

A Very “Cool” Place HDPE pipe to keep downtown St. Paul buildings cool in summertime

President Bush stood in front of the District Energy St. Paul (Minn.) plant in May of 2001 for the first public unveiling of his National Energy Policy. His decision to be there “underscored the growing recognition that energy efficiency (and) reliability... certainly are key to stabilizing the country’s energy future,” according to the president of the International District Energy Association, Rob Thornton.

Exactly 12 months later, District Energy awarded its first bid to a contractor who specified high density polyethylene (HDPE) pipe for an outtake/intake water line that stretches more than a mile. Installation of the 18-inch lines began in May and will be complete in October.

“Our customers choose our service for reliability, environmental stewardship and price,” said Doug Maust, the vice president of development for Market Street Energy Co., LLC, a wholly owned affiliate of District Energy St. Paul, Inc. “With those factors in mind, we were encouraged by a contractor in St. Paul to use HDPE pipe instead of steel – and it reduced our overall costs.”

Closed loop heating/cooling pipeline

District energy systems produce steam, hot water and chilled water at a central plant and distribute it out to buildings in the district for space heating, domestic hot water heating and air conditioning. Individual buildings don’t need their own boilers or furnaces, chillers or air conditioners. A district energy system does that work for them.

The system in St. Paul provides heat for about 80 percent of the city’s downtown buildings. And by moving chilled water, the system cools about 60 percent of the buildings in the same area. The new HDPE lines were needed due to the rapid growth of the company’s cooling capacity and the need for more pipes to distribute the water.

“The bidding process showed that it was much less expensive using the HDPE pipe,” Maust said. “That also told us that the contractor was very confident in handling the material and that they were able to do it at a very competitive price. We have heard about other chilled water systems that have had positive experiences with HDPE pipe, so that gave us even more confidence.”

The new line will extend air conditioning from Regions Hospital and the rest of the district cooling system on the north end of St. Paul, traveling east down University Avenue under the interstate highway and extend south to the Ramsey County Law Enforcement Center. Initially, one thousand gallons a minute will move through the new extension in the pipeline – leaving the plant at 40 degrees F and returning via the closed loop system at about 56 degrees F to be re-cooled.

Homework done on HDPE

Jack Hunter of Magellan Associates was the designer/specifier on the District Energy project. He did extensive research on similar applications before making the recommendation to use HDPE pipe. Hunter said that research proved that the savings of time and effort required for HDPE system installation proved more advantageous.

“It takes about a quarter of the time to butt-fuse the HDPE pipes together versus welding with the steel,” Hunter said. “That’s a significant cost savings right there alone. But the

final decision was made by Doug Maust at District Energy. He was looking to reduce his costs and maintain the reliability of the system. It came down to an alternative to the high prices of other materials that can still serve customers efficiently.”

For this project, the polyethylene pipe was joined by heat fusion that produces strong, totally sealed connections. When using this process to join two lengths of pipe, the ends are “faced” to clean the surface and to make the ends perpendicular with the axis of the pipe. The ends are then heated to a temperature adequate to melt the polyethylene and pressed together until cool. Fusion fittings are manufactured for use with polyethylene pipe in a wide variety of sizes and types.

“The procedure is very straightforward and is enhanced by machines which clamp the pipe, face it, heat the two ends, and force them together. A properly made fusion joint has the same or greater strength than the pipe itself and is liquid tight,” said Dave Allison, P.E. and applications engineering manager for the Plastics Pipe Institute (PPI).

Confident contractors

The successful District Energy project contractor, Rob Wilder, of Metropolitan Mechanical Contractors teamed with Mueller Pipeliners to bid on the project. Both companies are subsidiaries of the Chicago based utility, Exelon.

“Mueller with their extensive installation experience with HDPE pipe for gas is a great synergistic partner for our hydronic expertise.” Wilder said. “We were able to take advantage of the lower labor requirements of HDPE to assemble a bid that resulted in an award. Now I’ve got several other clients that I’m ready to convert over to HDPE. I’m excited about what HDPE can do for the industry and for the business.”

The new HDPE water lines eliminate the need for welding inspections and coating inspections that are required when using alternative materials. “We had been using coated pipe, but by its nature the HDPE pipe is protected against corrosion. That’s another way to save on costs,” Maust added.

Metal pipe manufacturers attempt to prevent corrosion by either coating their base materials with electrically insulating materials, or providing sacrificial anodes that will corrode before the base metal. Insulating or dielectric materials used include coal tar derivatives, various epoxy coatings and most recently polymer coatings.

“Coatings have the disadvantage of being easily damaged during handling and there’s always the possibility of discontinuities in the coating as a result of poor factory coating procedure,” Allison said. “Any exposure of the base metal will allow electrolytic action to start. Polyethylene is a dielectric material, so good in fact that it is used frequently as an insulating material for electrical conductors. Because it is a non-conductor, polyethylene is simply not subject to corrosion.”

About PPI

The Plastics Pipe Institute is the major trade association representing all segments of the plastics piping industry. Member companies share a common interest in broadening market opportunities that make effective use of plastics piping for water and gas distribution, sewer and wastewater, oil and gas production, industrial and mining uses, power and communications duct and irrigation. More information is available at www.plasticpipe.org.

About District Energy St. Paul, Inc.

District Energy owns the largest hot water district heating system in North America in addition to a large chilled water-cooling system. This non-profit, community-based corporation keeps prices low and stable because it is “fuel flexible” – it can use natural gas, oil, clean-burning coal, or wood, selecting the cheapest fuel at any time. More information is available at www.districtenergy.com.

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