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This specification is a manufacturer-specific proprietary product specification using the proprietary method of specifying applicable to project specifications and master guide specifications. Optional text is indicated by brackets [ ]; delete optional text in final copy of specification. Specifier notes typically precede specification text; delete notes in final copy of specification. Trade/brand names with appropriate symbols typically are used in specifier notes; symbols are not used in specification text. Metric conversion, where used, is soft metric conversion.

This specification is for multi-purpose residential fire suppression systems. These products are manufactured by Uponor and marketed under the names Uponor Plumbing System and Uponor Residential Fire Safety System (formerly AQUASAFE®). Revise the section number and title below to suit project requirements, specification practices and section content. Refer to CSI *2004 MasterFormat* for other section numbers and titles.

SECTION 13930
WET-PIPE FIRE SUPPRESSION SPRINKLERS

PART 1 GENERAL

1.01 SUMMARY

Specifier Note: The work covered by this section includes materials required to supply, install and pressure test crosslinked polyethylene (PEX) tubing manufactured by Uponor as shown on drawings or as specified. For the purpose of this specification, Uponor is hereby referred to as the PEX tubing manufacturer.

A. Section Includes: Multipurpose residential fire suppression system integrated with the potable cold water distribution system, using crosslinked polyethylene (PEX) tubing and ASTM F 1960 cold expansion fittings.

Specifier Note: Article below may be omitted when specifying manufacturer's proprietary products and recommended installation. Retain References Article when specifying products and installation by an industry reference standard. If retained, list standard(s) referenced in this section. Indicate issuing authority name, acronym, standard designation and title. Establish policy for indicating edition date of standard referenced. Conditions of the Contract or Division 1 References Section may establish the edition date of standards. This article does not require compliance with standard. It is a listing of all references used in this section.

1.02 REFERENCES

A. General: Standards listed by reference, including revisions by issuing authority, form a part of this specification section to the extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designation number, title or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.

B. ASTM International

1. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials
2. ASTM E814 Standard Test Method for Fire Tests of Through-penetration Fire Stops
3. ASTM F876 Standard Specification for Crosslinked Polyethylene (PEX) Tubing
4. ASTM F877 Standard Specification for Crosslinked Polyethylene (PEX) Plastic Hot- and Cold-Water Distribution Systems
5. ASTM F1960 Standard Specification for Cold Expansion Fittings with PEX Reinforcing Rings for Use with Cross-linked Polyethylene (PEX) Tubing

C. Underwriters Laboratories, Inc. (UL)

1. UL 1821 Standard for Safety for Thermoplastic Sprinkler Pipe and Fittings for Fire Protection Service

D. American National Standards Institute (ANSI)/National Sanitation Foundation (NSF)

1. ANSI/NSF Standard 14 Plastics Piping System Components and Related Materials
2. ANSI/NSF Standard 61 Drinking Water System Components - Health Effects

E. International Conference of Building Officials (ICBO)

1. ICBO Evaluation Service (ES) Evaluation Report No. 5142

F. Southern Building Code Congress International (SBCCI)

1. SBCCI Standard Plumbing Code (PST and ESI Report #9661)

G. International Plumbing Code (IPC)

H. Building Officials and Code Administrators International (BOCA)

1. 1993 BOCA National Plumbing Code

I. International Association of Plumbing Officials (IAPMO)

1. Uniform Plumbing Code (UPC)

J. National Association of Plumbing, Heating and Cooling Contractors (NAPHCC)

1. National Standard Plumbing Code (NSPC)

K. U.S. Department of Housing and Urban Development (HUD)

1. HUD Material Release No. 1269

L. Plastics Pipe Institute (PPI)

1. PPI Technical Report TR-4/03

M. National Fire Protection Association (NFPA)

1. NFPA 13D Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes

N. Uponor

1. Uponor Residential Fire Safety AQUASAFE Network System Installation Guide
2. Uponor Residential Fire Safety AQUASAFE Looped System Installation Guide
3. Wirsbo AQUAPEX Installation Guide

Specifier Note: Article below should be restricted to statements describing design or performance requirements and functional (not dimensional) tolerances of a complete system. Limit descriptions to composite and operational properties required to link components of a system together and to interface with other systems.

