PERT Hot Water Piping for Campus Energy – One Year Later Wes Long

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What is PE-RT?

PE4710 PE-RT Pipe & Fittings (Introduced in 2016)

- A PE-RT material (polyethylene of raised temperature resistance) designation applies to PE materials that have an established HDB at 180F (82.2C) in Plastic Pipe Institute (PPI) TR-4
- Dow's PE-RT resin is the only PE resin listed above 60 °C (140 °F) in TR-4



PPI Listing for DOW INTREPID 2499 PE-RT



Texas A&M University – The RELLIS Campus, America's Newest Center for Transformative Research and Education





PROJECT RELLIS Campus Water Distribution Lines

LOCATION

Texas A&M College Station, Texas

THE NEED

Leak-free heating hot water and chilled water lines

SOLUTION 20 and 24-inch HDPE 12-inch PERT Various Fittings



ISCO supplies HDPE and PERT for water lines at massive university.















Gilsulate insulating backfill used for part of project part compared to pre-insulated piping













PROJECT Hospital Heat Recovery System

LOCATION

lles-de-la-Madeleine (Magdalen Islands), Quebec, Canada

THE NEED

Leak-free, corrosionresistant heating and cooling dual lines for hospital heat recovery system

SOLUTION 13,500' (4km) of 8" IPS DR 11 PlatinumStripe® 1800 PE-RT pipe & fittings



ISCO offers PE-RT for a dual line heat recovery system.



Residual Heat Recovery Project from the Thermal Power Plant Hydro-Québec to Iles-de-la-Madeleine Hospital

 Will consist of heat exchangers at the Hydro-Québec de Cap-aux-millstones thermal power station and the hospital, and a 2-km transfer loop consisting of buried insulated pipes.



- Recovered heat will help meet the energy requirements of the hospital buildings.
- The project will reduce greenhouse gas (GHG) emissions by 1 555 T eq. CO2, the equivalent of removing 457 light vehicles from our roads annually."





Scope of the project

- 600' of 6" IPS 11 1800 series PE-RT
- 640' of 8" IPS 11 1800 series PE-RT
- Molded 90's, 45's, Caps, Flange Adapters
 - University of MN at Minneapolis Twin City campus
 (Gopher athletic village addition)
 - General Contractor = Mortenson Construction
 - Subcontractor = Horwitz Inc.
 - Engineer = MEP Associates
 - Pipe was sold by Ferguson Waterworks
 - Pipe project is the HVAC system for the new additions to the athletic department:
 - -Academic Center -Training Table -Indoor Football Complex -Women's Gymnastics Facility -Olympic Sport Indoor Practice Facility -Outdoor Olympic Sport Track -Men's/Women's Basketball Practice Facility -Wrestling Training Facility

This \$190MM project was completed in 2017





Hot and cold water HVAC lines leaving mechanical building (2 lines on the left are chilled water, 4 on the right are hot water)







Caped lines ready to be pressure tested







This new building will house men and women's basketball courts as well as training tables for the athletes







90's being fused for additional sections to be installed later







Oklahoma State University – Northern Oklahoma College Stillwater Classroom Building

- 1,400' 16" DR 11 PE-RT used to supply new NOC building with hot water
- Pipe was pre-insulated and used for both supply and return lines
- Plan for future is to utilize PE-RT for hot water in place of steam on future buildings that may include new dormitories



Northern Oklahoma College requests the honor of your presence at the groundbreaking for the

NOC STILLWATER CLASSROOM BUILDING

Wednesday, March 22, 2017 11 a.m.

615 N. Monroe Street Northern Oklahoma College Stillwater, OK

Public parking available at the OSU parking garage RSVP to Ruchel Macy at 580.628.6214 or rachel macy@noc.edu by Wednesday, March 1.

















Construction of the new Harvard University Science and Engineering Complex, District Energy Facility, and Harvard Business School has begin in Allston, MA



Construction of the new Harvard University Science and Engineering Complex, District Energy Facility, and Harvard Business School has begin in Allston, MA

- Harvard planned to expand its district energy systems footprint in Allston by constructing a new facility and associated distribution systems
- The new facility and distribution will support potential future growth in the Allston Campus
- The project is a joint venture between RMF Engineers, Bond Brothers, and VARI-TECH.



Construction of the new Harvard University Science and Engineering Complex, District Energy Facility, and Harvard Business School has begun in Allston, MA

- Over 4000' of 34" DR 17 chilled water pipe will be installed in early phases.
- Over 4000' of 24" DR 11 140 degree hot water heating pipe will be installed in the same trench as the chilled water.
- The chilled water supply pipe will be insulated as will both the hot water supply and return pipe.
- Many fittings and valve clusters will be prefabricated to speed up field fusion.



Pulp and Paper Mill Case Study Canfor's Prince George Pulp and Paper

- 30" DR 21 & 26
- 3200 ft
- 175°F
- FRP vs PERT
- Material Evaluation Criteria
 - Changing Effluent
 Stream
 - Installation
 - Burial
 - Cost





Overview

Problem

- The FRP bleach effluent piping that conveys effluent from the PG Pulp bleach plant to the PG biobasin has reached the end of its useful life
- In 5 years there have been over 10 pipe failures
- The effluent streams are bleach plant acid filtrate, caustic filtrate, boiler feedwater acid and caustic effluents and chemical containment basin effluent
- Existing FRP piping showed evidence of spider cracking or complete inner delamination from the outer pipe wall

Solution

- PE-RT Piping used to replace 3,200' of FRP piping
 - PE-RT liner considered, but too many bends make this impracticable
 - Underground installation of PE-RT piping adjacent to existing FRP piping was selected to allow installation to occur during mill operation



Replace Aging FRP with New PE-RT Piping System









Cost Comparison

- Material supply and field installation of PE-RT reduce project cost by 1/3
 - PE-RT material costs less than equivalent FRP material cost
 - PE-RT installation performed over 11 times faster than FRP
 - 8-50' pipe length PE-RT fusions completed per day compared to 2-20' pipe length butt and wrap joining of FRP

Hours vs Diameter	2"	3"	4"	6"	8"	10"	12"	14"	16"	20"	22"	24"	26"	28"	30"
FRP	0.5	0.7	0.9	1.2	1.8	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0
PERT	0.1	0.1	0.2	0.3	0.3	0.4	0.4	0.5	0.6	0.7	0.7	0.8	0.9	0.9	1.0

Table 1. FRP vs PE-RT Joining Times

Source: Pipe Design Considerations, Composites USA, Inc, and McEllroy Manufacturing

Conclusions

- Cost savings of 33% achieved by replacing FRP with the new PE4710 PE-RT
- PE-RT was able to be quickly joined by heat fusion creating a leakfree continuous monolithic pipe, that could be field bent, eliminating joints and minimizing flanged connections
- PE-RT was joined by the same fusion procedures used for standard PE4710 pipe, requiring no additional training
- Fusion joint verification and documentation by data logger eliminated the need for most hydrostatic testing
- Engineering contractor was on-site during construction enabling better communication with construction minimizing change orders

Thank You!

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