



## POLYPROPYLENE PIPE HELPS EASE ELEMENTARY SCHOOL'S TRANSITION TO GEOTHERMAL

### PROJECT:

Park Orchard Elementary, HVAC

### PRODUCTS:

**aquatherm blue pipe®**

### LOCATION/DATE:

Kent, WA  
Summer 2011

### AQUATHERM ADVANTAGES:

- Faster installation times thanks to the lighter weight (75% less than steel) and heat-fused connections
- Simple and durable heat-fused joints produced no leaks in over 3,000 ft of piping
- The lower installation time and competitive material cost led to project savings

The Kent (WA) School District leveraged grant money to dramatically upgrade its heating system with an assist from Aquatherm's polypropylene pipe.

Originally completed and opened in 1963, Park Orchard Elementary was part of the local school district's plan to accommodate the growing population in Kent, WA. After undergoing various additions including extra wings and a gym, the district determined that the roughly 50,000-sq-ft building should be retrofitted for energy savings.

The retrofit included replacing classroom heating systems including boilers, pumps, piping, and three rooftop heat pump units. The Kent School District was awarded a \$1 million-plus grant from the Office of the Superintendent of Public Instruction for project design enhancements including the installation of a ground-source heat pump system with full energy management controls, and roughly \$60,000 in additional grant funds from Puget Sound Energy.

As the project's mechanical contractor, Hawk Mechanical in nearby Monroe, was tasked with removing the existing radiators and getting the school set up with geothermal heating. Hawk has built a reputation for innovation and customer service in the commercial, hospital, industrial, and public works sectors since 1996.

### A NEW PIPING OPTION

While many piping materials including Schedule 40 steel and copper were considered for the condenser water supply



and return loop, Aquatherm's polypropylene pipe was ultimately chosen for the project. Aquatherm's polypropylene-random (PP-R) piping has been used in more than 70 countries for four decades, but is relatively new to North America. Aquatherm Blue Pipe® (formerly Climatherm) is specifically designed for chilled water, condensing water, radiant heating, and industrial applications.

In order to provide a material suitable for replacing metal pipe, Aquatherm extrudes a fiberglass impregnated layer that ensures exceptional strength and reduces thermal expansion by up to 75% so that it hangs rigidly even in operating temperatures up to 200 °F.





Demolition began in July 2011 and by the third week of July Hawk Mechanical had used the rented Aquatherm fusion welding tools to install several thousand feet of Aquatherm throughout the school's 20 classrooms and four offices. Each classroom is tied into a ClimateMaster Tranquility 27® two-stage Earth Pure unit. The ClimateMaster units far exceed ASHRAE 90.1 efficiencies and use EarthPure® HFC-410A zero ozone depletion refrigerant. Some of the heat pumps are vertical and some are horizontal, depending on the space they are fitting into.

Hawk's project engineer on the job, Garrett Brown, said that the Aquatherm training helped eliminate the learning curve involved with heat fusion connections. As the hands-on supervisor of the Aquatherm installation, field foreman Harry Medina was impressed with the product from the get-go. "I thought Aquatherm was great the first time that I saw it. Having not used it before, I thought it might be a bit slow, but when you get going it's quick."



## LIGHTER WEIGHT PITCHES INTO SAVINGS

The lighter weight of PP-R and corresponding ease of installation were significant factors on the job. "I think, for myself, Aquatherm is faster to install than steel," Medina said. "The weight of it is a benefit too since you need a lot less men to carry it. You do need more supports, but overall, it's a good 30% faster than grooved steel with the smaller diameters. With the bigger diameters, it's maybe about 25% faster. Once you get the hang of it, it's a lot better."

The main supply and return loops to and from the ClimateMaster units were run in Aquatherm Blue Pipe® ranging from 2-inch to 6-inch, with branch lines ranging from ¾-inch to 1 ½-inch depending on how many units they served. The following approximate lengths were used:

- 360 ft of 6 inch
- 480 ft of 4 inch
- 250 ft of 3 inch
- 190 ft of 2 ½ inch
- 480 feet of 2 inch
- 600 feet of 1 ½ inch
- 980 feet of 1 inch
- 600 feet of ¾ inch

Unlike metal piping materials, Aquatherm's piping systems are installed via heat fusion. The heat fusion process bonds both sides of a joint into a single, homogenous material, without the use of flames, chemicals, or mechanical connections. Once fused, pipes and fittings have the same physical properties, thus eliminating systematic weaknesses that can be caused by introducing different materials into the joint in other types of piping systems.

The Hawk Mechanical crew took a standard half-day training from Aquatherm and its local manufacturer's representative. With the proper training, Aquatherm offers a 10-year warranty covering replacement parts and labor as well as incidental damages and even personal injury.

**"With the smaller diameter pipe and branch outlet connections going in quickly, along with easier handling and reduced material costs, Aquatherm helped create a cost savings for Hawk Mechanical."**

—Garrett Brown, Project Engineer, Hawk Mechanical

The 6-inch and above Aquatherm was connected via butt fusion and Brown said some of the connections took as much as 25 minutes. Yet while those connection times were a bit slower than they'd hoped, they were offset by the



socket fusion of 3-inch and down and fusion outlets which were much quicker than grooved steel or soldered copper. The fusion outlets are huge labor savers since they allow installers to simply drill into the supply pipe, then heat fuse the fusion outlet fitting into place wherever

needed.

Due to space constraints, some copper and Schedule 10 steel was installed in the mechanical room where the butt fusion machines made it too challenging to work with Aquatherm. The

steel and copper ties into Armstrong model #4300, 6-inch, 30-hp circulating pumps at expansion tanks. However, Aquatherm was used to tie into all of the building's ClimateMaster heat pumps.

## COMPLETED IN TIME FOR AN "A" GRADE

The installation was completed in August in time for school, although some additional work was performed over the school's winter break. During the primary portion of the project and also the change order portion, Brown noted that everyone was pleased with the equipment and pipe installed on the job.

"We found zero leaks while pressure testing the 3,000-plus feet of pipe we installed during this project. You might typically find a few small leaks, so it was great not having to deal with that," Brown said.

While Brown acknowledged that the larger diameter sections of the job were relatively slow, "the socket fusion stuff really flew, and I'd say for our first job with the product, the Aquatherm portion of the job went very well. "With the smaller diameter pipe and branch outlet connections going in quickly, along with easier handling and reduced material costs, Aquatherm helped create a cost savings for Hawk Mechanical," Brown concluded. @



The German-manufactured pipe has been one of the world's most durable and greenest piping systems for four decades and proven successful in 70-plus countries. Aquatherm piping systems offer many performance and environmental benefits, such as:

- Eliminating toxic materials, glues and resins, and open flames from the piping installation equation
- An R-value of 1 or more per inch or greater depending on pipe size and SDR
- The fusion welding process, which creates seamless connections that last a lifetime without leaking or failing
- An optional fiber-composite layer in the pipe reduces linear expansion of the pipe by up to 75% compared to plastic piping



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