1.03 SYSTEM DESCRIPTION

A. Design Requirements

1. Standard-grade hydrostatic pressure ratings from Plastics Pipe Institute in accordance with TR-3 as listed in TR-4. The following three standard-grade hydrostatic ratings are required.
    a. 200 degrees F (93 degrees C) at 80 psi (551 kPa)
    b. 180 degrees F (82 degrees C) at 100 psi (689 kPa)
    c. 73.4 degrees F (23 degrees C) at 160 psi (1102 kPa)
2. Hydrostatic temperature and pressure rating from Underwriters Laboratories, Inc., in accordance with UL 1821. The following temperature and pressure rating is required for 1/2" Wirsbo AQUAPEX tubing.
    a. 120 degrees F (49 degrees C) at 130 psi (895 kPa)
3. Certification of flame spread/smoke development rating of 25/50 in accordance with ASTM E84 for the following PEX tubing sizes.
    a. ⅜ inch [9.53mm]
    b. ½ inch [12.7mm]

B. Performance Requirements: Provide a multi-purpose residential fire suppression system that integrates the sprinkler system with the domestic cold water distribution system in a way that eliminates stagnation of water and which has been manufactured, fabricated and installed to comply with regulatory agencies and authorities having jurisdiction, and maintain performance criteria stated by the PEX tubing manufacturer without defects, damage or failure.

1. Comply with UL 1821.
2. Comply with ANSI/NSF Standard 14.
3. Comply with ANSI/NSF Standard 61.
4. Comply with NFPA 13D.

Specifier Note: Article below includes submittal of relevant data to be furnished by Contractor before, during or after construction. Coordinate this article with Architect's and Contractor's duties and responsibilities in Conditions of the Contract and Division 1 Submittal Procedures Section.

1.04 SUBMITTALS

A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.

B. Product Data: Submit manufacturer's product submittal data and installation instructions.

C. Shop Drawings: Provide installation drawings indicating of tubing layout, sprinkler locations, manifold locations, plumbing fixtures supported and schedules with details required for installation of the system.

D. Samples: Submit selection and verification samples of piping.

E. Quality Assurance/Control Submittals: Submit the following.

1. Test Reports: Upon request, submit test reports from recognized testing laboratories.
2. Certificates: Submit the following.
   a. Manufacturer's certificate that products comply with specified requirements.
   b. System flow verification results.
   c. Certificate indicating that the installer is authorized to install the manufacturer's products.

F. Closeout Submittals: Submit the following.

1. Warranty documents specified herein.
2. Operation and maintenance data.

Specifier Note: Article below should include statements of prerequisites, standards, limitations and criteria that establish an overall level of quality for products and workmanship for this section. Coordinate article below with Division 1 Quality Assurance Section.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Utilize an installer having demonstrated experience on projects of similar size and complexity and possessing documentation proving successful completion of sprinkler system training by the PEX tubing manufacturer.

Specifier Note: Paragraph below should list obligations for compliance with specific code requirements particular to this section. General statements to comply with a particular code are typically addressed in Conditions of the Contract and Division 1 Regulatory Requirements Section. Repetitive statements should be avoided.

B. Regulatory Requirements and Approvals: Provide domestic potable system that complies with requirements of the following:

1. International Plumbing Code (IPC)
   a. ICBO Evaluation Service (ES) Evaluation Report No. 5142
   b. SBCCI Standard Plumbing Code (PST and ESI Report No. 9661)
2. Building Officials and Code Administrators International (BOCA)
   a. 1993 BOCA National Plumbing Code
3. Uniform Plumbing Code (UPC)
   a. IAPMO Files 3558, 3946 and 3960
4. National Standard Plumbing Code (NSPC)
5. HUD Material Release No. 1269

C. Certifications: Provide letters of certification as follows.

1. Installer is authorized, trained and certified by system manufacturer to install the multi-purpose residential fire safety system.
2. Installer will utilize skilled workers holding a trade qualification license or equivalent, or apprentices under the supervision of a licensed tradesperson.

