FIELD REPORT

POLY ALL THE WAY: PP-RCT FOR HYDRONIC APPLICATION

ISCO PP | RCT
POLYPROPYLENE
PIPING SYSTEMS

Thermoplastic pipe for hydronic application a "sign of the future."

Changing of the Guard

In a first-of-its-kind project for South Dakota State University, the school chose to build a centralized chiller plant on the north end of campus with an entirely poly piping system. Inside the building, ISCO Industries provided PP-RCT (polypropylene-random crystallinity temperature). It's the largest PP-RCT project in North America for chilled water and condenser lines inside a new mechanical room. In fact, it's the first time 24-inch PP-RCT has been installed in the world.

The Need to Chill

The school decided to add the North Chiller Plant (NCP) to support the growing campus. "The goal was to build an efficient and low-cost operating plant with minimal maintenance for an unmanned chiller plant," explained Greg Kronaizl from Farris Engineering, the design engineer of record. The new NCP will serve more than 400,000 sq. ft. with the potential for expansion to serve nearly 1,000,000 sq. ft. Initially, the project was designed with steel in mind. As plans began to develop on the project, the prospect of using steel became a challenge. Using steel would have required massive cranes onsite to lift and maneuver the pipe. Working with steel can coat a jobsite in carbon. "If this had been a steel job, we likely would have had to repaint the interior of the chiller because of the carbon," explained field foreman Scott Rick from Midwestern Mechanical, Inc. "Every worker would have gone home at night covered in carbon as well. PP-RCT was so much easier and cleaner to handle on the jobsite."
ISCO was able to help re-configure the plans with PP-RCT. "The project required large diameter piping in the plant," Kronaizl said. "ISCO was able to provide PP-RCT in the pipe sizes and with pressure ratings we required for this project which was critical to the success of using a non-ferrous product for this type of facility."

Total Cost of Ownership – The Benefit of Corrosion-Resistance

Engineers were also motivated by the low total cost of ownership for a polypropylene piping system. PP-RCT is a thermoplastic that uses fusion welding to join the pipe and fittings. It creates a monolithic piping system that is leak-free. The welding process eliminates the need for harmful chemicals like glues or solvents.

PROJECT
Chilled water and condenser lines in chiller plant.

LOCATION
South Dakota State University-Brookings, South Dakota

PP-RCT SOLUTION
Large diameter PP-RCT installed overhead.

MECHANICAL ENGINEER
Greg Kronaizl, Farris Engineering

MECHANICAL CONTRACTOR
Midwestern Mechanical, Sioux Falls, South Dakota

The material is 100% recyclable and environmentally friendly. It also lasts significantly longer than traditional pipe materials because it will not corrode. PP-RCT will outlast the building in which it is installed. "Overall, the idea of thermoplastic pipe for hydronic applications is a sign of the future," said field foreman Scott Rick from Midwestern Mechanical, Inc. in explaining the decision to work with thermoplastics on this project. "It will outlast steel and other types of materials."

"A fusion-welded poly system can drastically reduce chemical treatments. The owner of the system will only have to treat for the components in their equipment," ISCO Industries' North American Polypropylene sales manager Zak Schultz explained. The fusion process ensures the system will be leak-free, corrosion-free, and require minimal, if any, maintenance for decades to come.

Making Room For Big Ideas

Fitting mainly 24-inch pipe into the building was a challenge the team worked to overcome. "We had a lot of large diameter piping that needed to be installed in a relatively small building and it needed to be performed in a timely manner," said Chris Breuer, project manager from Midwestern Mechanical, a Sioux Falls-based contractor. "We also needed quite a bit of front-end coordination to complete this task." The job was designed with both 20- and 24-inch PP-RCT pipe and fittings throughout. "Working with the size of pipe we needed, it was very helpful how light the piping was compared to similar steel piping," Breuer recalled. "It can be difficult with thermoplastics to perform some of the overhead fusions needed. But, ISCO was very helpful in providing the proper training, knowledge, and pre-planning to keep those fusions to a minimum."

From planning to execution, ISCO's estimating, design, and product management team worked with the engineers and Midwestern Mechanical to ensure that any potential obstacles were identified and mitigated. ISCO fabricated 29 spools at their Louisville, Kentucky plant and shipped them to the jobsite, cutting the time spent fusing on site. It also eliminated the majority of overhead fusions necessary. For those few overhead fusions that remained, ISCO designed, built, and supplied a two-jaw 500mm unit.

In all, ISCO provided 2,120 feet of pipe ranging from three to 24-inches in diameter. With PP-RCT, the plants can operate with even less maintenance and more reliability. "We spec'd PP-RCT to maintain poly throughout the entire plant, giving us longevity and corrosion-resistance. Both of which are very important in a chiller plant environment. Contractors also like working with the product due to its fabrication and installation benefits over steel," explained Zack Rykhus an engineer with SDSU. This alternative to traditional piping has evolved over the years as a cost-effective solution for many different pressure and temperature applications. It can withstand temperatures up to 230°F. Kronaizl expanded on the explanation for the pipe selection saying it was chosen for the "pressure rating capabilities, lack of corrosion issues to open water systems, similarities to ferrous materials in terms of support, ease of assembly, and fabrication."

The system will be operational as students return for classes in the fall. The plant and the piping system will require minimal maintenance, offering cost-efficient air handling for decades to come. It is indeed, a sign of the future.