Today’s Plastic Piping Solutions for Building and Construction

A presentation by the Plastics Pipe Institute

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Presentation Outline

1. Introduce PPI as a resource of knowledge for plumbing, hydronic heating, fire protection and other building piping topics

2. Introduce the piping products represented by PPI BCD
   - CPVC  *Chlorinated polyvinyl chloride*
   - PEX  *Crosslinked polyethylene*
   - PE-RT  *Polyethylene of raised temperature*
   - PP-R  *Random copolymerized polypropylene*

3. Discuss the applications addressed by these piping solutions

4. Provide knowledge about PPI publications

5. Summary
1. Introduction to the Plastics Pipe Institute

- PPI was formed in **1950** and is based in Irving, TX
- PPI is dedicated to promoting the safe use of plastic piping systems by:
  1. Contributing to development of standards
  2. Educating designers, installers, users and government officials
  3. Establishing a forum for problem solving and new ideas
  4. Maintaining liaison with industry, educational and government.

PPI headquarters in Irving, TX
Introduction to the Plastics Pipe Institute

PPI’s Building & Construction Division (BCD) Mission Statement:
To promote the expanded acceptance and use of high reliability plastic pressure pipe and tubing systems in building and construction environments by providing research, education, and code/standard development with a focus on delivering sustainable and safe plastic system solutions that enrich people’s lives.

BCD is involved with many industry groups:
Introduction to the Plastics Pipe Institute

Examples of BCD Member Companies…

- AquaTherm
- BASF
- Borealis
- Bow Plumbing Group
- Dow Chemical
- Golan Plastics
- IPEX
- Kafrit NA Ltd.
- Legend Valve
- LK PEX/Mr. PEX
- Lubrizol
- LyondellBasell Industries
- Mercury Plastics
- NIBCO Inc.
- Reliance Worldwide USA
- REHAU Construction LLC
- Rifeng
- Uponor, Inc.
- Viega LLC
- Watts Water Technologies
- Zurn PEX, Inc.

These are the firms that pioneer, develop and produce plastic pressure piping systems for Building & Construction
2. Today’s Plastic Piping Solutions for Building & Construction

**CPVC: Chlorinated Polyvinyl Chloride**
- A high-temperature pressure piping system
- Introduced for potable plumbing in 1959
- Introduced for fire protection in 1985
- Also used for many industrial and process piping applications
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**CPVC: Advantages**
- Safety of potable water and long-term reliability
- Corrosion resistance, chlorine and chloramine resistance
- No flame used for joining; solvent weld joints
- Lightweight, easy to transport
- No scrap value; avoid jobsite theft
- Available in wide range of sizes
- Universal compatibility of pipes/fittings
- Professional installed appearance
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**PEX: Crosslinked Polyethylene**
- Introduced for radiant heating in the early 1970’s in Europe
- Introduced to USA and Canada in 1984 for heating and plumbing
- A high-temperature flexible pressure piping system
- PEX tubing systems are used for water service lines, hot- and cold-water distribution, radiant heating and cooling, outdoor snow and ice melting, residential fire protection, geothermal ground loops and other demanding applications
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PEX: Advantages
- Safety of potable water and long-term reliability
- Corrosion resistance, chlorine and chloramine resistance
- Ease of installation
- Flexibility to speed installations
- Lightweight, easy to transport
- Noise and water hammer resistance
- No flame used for joining; compression fittings
- No scrap value; avoid jobsite theft
- Many fitting and joining options

Courtesy NIBCO
Today’s Plastic Piping Solutions for Building & Construction

PE-RT: Polyethylene of Raised Temperature
- First used for warm-water radiant heating in the 1990’s in Europe
- Introduced to North America in the 2000’s
- A high-temperature flexible pressure piping system
- PE-RT tubing systems are used for hot- and cold-water plumbing, water service lines, radiant heating and cooling, outdoor snow and ice melting, and other demanding applications
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PE-RT: Advantages
- Ease of installation
- Flexibility
- Lower cost
- Lightweight, easy to transport
- No flame used for joining; compression-style fittings
- No scrap value; avoid jobsite theft
- Many fitting and joining options; works with many of the same fittings as PEX tubing

Courtesy Dow
Today’s Plastic Piping Solutions for Building & Construction

**PP-R: Random copolymerized Polypropylene**
- First used for hydronic heating in the 1970’s in Europe, then in the 1990’s for plumbing
- Introduced to North America in the 2000’s
- A high-temperature pressure piping system
- PP-R piping systems are used for hot- and cold-water plumbing, hydronic heating and cooling, industrial and food-grade piping and other demanding applications
- PP-R pipes also provide resistance to highly acidic and basic solutions
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**PP-R: Advantages**
- Safety of potable water and long-term reliability
- Corrosion resistance, chlorine and chloramine resistance
- Ease of installation
- Lightweight, easy to transport
- Lower installed cost than metal pipes
- No flame used for joining; joints are heat-fused
- No scrap value; avoid jobsite theft
- Some PP-R pipes include reinforcement layers for reduced longitudinal expansion/contraction
3. Applications Addressed by BCD Piping Solutions

