Section 23 21 13
Hydronic Piping
(INSULPEX Pre-insulated PEXa Piping)

This draft specification is for hydronic piping. REHAU supplies flexible insulated PEXa piping with closed-cell foam bonded insulation under the name INSULPEX Pre-insulated PEX Piping.

This draft specification is provided only as an aid in architect's/engineer's development of the final specification and is not intended as a substitute for sound architectural/engineering judgment. The architect/engineer shall be responsible to convert this draft specification into a final specification that meets the functional and aesthetic needs of his/her client, as well as to comply with all applicable codes.

Part 1 - General

1.01 Summary

A. Pre-insulated PEX piping system, where shown on the Drawings and Schedules, shall be hydronic, and shall include the following:
   1. Insulated PEXa pipe and associated fittings.
   2. Installation accessories including insulation kits and end caps.
   3. Supervision and field engineering required for the complete and proper function of the system.

1.02 Related Sections

A. Section 23 83 16 – Radiant-Heating Hydronic Piping

B. Section 33 61 00 – Hydronic Energy Distribution

1.03 References

A. Publications listed here are part of this specification to the extent they are referenced. Where no specific edition of the standard or publication is identified, the current edition shall apply.

B. EN – European Standards Organization

   1. EN 15632 – District Heating Pipes – Pre-insulated flexible pipe systems

C. DIN – German Institute for Standardization (Deutsches Institut für Normung)
   1. DIN 16892 / DIN 16893 – Crosslinked Polyethylene (PE-X) Pipes General Quality Requirements and Dimensions
   2. DIN 4726 – Plastic Piping Used in Warm Water Floor Heating (Warmwasser-Fußbodenheizungen und Heizkörperanbindungen - Rohrleitungen aus Kunststoffen).
   3. DIN 253 – District Heating Pipes – Bonded pipe systems for directly buried hot water networks

D. ISO – International Organization for Standardization
   1. ISO 15875 – Plastic piping systems for hot and cold water installations – Crosslinked Polyethylene (PE-X)
   2. ISO 9001 – Quality Management Systems – Requirements

1.04 Definitions

A. Crosslinked polyethylene, or PEX, is a modified polyethylene material which has undergone a change in the molecular structure using a chemical or a physical process whereby the polymer chains are permanently linked to each other.

B. This specification requires PEX to be designated as PEXa and be manufactured by the high-pressure peroxide method.

1.05 Submittals

A. Provide submittals and shop drawings in accordance with the General requirements and as specified herein.

B. Product Data: Submit manufacturer's Technical Manual, submittal forms, catalog cuts, brochures, specifications, and installation instructions. Submit data in sufficient detail to indicate compliance with the contract documents.
   1. Submit manufacturer's instructions for installation.
   2. Submit data for equipment, fittings, fasteners and associated items necessary for the installation of the piping.

C. Submit pressure loss and flow information for the project specific pipe size(s).

D. Certification
   1. Submit independent certification results for the piping systems from an accredited independent testing laboratory.
   2. The design shall be approved by a professional appropriately licensed in the jurisdiction where the installation will take place, as being complete and accurate.

1.06 Delivery, Storage, and Handling

A. Deliver pipe cut to the length specified by the project, in banded coils. The coils shall be rolled or carried, but not dragged across the ground or concrete surfaces. Coils may be carried using flexible slings wrapped inside the coil. Coils may also be carried with forks covered by plastic sheaths to prevent damage to the pipe.

B. The coils shall be stored upright on a flat surface with no sharp edges, and chocked or braced to prevent rolling or tipping.

C. The coils shall remain strapped or banded while in storage and should not be uncoiled until time of installation.

D. Protect the exposed carrier pipe at the ends of coils from UV (ultraviolet) light with the supplied protective caps, until time of installation.

E. Maximum accumulated UV exposure to not exceed two years for outer jacket.

F. Pipe shall be protected from oil, grease, paint, and other elements as recommended by manufacturer.

1.07 Warranty

A. Provide manufacturer’s standard written warranty.

B. The pipe manufacturer shall warrant the crosslinked polyethylene carrier pipe to be free from defects in material and workmanship for a period of twenty-five (25) years.

Part 2 - Products

2.01 Acceptable Manufacturer

A. REHAU Construction LLC, 1501 Edwards Ferry Road, NE; Leesburg, VA 20176; email: rehau.mailbox@rehau.com; website: na.rehau.com; upon whose products and equipment these specifications are based.

B. No Substitutions allowed.

2.02 Carrier Piping

. Material: Crosslinked polyethylene (PEX) carrier pipe shall conform to the requirements of one or more of the following: ISO 15875 or DIN 16892 and/or DIN 16893. PEX carrier pipe shall have a minimum degree of crosslinking of 70% when tested in accordance with DIN 16892

A. Oxygen Diffusion Barrier: If required for protection against oxygen diffusion, a coextruded barrier layer that limits oxygen diffusion through the PEX carrier pipe to less than 0.32 mg/(m^2*day) at 40°C temperature, as defined by DIN 4726, shall be applied to the PEX carrier pipe.

2.03 Thermal Insulation

. Material: Thermal insulation shall be made from closed-cell polyurethane foam and shall be free from CFCs and HCFCs. Minimum density to be 3.1 lb/ft^3 (50 kg/m^3), measured in accordance with EN 253. Closed cell structure to be minimum 90%. Thermal insulation shall be bonded to carrier pipe.

A. Thermal Conductivity: Closed cell foam insulation shall have a maximum thermal conductivity of 0.15 Btu·in/h·ft^2·°F (0.022 W/m-K), measured in accordance with EN 15632.

B. Permeability: Closed cell foam insulation shall have a maximum water absorption of <10% (vol) in accordance to EN 15632.

2.04 Outer Casing

. Material: Outer casing shall be made from seamless, extruded low-density polyethylene (LDPE).

A. Profile: Outer casing shall have corrugated profile, which improves the structural properties, increases the flexibility and enables lower bend radii. Outer casing shall be fully bonded to thermal insulation.

B. Markings: The outer casing shall be marked with the following information, repeated every 3.3 feet (1.0 meter):
1. Manufacturer name or trade name
2. Carrier pipe nominal size and Standard Dimensional Ratio (SDR)
3. Temperature and pressure ratings
4. Length markings

2.05 Fittings

. General: Mechanical fittings to be of compression-sleeve style, manufactured of metal suitable for the fluid application, in a size suitable for the PEX carrier pipe dimensions.

A. Fittings with Solder-joint Ends: Solder-joint end dimensions shall be in accordance with ASME B16.18, ASME B16.22 or MSS SP-104.

B. Tapered Threaded Ends: Fitting threads shall be right-hand, conforming to ASME B1.20.1, and shall be tapered threads (NPT).

C. SDR11 Compression-Sleeve Fittings: Mechanical compression-sleeve cold-expansion fittings to consist of a metal ribbed insert and a metal compression-sleeve. Fittings must meet the temperature and pressure performance requirements of the PEX carrier pipe.

D. Electrofusion Fittings: Electrofusion fittings used for joining PEXa pipes. Fittings must meet the temperature and pressure performance requirements of the project design.

Part 3 - Execution

3.01 Installation

. Installation and Testing: Install and test products in accordance with manufacturer’s installation instructions.

A. Manufacturer’s installation instructions shall describe the following:
   1. Storage and Handling of Pipes
   2. Trench Preparation
   3. Installing Pipe
   4. Installing Accessories
   5. Installing Fittings
   6. Building Penetrations
   7. Field Insulation Kits
   8. Testing

END OF SECTION