Specifier Note: Retain paragraph below if pre-installation meeting is required.

D. Pre-installation Meetings: [Specify requirements for meeting.]. Verify project timeline requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

Specifier Note: Article below should include specific protection and environmental conditions required during storage. Coordinate article below with Division 1 Product Requirements Section.

1.06 DELIVERY, STORAGE & HANDLING

A. General: Comply with Division 1 Product Requirement Section.

B. Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.

C. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

D. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.

1. Store PEX tubing in cartons or under cover to avoid dirt or foreign material from being introduced into the tubing.
2. Do not expose PEX tubing to direct sunlight for more than 30 days. If construction delays are encountered, provide cover to portions of tubing exposed to direct sunlight.
3. Do not store sprinkler assemblies or cover plates in areas subject to extreme temperatures over 100 degrees F (38 degrees C).

Specifier Note: Coordinate article below with Conditions of the Contract and with Division 1 Closeout Submittals (Warranty) Section. Use this article to require special or extended warranty or bond covering the work of this section.

1.07 WARRANTY

A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.

B. Manufacturer's Warranty: Submit, for owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights owner may have under contract documents.

1. Warranty shall provide for repair or replacement of any tube or fittings that are proven to be defective.
2. Warranty shall be transferable to subsequent owners.

Specifier Note: Coordinate subparagraph below with manufacturer's warranty requirements.

3. Warranty Period for Wirsbo AQUAPEX tubing used with Uponor ProPEX® fitting systems: 25-year, non-prorated warranty against failure due to defect in material or workmanship, beginning with date of substantial completion.
4. Warranty Period for ProPEX fittings used with Wirsbo AQUAPEX tubing: 25-year, non-prorated warranty against failure due to defect in material or workmanship, beginning with date of substantial completion.
5. Warranty Period for Wirsbo AQUAPEX tubing used with a fitting system other than ProPEX: 10-year, non-prorated warranty against failure due to defect in material or workmanship, beginning with date of substantial completion.
6. Warranty Period for ProPEX fittings used with PEX tubing other than Wirsbo AQUAPEX: 10-year, non-prorated warranty against failure due to defect in material or workmanship, beginning with date of substantial completion.

1.08 MAINTENANCE

A. Extra Materials: Provide [Specify number] additional sprinkler heads for use by owner in building maintenance and repair.

1. Provide sprinkler cabinet to house extra sprinkler heads.

PART 2 PRODUCTS

Specifier Note: Retain article below for proprietary method specification. Add product attributes, performance characteristics, material standards and descriptions as applicable. Use of such phrases as "or equal" or "or approved equal" or similar phrases may cause ambiguity in specifications. Such phrases require verification (procedural, legal and regulatory) and assignment of responsibility for determining "or equal" products.

2.01 MULTI-PURPOSE RESIDENTIAL FIRE SUPPRESSION SYSTEM

Specifier Note: Paragraph below is an addition to CSI *SectionFormat*. Retain, edit or delete paragraph below to suit project requirements and specifier practice.

A. Manufacturer: Uponor, Inc.

1. Contact: 5925 148th Street West, Apple Valley, MN 55124; Telephone: (800) 321-4739, (952) 891-2000; Fax: (952) 891-1409; Website: www.uponor-usa.com.

Specifier Note: Edit Article below to suit project requirements. If substitutions are permitted, edit text below. Add text to refer to Division 1 Project Requirements (Product Substitutions Procedures) Section.