Water service:
- PEX tubing can be certified to AWWA C904 for Water Service
- Less expensive than copper
- Corrosion resistant
- High flexibility to ease installations
- Impact resistance and abrasion resistance
- Highly resistant to chlorine and chloramine (disinfectants)
Applications Addressed by BCD Piping Solutions

Plumbing:
- CPVC, PEX, PE-RT and PP-R are all used for hot- and cold-water distribution pipe
- PEX and PE-RT are supplied in coils or sticks
- CPVC and PP-R are supplied in straight lengths
- *Bendable* versions of CPVC and PP-R are available
- Plastic systems can be designed for better performance than metal pipe systems (less heat loss, lower pressure loss)
- These plastic pipes are approved in all model plumbing codes
Applications Addressed by BCD Piping Solutions

**Fire Protection:**
- Some CPVC and PEX systems are approved for NFPA 13D residential applications
- May be used as stand-alone or multi-purpose applications
- Rigid or flexible options
- Plastic pipe systems can reduce installation costs and improve long-term performance and reliability
Applications Addressed by BCD Piping Solutions

Radiant Heating:
- PEX and PE-RT tubing are the basis of virtually all radiant heating systems
- PPI works closely with the Radiant Professionals Alliance (RPA) on standards and education

Courtesy REHAU
Applications Addressed by BCD Piping Solutions

**Radiant Heating and Cooling:**
- Combined radiant heating and cooling systems expand the application of radiant technology to year-round use.
- All 3 entries of PPI’s *Project of the Year* competition were radiant heating and cooling systems in public spaces:
  1. College dorm
  2. Bus station
  3. High school
Applications Addressed by BCD Piping Solutions

**Snow and Ice Melting:**
- SIM systems augment the removal of snow and ice by circulating a heat transfer fluid through plastic pipes

- These systems provide convenience, safety, reduce liability, operating costs, and environmental impact, and deliver long-lasting reliability
Applications Addressed by BCD Piping Solutions

Geothermal ground loop piping:
- HDPE and PEX tubing are specifically approved in IGSHPA and CSA standards, as well as many state codes
- These pipes provide long-term reliability for earth energy heat exchange systems in:
  - Horizontal trenches
  - Vertical boreholes
  - Combined solar thermal energy and underground thermal storage

Courtesy REHAU
4. PPI Publications

Please visit our website for:

- Technical Notes and Technical Reports
- Plastic Pressure Pipe Design Calculator
- Educational videos
- Case studies
- Finding a Manufacturer
- Connecting with other organizations
- www.plasticpipe.org/building-construction
PPI Publications

PPI Technical Notes and Reports

Examples:
- TN-17: Crosslinked Polyethylene (PEX) Pipe & Tubing
- TN-31: Differences Between PEX and PB Systems for Potable Water Applications
- TN-39: Recommended Practices Regarding Application of Pesticides and Termiticides near PEX Pipes
- TR-48: R-Value and Thermal Conductivity of PEX and PE-RT Tubing
- www.plasticpipe.org
PPI Publications

PEX Plumbing Design Guide

- Material Properties
- Code Acceptance
- Joining Methods
- Types of Systems
- Design
- Performance Data
- Installation
- Testimonials
- A joint development with PPFA, ICC and NAHB Home Innovations Research Labs
PPI Publications

Plastic Pressure Pipe Design Calculator

- Launched in July 2015, piping designers can simply go to [www.plasticpipecalculator.com](http://www.plasticpipecalculator.com) for the free piping design tool.
- Allows online users to calculate pressure/head loss, thermal expansion/contraction, pipe weight/volume, expansion arm/loop designs and predict hydraulic shock/pressure surges.
- For PEX, PE-RT, and CPVC.
PPI Publications

Educational Videos

- Short videos explaining how to work with PEX tubing and fittings
PPI Publications

Educational Presentations

- PPI website contains presentations on:
- PEX Pipes for Plumbing Applications
- PEX Pipes for NFPA 13D Fire Sprinkler
- PEX Pipes for Service Line Applications
- www.plasticpipe.org
PPI Publications

Industry Links

- Get direct access to standards developments organizations, product certification agencies, code bodies and other associations through this BCD webpage

INDUSTRY LINKS

ANSI - American National Standards Institute
ASHRAE - American Society of Heating, Refrigeration and A/C Engineers
ASME - American Society of Mechanical Engineers
ASPE - American Society of Plumbing Engineers
ASSE - American Society of Sanitary Engineers
ASTM - American Society for Testing and Materials
AWWA - American Water Works Association
CSA Group - Canadian Standards Association
IAPMO - International Association of Plumbing and Mechanical Officials
ICC - International Code Council
IGSHPA - International Ground Source Heat Pump Association
NFPA - National Fire Protection Association
NSF - NSF International
PPFA - Plastic Pipe and Fittings Association
RPA - Radiant Professionals Alliance
UL - Underwriters Laboratories
ULC - Underwriters Laboratories of Canada
PPI Publications

Social Media

PPI is active in the big three:

- Sharing publications and industry news on [LinkedIn]

- Connecting with users through [Facebook]

- Publishing educational videos with [YouTube]
Summary

Contact PPI BCD at:
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Thank you!