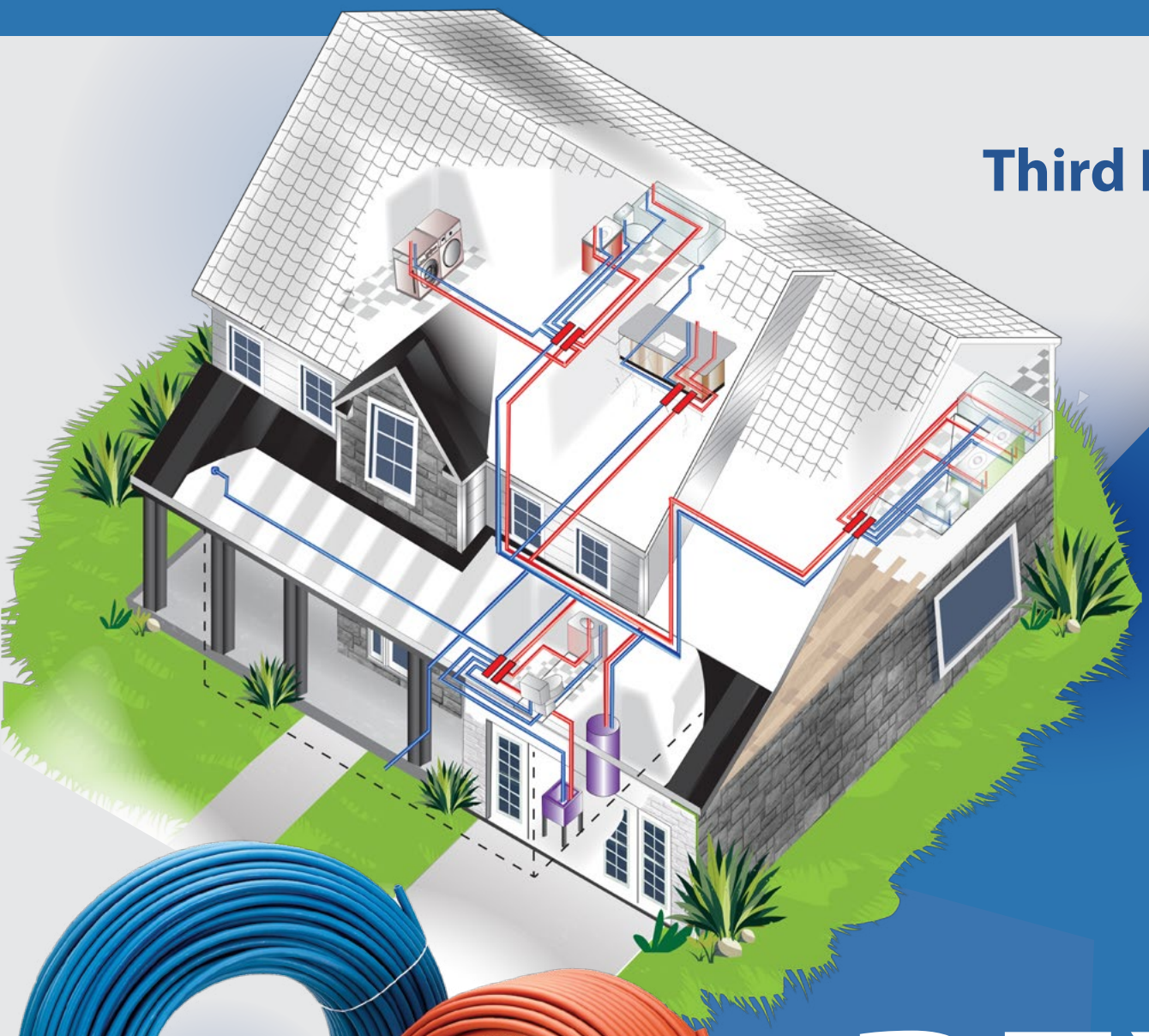
Third Edition



PEX

Plumbing Distribution Systems Design and Installation Guide

Advantages | Material Properties | Codes & Standards

Joining Methods | PEX Plumbing Layouts | Optimizing Design

Installation Guidelines | Water Service Line | Other Applications

IAPMO

PPI Plastics Pipe Institute The Voice of an Industry.

Home Innovation RESEARCH LABS™

PPFA Plastic Pipe and Fittings Association

ES ICC EVALUATION SERVICE®

PEX

Plumbing Distribution Systems Design and Installation Guide

Third Edition

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Further Information

Please consult the following websites for the latest version of this publication, reference publications, and other related information:

- Plastics Pipe Institute
  www.plasticpipe.org
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APPENDIX B Other Applications

Radiant Heating and Cooling Systems

Hydronic radiant heating systems utilize flexible plastic tubing such as PEX embedded within floors, walls, or ceilings. Warm water is circulated through the tubing, which conducts heat to the panel, which then radiates heat to the space, warming the objects and people in the room, while also allowing warm air to gently rise from heated floors. The resulting comfort and efficiency are unmatched with other forms of heat delivery.

Figure B.1 Radiant Floor Heating Tubing in a Residential Application

Figure B.2 Radiant Floor Heating tubing in a Commercial Application

Warm fluid may be produced by a variety of heat sources such as high efficiency boilers, geoexchange ground source heat pumps, air-to-water heat pumps, electric boilers, biomass boilers, or thermal solar collection systems. Benefits of hydronic radiant heating include increased efficiency, more uniform heat distribution in the lower portion of rooms, quieter operation, better control of indoor relative humidity in wintertime, and easier zoning. Radiant heating systems are commonly found in many types of construction and many applications, from houses to schools to hotels.