2.02 PRODUCT SUBSTITUTIONS

A. Substitutions: No substitutions permitted.

Specifier Note: Specify materials to be furnished. This article may be omitted and the materials can be included with the description of a manufactured unit, equipment, component or accessory.

2.03 MATERIALS

A. Tubing:

1. Material: Crosslinked polyethylene (PEX) manufactured by PEX-a or Engel method.
2. Type: Wirsbo AQUAPEX

3. Material Standard: Manufactured in accordance with ASTM F876 and ASTM F877 and tested for compliance by an independent third party agency.
4. Standard-grade hydrostatic design and pressure ratings from PPI.
5. Hydrostatic temperature and pressure rating from UL.
6. Minimum Bend Radius (cold bending): No less than 6 times the outside diameter. Bends with a radius less than stated shall require the use of a bend support as supplied by the PEX tubing manufacturer.
7. Nominal Inside Diameter: Provide tubing with nominal inside diameter, in accordance with ASTM F876 as indicated.
    a. 1/2 inch (12.7 mm)

B. Fittings:
1. Material: UNS 3600 series brass.
2. Material Standard: Comply with ASTM F1960.
3. Type: PEX-a cold expansion fitting.
    a. Assembly consisting of brass insert and PEX-a cold expansion ring.

C. Manifolds:
1. Material: Type L copper body with UNS 3600 series brass ProPEX outlet connections.
2. Manifold Type: Uponor ProPEX 1" Copper Manifold.
3. Manifolds will be manufactured with ½" ProPEX fitting brazed to the manifold outlets.

D. Sprinkler Heads with Density of 0.05 gprn per Square Foot:
1. Concealed assembly type shall consist of the following.
    a. Type 316 stainless steel multi-port fitting with four Uponor ProPEX outlets.
    b. Reliable Model RFC 43 (SIN RA0612) heat activated sprinkler set to activate at 165 degrees F (74 degrees C).
    c. Reliable Model CRFCW concealed cover plate designed to detach from the assembly at 135 degrees F (57 degrees C).
    d. Reliable protective construction cap.
2. Recessed pendent type shall consist of the following.
    a. Type 316 stainless steel sprinkler adapter fitting with four Uponor ProPEX outlets.
    b. Reliable Model F1/Res 49 (SIN R3516) heat activated sprinkler set to activate at 155 degrees F (68 degrees C).
    c. Reliable Model F1 or F2 escutcheon.
    d. Reliable protective construction cap.
3. Recessed horizontal sidewall type shall consist of the following.
    a. Type 316 stainless steel sprinkler adapter fitting with four Uponor ProPEX outlets.

b. Reliable Model F1/Res 44 (SIN R3531) heat activated sprinkler set to activate at 155 degrees F (68 degrees C).

c. Reliable Model F1 or F2 escutcheon.

d. Reliable protective construction cap.

PART 3 EXECUTION

Specifier Note: Article below is an addition to the CSI *SectionFormat*. Revise article below to suit project requirements and specifier's practice.

3.01 MANUFACTURER'S INSTRUCTIONS

B. Comply with manufacturer's product data, including product technical bulletins, installation instructions and design drawings, including:

1. Uponor Residential Fire Safety AQUASAFE Network System Installation Guide
2. Uponor Residential Fire Safety AQUASAFE Looped System Installation Guide
3. Wirsbo AQUAPEX Installation Guide

Specifier Note: Specify actions to physically determine that conditions are acceptable to receive primary products of the section.

3.02 EXAMINATION

A. Site Verification of Conditions:

1. Verify that site conditions are acceptable for installation of fire safety system.
2. Do not proceed with installation of fire safety system until unacceptable conditions are corrected.

Specifier Note: Coordinate article below with manufacturer's recommended installation requirements.

