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**SECTION 21 05 00**  
**FIRE PROTECTION COMMON WORK RESULTS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Above ground piping.
- B. Escutcheons.
- C. Pipe, fittings, sleeves, escutcheons, seals, and connections for sprinkler systems.
- D. Pipe hangers and supports.
- E. Pipe sleeves.
- F. Pipe sleeve-seal systems.
- G. Fire Protection work shall include all final connections and flexible connections to the fire protection system and to related equipment by others, as well as connections serving the fire protection systems (site connections, water connections, indirect waste connections, fire department connections, etc.) and external systems as required.

**1.2 RELATED REQUIREMENTS**

- A. Division 01 - General Requirements
- B. Section 01 00 00 - General Requirements
- C. Section 01 30 00 - Administrative Requirements
- D. Section 01 60 00 - Product Requirements
- E. Section 01 51 00 - Temporary Utilities
- F. Section 01 78 00 - Closeout Submittals
- G. Section 22 00 00 - Plumbing Common Work Results; for additional requirements.
- H. Section 07 84 00 - Firestopping.
- I. Section 09 91 23 - Interior Painting: Preparation and painting of interior fire protection piping systems.
- J. Section 21 05 53 - Identification for Fire Suppression Piping and Equipment: Piping identification.
- K. Section 21 05 53 - Fire Protection Identification for Piping and Equipment
- L. Section 21 13 00 - Fire-Suppression Sprinkler Systems: Sprinkler systems design.

**1.3 REFERENCE STANDARDS**

- A. ASME A112.18.1 - Plumbing Supply Fittings 2018, with Errata.
- B. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250 2020.
- C. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300 2021.
- D. ASME B16.4 - Gray Iron Threaded Fittings: Classes 125 and 250 2021.
- E. ASME B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard 2020.
- F. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings 1999, with Editorial Revision (2022).
- G. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless 2022.
- H. ASTM A536 - Standard Specification for Ductile Iron Castings 1984, with Editorial Revision (2019).
- I. ASTM C592 - Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type) 2022a.
- J. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023.

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- K. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems 2013a (Reapproved 2017).
  - L. AWWA C110/A21.10 - Ductile-Iron and Gray-Iron Fittings 2021.
  - M. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings 2017.
  - N. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast 2017, with Errata (2018).
  - O. AWWA C606 - Grooved and Shouldered Joints 2015.
  - P. FM (AG) - FM Approval Guide Current Edition.
  - Q. NFPA 13 - Standard for the Installation of Sprinkler Systems Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
  - R. UL (DIR) - Online Certifications Directory Current Edition.
  - S. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.
  - T. UL 262 - Gate Valves for Fire-Protection Service; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.
  - U. UL 312 - Check Valves for Fire-Protection Service; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

#### 1.4 **SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
  - B. Submittal Naming: Submittals shall be identified through a numbering system. Throughout Division 21 and 22, submittal numbers are proposed for the mandatory submittals. The numbers are (## ## ## - ### - L).
    - 1. ## ## ## Is the section number or drawing number referenced for the submittal.
      - a. A specification section would be referenced using all of the number for the spec section, it is not limited to just 6 digits.
      - b. A drawing would be referenced as MH601.
    - 2. - indicated a hyphen at the end of the section or drawing number.
    - 3. ### a three number series. The first number is the contractor number. The next two numbers in the sequential number for the submittal for that section.
      - a. 0## - use through Division 21 and 22, for proposed number, contractor responsible for work to change when submitting.
      - b. 1## - Fire Protection Contractor.
      - c. 2## - Plumbing Contractor.
    - 4. - indicated a hyphen at the end of the three number series.
    - 5. L Starting with an A for the first submittal. Each re-submittal shall increase to the following letter.
  - C. Listed manufacturers and series are for reference only and do not promote any single product. Series are provided for reference, and should not be used as an ordering model number. Accessories and options may be custom components purchased separately.
  - D. Shop Drawings: Indicate pipe materials used, jointing methods, supports, and floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.
    - 1. Access panels (21 05 00 - 001 - A)
    - 2. Fire sealants (21 05 00 - 002 - A)
    - 3. Pipe portals (21 05 00 - 003 - A)
  - E. Project Record Documents: Record actual installed locations of components and tag numbering.
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1. Refer to Section 21 05 00 - Fire Protection Common Work Results.
2. Record Documents (21 05 00 - 005 - A)
- F. Coordination Drawings: Indication locations for products and resolve conflicts with other trades.
  1. Refer to Section 21 05 00 - Fire Protection Common Work Results; for general coordination drawings guidelines. Refer to paragraph below for drawing contents.
  2. Coordination Drawings (21 05 00 - 004 - A)
- G. Product Data: Provide manufacturer's most current catalog data sheet for equipment indicating rough-in size, finish, and accessories. Manufacturer's data sheets on each item of equipment and device, shall be clearly marked up to identify the items, accessories and options to be used on the project.
  1. Access panels (21 05 00 - 001 - A)
  2. Fire sealants (21 05 00 - 002 - A)
  3. Pipe portals (21 05 00 - 003 - A)
- H. Operation and Maintenance Data: Include installation instructions and spare parts lists.
  1. Refer to Section 21 05 00 - Fire Protection Common Work Results.
  2. Operation and Maintenance Data Books (21 05 00 - 006 - A)
  3. Operation and Maintenance DVD (21 05 00 - 007 - A)