Some radiant heating systems also operate as cooling systems, circulating chilled water through floors, walls, or ceilings to absorb thermal energy from people and spaces. Radiant cooling systems improve comfort and efficiency, as the reduced cooling load on the traditional air-based system can be significantly reduced, lowering air movement, noise, and fan loads.

The reduction in size of the air handling equipment is often enough to offset the cost of the heating/cooling pipes. Radiant cooling systems are typically employed in commercial spaces where the humidity can be controlled by computerized control systems to manage air dehumidification and prevent condensation on surfaces.

Figure B.3 Snow and Ice Melt Piping for a Ski Lodge

Figure B.4 Snow and Ice Melting in Operation at a Commercial Building

Figure B.5 Turf Conditioning in a Football Stadium

Snow and Ice Melting Systems

Hydronic snow and ice melting (SIM) systems utilize PEX tubing embedded in outdoor surfaces to augment the removal of snow and ice by circulating a heat transfer fluid, usually glycol and water, through the pipes. The durability and flexibility of PEX tubing allows these systems to provide years of reliable service, without worries about corrosion or failing electrical connections.

SIM systems are used in a wide variety of applications across North America, including sidewalks, steps, driveways, ramps, parking lots, loading docks, carwashes, roadways, bridges, and even helicopter landing pads. Systems are also used at hospitals, train stations, airports, hotels, and ski lodges. Most of these types of areas can be considered as high-traffic/high-hazard situations where 24/7 accessibility might be required, but many SIM systems are also found in private residences for driveways, walkways, and steps.

Benefits include safety, improved building access, no snow removal costs, elimination of sand and salt, reduced liability, and obvious convenience. Many SIM systems are less expensive to operate than traditional methods of snow removal, such as plowing.

Turf Conditioning

Turf conditioning or pitch heating systems utilize plastic tubing installed within the soil layer of natural turf at specific depths as determined by the turf experts in outdoor applications such as stadiums (e.g., football, baseball, soccer), golf courses, and other field surfaces. Warm fluid is circulated through the embedded tubing at a controlled temperature to gently warm the grass roots,

providing optimal root zone temperature for continued growth, even in cold weather, and the potential to melt snow or ice.

Embedded soil temperature sensors guide control systems to modulate heat input as needed. Large surfaces are often split into multiple zones to respond to specific weather, wind, and sun exposures.

These systems can extend the growing season of natural grass surfaces for use in late autumn and winter, allowing the fields to recover faster after use. It has been reported that warm soil is softer than cold soil or artificial turf, and can even reduce player injuries. Turf conditioning systems may also melt snow, keeping playing surfaces accessible, visible, and safer.

In warmer climates, hydronic turf conditioning systems are also used with chilled water to absorb excessive solar thermal energy from outdoor grass surfaces to protect the grass from overheating. Chilled water can be produced from geothermal ground source heat pumps, cooling towers, chillers, or large bodies or water (e.g., a lake) when available.

Turf conditioning systems have been used for decades in European soccer fields and are widely used across North America in professional football, baseball, soccer facilities, and golf courses.

Geothermal Ground Source Heat Pump Systems

Figure B.6 Horizontal Geothermal Application

Geothermal ground source heat pump systems typically utilize buried pipes as the ground heat exchanger, transferring heat to and from the earth during cooling and heating operation, respectively. Ground source geothermal systems have the potential to reduce heating costs by 70% and cooling costs by 50%, or more, as compared to other sources of heating and cooling energy. PEX pipes are ideally suited for these applications, due to their flexibility, toughness and proven longevity. The flexibility of PEX assists installation in curved trenches; its high resistance to slow crack growth provides resistance to damage in both vertical and horizontal applications; its smooth interior permits excellent flow of heat transfer fluids; and its long-term history in pressurized applications ensures reliability, even when buried in the ground. PEX tubing conforming with ASTM F876 or CSA B137.5 is approved in model ground source geothermal codes such as CSA/ANSI/IGSHPA C448, the IAPMO Uniform Mechanical Code (UMC), the IAPMO Uniform Solar, Hydronic and Geothermal Code (USHGC), and the ICC International Mechanical Code (IMC). Please see **PPI TN-55** ***Plastic Piping Materials for Ground Source Geothermal Heating and Cooling Applications*** for more information.

Figure B.7 Residential Fire Sprinkler with PEX Tubing

Fire Protection

PEX tubing and fitting systems which are listed to the appropriate UL standards can be used to supply water to fire suppression sprinklers for residential applications. While many sprinkler systems are largely independent from the water distribution system, for some building types they can be combined with a building's cold-water plumbing system in a multi-purpose system. This has the potential to reduce installation costs and the total amount of pipe and fittings installed. Sprinklers, PEX tubing, and fittings must comply with National Fire Protection Association (NFPA) requirements for residential fire sprinkler systems. Several PEX systems meet the requirements of NFPA 13D or IRC P2904 for residential applications. Local codes must be consulted when implementing any fire sprinkler system to ensure that PEX and/or combined systems are permitted for each building type.

Figure B.8 Purple PEX Tubing for Water Reuse

Water Reuse/Reclaim

Reclaim water systems reuse greywater, commonly defined as wastewater from bathtubs, shower drains, sinks, washing machines, and dishwashers. Greywater accounts for 60% of the outflow produced in homes. By designing plumbing systems to separate it from blackwater, greywater can be reused for irrigation, toilets, and exterior washing, resulting in water conservation. PEX tubing systems may be used for reclaimed water systems and may contain special color codes or marking on the products to indicate this application. Be sure to consult your local regulations and the PEX system manufacturer when selecting materials for reclaimed water systems.

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