

Achieving Energy Efficiency with Plumbing & Mechanical Systems using Plastic Piping Solutions

2020 Solar Decathlon - Design Challenge

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The Plastics Pipe Institute

PPI is a Non-profit trade association based in North America

- PPI was formed in 1950 to develop test methods for plastic pressure pipes
- PPI's five divisions deliver piping solutions for multiple applications
- The Building & Construction Division (BCD) focuses on plumbing & mechanical
- BCD products include **CPVC**, **PEX**, **PE-RT**, **HDPE**, and **PP** pressure pipes
- BCD webpage explains these materials:

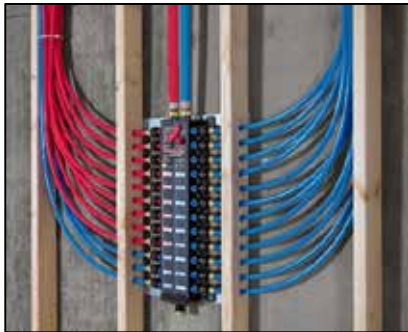
www.plasticpipe.org/building-construction



Outline

Presentation will introduce using these materials for:

- Plumbing distribution
- Safety using Fire Protection
- Energy Source using Ground-source Geothermal
- Energy Distribution using Hydronic Heating & Cooling



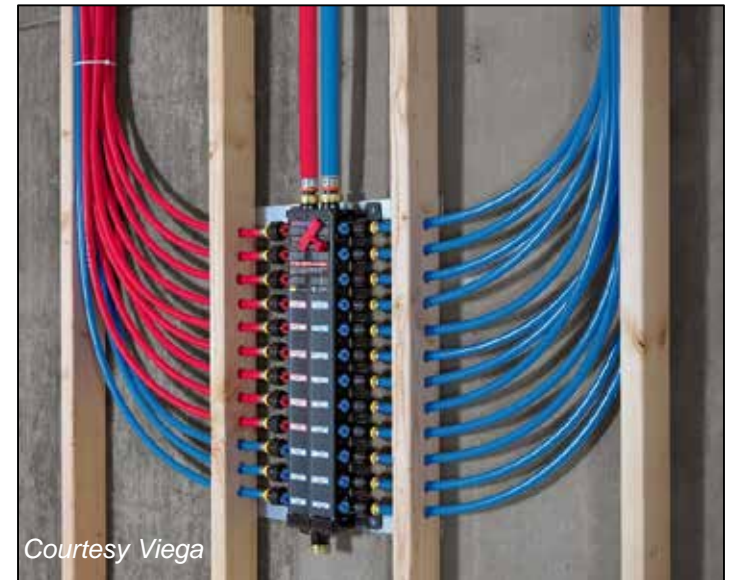
Plastic Piping Solutions - Plumbing

Hot- and Cold-Water Plumbing Distribution

- CPVC, PEX, PE-RT and are widely used for residential plumbing supply pipes
- CPVC, PEX, PE-RT and PP are commonly used in commercial applications
- Some systems use both flexible (PEX, PE-RT) and rigid (CPVC, PP) pipes

System Benefits:

- Plastic systems are safe for drinking water
- Plastic systems are corrosion-resistant
- Pipes are quieter and transfer less heat
- Optimized plumbing designs can save water
- Timed hot-water recirculation reduces waste
- Can provide benefits for **Operations, Comfort & Environmental Quality**



Plastic Piping Solutions - Safety

Fire Protection

- Certain CPVC and PEX pipes are third-party certified for FP applications
- PEX systems are used for **NFPA 13D** systems; CPVC is used for residential fire protection applications built according to codes **NFPA 13D** and **13R**

System Benefits:

- FP systems stop fires where they develop
- Systems save lives, reduce property damage
- Often mandated by building codes, especially in multi-family buildings
- Can provide benefits for **Innovation, Engineering, Operation, Market Potential**



Plastic Piping Solutions – Energy Source

Ground Source Geothermal

- Ground source heat pumps are the most efficient source of heating and cooling energy for any type of building (vs. VRF, boilers, chillers, etc.)
- HDPE, PEX, and PE-RT piping materials are used for ground loop piping

System Benefits:

- Geothermal heat pumps can have efficiencies greater than 450% when operating in heating mode (COP 4.5)
- When cooling, heat is rejected to the earth (high EER)
- Heat pumps are indoors, out of sight, no noise
- High investment (rebates), low operating costs
- Can provide benefits for **Energy Performance, Engineering, Resilience, Financial Affordability**



Plastic Piping Solutions – Heating & Cooling

Radiant Heating, Radiant Heating & Cooling

- PEX or PE-RT tubing is embedded in floors, walls or ceilings
- Heated or chilled water is circulated through the tubing for energy transfer
- The most comfortable and efficient method to heat or cool any space

System Benefits:

- Improved thermal comfort, silent
- Architectural freedom, invisible (no ducts)
- Low power consumption for circulators
- Energy flexibility, controllability (zoning)
- Higher overall system efficiency
- Benefits for **Energy Performance, Comfort & Environmental Quality**



Plastic Piping Solutions – Resources

Industry resources are available to assist with design

- **RPA (Radiant Professionals Alliance):** Guides, Manuals @ www.radiantpros.org
- **HIA (Hydronics Industry Alliance):** Building Efficiency System Tool (BEST software) for commercial system HVAC design @ www.radiantprofessionalsalliance.org/hia
- **IGSHPA (International Ground Source Heat Pump Association):** Guides, manuals, videos, rebate information @ www.igshpa.org
- **GEO (Geothermal Exchange Organization):** Consumer info @ www.geoexchange.org

PPI is here to help!

- Start at www.plasticpipe.org/building-construction go to **Applications** for more details
- Also go to **Education** tab, click on **DOE Programs**

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Thanks for watching, and Good Luck!

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