#### **1.5 QUALITY ASSURANCE**

- A. Installer Qualifications: Company specializing in performing work of the type specified in this section.
  1. Minimum three years experience.
  2. Approved by manufacturer.
- B. Comply with UL (DIR) requirements.
- C. Valves: Bear UL (DIR) product listing label or marking. Provide manufacturer's name and pressure rating marked on valve body.
- D. Products Requiring Electrical Connection: Listed and classified as suitable for the purpose specified and indicated.
- E. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

#### **1.6 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

### **PART 2 PRODUCTS**

#### **2.1 GENERAL REQUIREMENTS**

1. Comply with NFPA 13.
2. See Section 21 13 00.
- B. Welding Materials and Procedures: Comply with ASME BPVC-IX.
- C. Provide system pipes, fittings, sleeves, escutcheons, seals, and other related accessories.

#### **2.2 ABOVE GROUND PIPING**

- A. Steel Pipe: ASTM A53 Schedule 40, black.
  1. Cast Iron Fittings: ASME B16.1, flanges and flanged fittings and ASME B16.4, threaded fittings.
  2. Malleable Iron Fittings: ASME B16.3, threaded fittings and ASTM A47/A47M.
  3. Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, "C" shaped elastomeric sealing gasket, steel bolts, nuts, and washers; galvanized for galvanized pipe.

**2.3 PIPE SLEEVES**

- A. Horizontal or Vertical Piping:
  - 1. Sleeve Length: 1 inch above finished floor.
  - 2. Provide sealant for watertight joint.
  - 3. Blocked Out Floor Openings: Provide 1-1/2 inch angle set in silicon adhesive around opening.
  - 4. Drilled Penetrations: Provide 1-1/2 inch angle ring or square set in silicone adhesive around penetration.
- B. Clearances:
  - 1. Provide allowance for insulated piping.
  - 2. Wall, Floor, Floor, Partitions, and Beam Flanges: 1 inch greater than external; pipe diameter.
  - 3. Rated Openings: Caulked tight with firestopping material complying with ASTM E814 in accordance with Section 07 84 00 to prevent the spread of fire, smoke, and gases.

**2.4 PIPE SLEEVE-SEAL SYSTEMS**

- A. Modular Mechanical Seals:
  - 1. Elastomer-based interlocking links to continuously fill annular space between pipe and wall-sleeve, wall or casing opening.
  - 2. Watertight seal between pipe and wall-sleeve, wall or casing opening.
  - 3. Size and select seal component materials in accordance with service requirements.
  - 4. Glass-reinforced plastic pressure end plates.
- B. Wall Sleeve: PVC material with waterstop collar, and nailer end caps.
- C. Sleeve-Forming Disk: Nonconductive plastic-based material, 3 inch thick.
- D. Pipeline-Casing Seals:
  - 1. End Seals: 1/8 inch, pull-on type, rubber or synthetic rubber based.

**2.5 ESCUTCHEONS**

- A. Manufacturers:
  - 1. Fire Protection Products, Inc: [www.fppi.com/#sle.com/#sle](http://www.fppi.com/#sle.com/#sle).
  - 2. Tyco Fire Protection Products: [www.tyco-fire.com/#sle](http://www.tyco-fire.com/#sle).
  - 3. Viking Group Inc: [www.vikinggroupinc.com/#sle](http://www.vikinggroupinc.com/#sle).
  - 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Material:
  - 1. Chrome-plated.
  - 2. Metals and Finish: Comply with ASME A112.18.1.
- C. Construction:
  - 1. One-piece for mounting on chrome-plated tubing or pipe and split-pattern type elsewhere.
  - 2. Internal spring tension devices or setscrews to maintain a fixed position against a surface.

**2.6 PIPE HANGERS AND SUPPORTS**

- A. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
  - B. Hangers for Pipe Sizes 2 inches and Over: Carbon steel, adjustable, clevis.
  - C. Vertical Support: Steel riser clamp.
  - D. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
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**2.7 MECHANICAL COUPLINGS**

- A. Manufacturers:
  - 1. Victaulic Company; FireLock Style 009H: [www.victaulic.com/#sle](http://www.victaulic.com/#sle).
- B. Rigid Mechanical Couplings for Grooved Joints:
  - 1. Dimensions and Testing: Comply with AWWA C606.
  - 2. Minimum Working Pressure: 300 psig.
  - 3. Housing Material: Fabricate of ductile iron complying with ASTM A536.
  - 4. Housing Coating: Factory applied orange enamel.
  - 5. Gasket Material: EPDM suitable for operating temperature range from minus 30 degrees F to 230 degrees F.
  - 6. Bolts and Nuts: Hot-dipped-galvanized or zinc-electroplated steel.
  - 7. Product:
    - a. Victaulic Company; FireLock Style 009H: [www.victaulic.com](http://www.victaulic.com).