3.03 INSTALLATION

A. Uponor Plumbing System:

1. Install the Uponor Plumbing System in accordance with the PEX tubing manufacturer's recommendations and as indicated in the installation handbook.
2. Do not install PEX tubing within 6 inches (152 mm) of gas appliance vents or within 12 inches (305 mm) of any recessed light fixtures.
3. Do not solder within 18 inches (457 mm) of PEX tubing in the same waterline. Make sweat connections prior to making PEX connections.
4. Do not expose PEX tubing to direct sunlight for more than 30 days.
5. Ensure that no glues, solvents, sealants or chemicals come in contact with the tubing without prior permission from the PEX tubing manufacturer.
6. PEX tubing passing through metal studs shall use grommets or sleeves at the penetration.
7. Protect PEX tubing with sleeves where abrasion may occur.
8. Use strike protectors where PEX tubing penetrates a stud or joist and has the potential for being struck with a screw or nail.

9. PEX tubing manufacturer supplied bend supports shall be used where bends are less than six times the outside pipe diameter.
10. Tubing shall be supported to structural members using support methods required by local plumbing codes and the PEX tubing manufacturer's installation handbook.
11. Pressurize the plumbing system with air in accordance with applicable codes or in the absence of applicable codes to a pressure of 25 psi (173 kPa) above normal working pressure of the system.
12. Comply with safety precautions when pressure testing, including use of compressed air, where applicable. Water shall not be used to pressurize the system if ambient air temperature has the possibility of dropping below 32 degrees F (0 degrees C).

B. Uponor Fire Suppression System:

1. Perform no fabrication of piping systems or other components until approval of submittals is received.
2. Install PEX tubing as indicated on the drawings. Comply with shop drawings for tube layout, manifold location and sprinkler configuration.
3. Do not paint the sprinklers or cover plates.
4. Install sprinklers in accordance with the PEX tubing manufacturer’s specifications and NFPA 13D.
5. Ensure sprinklers are positioned so that discharge will not be affected by obstructions such as beams or light fixtures.
6. Ensure sprinklers maintain minimum distances from heat sources as specified in the PEX tubing manufacturer’s installation manual and NFPA 13D.
7. Support tubing to structural members using support methods required by local plumbing codes and the PEX tubing manufacturer's installation handbook.
8. Ensure system meets or exceeds flow requirements specified in hydraulic calculations by completing a flow verification test at sprinkler location identified on the shop drawings.
9. Ensure the protective cap assembly remains in place until construction is complete.

C. Through-penetration Firestop.

1. Ensure one- and two-hour rated through-penetration assemblies have been tested in accordance with ASTM E814.
2. List of firestop manufacturers that list PEX tubing with their firestop systems is available from the PEX tubing manufacturer.

D. Related Products Installation: Refer to other sections listed in Related Sections paragraph herein for related products installation.

Specifier Note: Specify the tests and inspections required for installed or completed work.

3.04 FIELD QUALITY CONTROL

A. Site Tests:

1. Provide flow verification test to confirm system performance meets or exceeds flow requirements as indicated by hydraulic calculations and sprinkler manufacturer's specifications.

2. [Specify applicable test requirements to be performed during and after product installation.]

B. Manufacturer's Field Services: Provide manufacturer's field service consisting of product use recommendations and periodic site visit for inspection of product installation in accordance with the PEX tubing manufacturer's instructions.

1. Site Visits: [Specify number and duration of periodic site visits.]

Specifier Note: Specify the final actions required to clean installed equipment or other completed work to properly function or perform. Coordinate article below with Division 1 Execution Requirements (Cleaning) Section.

3.05 CLEANING

A. Remove temporary coverings and protection of adjacent work areas.

B. Repair or replace damaged installed products.

C. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance.

D. Remove construction debris from project site and legally dispose of debris.

Specifier Note: Specify provisions for protecting work after installation but prior to acceptance by the owner. Coordinate article below with Division 1 Execution Requirements Section.

3.06 PROTECTION

A. Protect installed work from damage due to subsequent construction activity on the site.

END OF SECTION