost eliminated. The floors in the space

are now always dry, which has ongoing positive safety and sanitary aspects not previously considered.

**City Corp.** Farther south, City Corp., which manages water and wastewater systems for the city of Russellville, Ark., also needed to reduce moisture buildup in its treatment plant's filter gallery. As temperature and humidity rose during the summer months, the pipe gallery became overly humid, with excess moisture condensing on the filter pipes, gallery walls, and other equipment, causing puddling and premature piping corrosion.

With the help of its engineer and local coatings consultants, the utility chose to use an insulation coating system on the pipes rather than installing dehumidification equipment in the space. Such equipment would have reduced ambient humidity and moisture but also required additional controls and electrical systems as well as ongoing operational costs.

Pipes were prepared and primed using a unique inorganic water-based epoxy coating, Tnemec's Series 1224 Epoxoline WB. The pipes then received two coats of the aerogel-filled insulating coating for a total thickness of 100 mils DFT. Following

the insulation coating, the pipes received the same finish acrylic coating as the one used in the York treatment plant, applied at 2–3 mils DFT to provide color fastness and help protect the pipes from abrasion and further atmospheric corrosion.

Since its application, the coating system has controlled corrosion on the pipes and provided the required thermal protection. The project was completed with necessary pipe colors for easy pipe identification. The project's success was recognized when the coating system's project engineer was awarded an Engineering Excellence Award in the special projects category from the American Council of Engineering Companies of Arkansas.

#### **DIVERSE BENEFITS**

Water and wastewater facilities are constantly challenged by the formation of condensation on cool metal substrates. When applied as a complete system with a corrosion-resistant primer and a durable topcoat, an aerogel-filled acrylic insulation coating can help reduce the frequency and severity of condensation and prevent problems associated with corrosion under insulation. 