**2.8 GATE VALVES**

- A. Over 2 inches:
  - 1. Iron body, bronze trim, rising stem pre-grooved for mounting tamper switch, handwheel, OS&Y, solid rubber covered bronze or cast iron wedge, flanged ends.

**2.9 BALL VALVES**

- A. Up to and including 2 inches:
  - 1. Bronze two piece body, brass, chrome plated bronze, or stainless steel ball, teflon seats and stuffing box ring, lever handle and balancing stops, threaded ends with union.
- B. Over 2 inches:
  - 1. Cast steel body, chrome plated steel ball, teflon seat and stuffing box seals, lever handle or gear drive handwheel for sizes 10 inches and over, flanged.

**2.10 BUTTERFLY VALVES**

- A. Bronze Body:
  - 1. Stainless steel disc, resilient replaceable seat, threaded or grooved ends, extended neck, handwheel and gear drive and integral indicating device , and built-in tamper proof switch rated 10 amp at 115 volt AC.
- B. Cast or Ductile Iron Body
  - 1. Cast or ductile iron, chrome or nickel plated ductile iron or aluminum bronze disc, resilient replaceable EPDM seat, wafer, lug, or grooved ends, extended neck, handwheel and gear drive and integral indicating device , and internal tamper switch rated 10 amp at 115 volt AC.

**2.11 CHECK VALVES**

- A. Up to and including 2 inches:
  - 1. Bronze body and swing disc, rubber seat, threaded ends.
- B. Over 2 inches:
  - 1. Iron body, bronze trim, swing check with rubber disc, renewable disc and seat, flanged ends with automatic ball check.

**2.12 DRAIN VALVES**

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- A. Ball Valve:
  - 1. Brass with cap and chain, 3/4 inch hose thread.

### **PART 3 EXECUTION**

#### **3.1 PREPARATION**

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and foreign material, from inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

#### **3.2 INSTALLATION**

- A. Install sprinkler system and service main piping, hangers, and supports in accordance with NFPA 13.
- B. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.
- C. Install piping to conserve building space, to not interfere with use of space and other work.
- D. Group piping whenever practical at common elevations.
- E. Sleeve pipes passing through partitions, walls, and floors.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- G. Inserts:
  - 1. Provide inserts for placement in concrete formwork.
  - 2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
  - 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
  - 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
  - 5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.
- H. Pipe Hangers and Supports:
  - 1. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
  - 2. Place hangers within 12 inches of each horizontal elbow.
  - 3. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
  - 4. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
  - 5. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
  - 6. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
    - a. Painting of interior fire suppression systems is specified in Section 09 91 23.
- I. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.
- J. Prepare pipe, fittings, supports, and accessories for finish painting. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc-rich primer to welding.
  - 1. Painting of interior fire suppression systems is specified in Section 09 91 23.
- K. Do not penetrate building structural members unless indicated.

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- L. Provide sleeves when penetrating footings, floors, walls, and partitions. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.
    - 1. Aboveground Piping:
      - a. Pack solid using mineral fiber complying with ASTM C592.
      - b. Fill space with an elastomer caulk to a depth of 0.50 inch where penetrations occur between conditioned and unconditioned spaces.
    - 2. All Rated Openings: Caulk tight with firestopping material complying with ASTM E814 in accordance with Section 07 84 00 to prevent the spread of fire, smoke, and gases.
  - M. Manufactured Sleeve-Seal Systems:
    - 1. Install manufactured sleeve-seal systems in sleeves located in grade slabs and exterior concrete walls at piping entrances into building.
    - 2. Provide sealing elements of the size, quantity, and type required for the piping and sleeve inner diameter or penetration diameter.
    - 3. Locate piping in center of sleeve or penetration.
    - 4. Install field assembled sleeve-seal system components in annular space between sleeve and piping.
    - 5. Tighten bolting for a watertight seal.
    - 6. Install in accordance with manufacturer's recommendations.
  - N. Escutcheons:
    - 1. Install and firmly attach escutcheons at piping penetrations into finished spaces.
    - 2. Provide escutcheons on both sides of partitions separating finished areas through which piping passes.
    - 3. Use chrome plated escutcheons in occupied spaces and to conceal openings in construction.
  - O. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, unions, and couplings for servicing are consistently provided.
  - P. Install valves with stems upright or horizontal, not inverted. Remove protective coatings prior to installation.
  - Q. Provide drain valves at main shut-off valves, low points of piping and apparatus.

### **3.3 CLEANING**

- A. Upon completion of work, clean all parts of the installation.
- B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

**END OF SECTION 21 05 00**