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## 211100 - Facility Fire-Suppression Water-Service Piping

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## **SECTION 21 1100 - FACILITY FIRE-SUPPRESSION WATER-SERVICE PIPING**

### 1.1 SUMMARY

- A. Section includes fire-suppression water-service piping and related components outside the building and service entrance piping through floor into the building and service entrance piping through wall into the building.
- B. Utility-furnished products include water meters that will be furnished to the site, ready for installation by the contractor.
- C. Building Services Identification Labeling – The University has adopted a comprehensive label identification for the distribution systems for all plumbing, fire protection, air, mechanical piping, electrical, fire alarm, controls, telecommunications, audio/visual, and security. The specific label colors, text, and directional flows for each component part are described in a single comprehensive table that is Chapter 5, Appendix A, Building Services Identification labeling. This labeling system must be part of any construction project, even those that are limited to a portion of a building or a single utility system.
- D. See Chapter 5, Division 01, Section 017700.1.1.B.1.i Closeout Procedures - Project Record Documents for equipment list requirements for all equipment provided in this section.

### 1.2 QUALITY ASSURANCE

- A. Regulatory Requirements:
  - 1. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.
  - 2. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.
- B. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. Comply with the "Approval Guide," published by FM Global, or UL's "Fire Protection Equipment Directory" for fire-service-main products.
- E. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-suppression water-service piping.

### 1.3 COORDINATION

- A. Coordinate connection to water main with utility company.

1.4 COPPER TUBE AND FITTINGS

- A. Soft Copper Tube: ASTM B 88, Type K (ASTM B 88M, Type A) and ASTM B 88, Type L (ASTM B 88M, Type B), water tube, annealed temper.
- B. Hard Copper Tube: ASTM B 88, Type K (ASTM B 88M, Type A) and ASTM B 88, Type L (ASTM B 88M, Type B), water tube, drawn temper.
- C. Copper, Solder-Joint Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint pressure type. Furnish only wrought-copper fittings if indicated.
- D. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.
- E. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

1.5 DUCTILE-IRON PIPE AND FITTINGS

- A. Grooved-Joint, Ductile-Iron Pipe: AWWA C151, with cut, rounded-grooved ends.
- B. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell and plain spigot end.
- C. Push-on-Joint, Ductile-Iron Pipe: AWWA C151, with push-on-joint bell and plain spigot end.
- D. Grooved-End, Ductile-Iron Pipe Appurtenances:
  - 1. Manufacturers:
    - a. Anvil International, Inc.
    - b. Shurjoint Piping Products.
    - c. Star Pipe Products.
    - d. Victaulic Company.
  - 2. Grooved-End, Ductile-Iron Fittings: ASTM A 47/A 47M, malleable-iron castings or ASTM A 536, ductile-iron castings with dimensions matching pipe.
  - 3. Grooved-End, Ductile-Iron-Piping Couplings: AWWA C606, for ductile-iron-pipe dimensions. Include ferrous housing sections, gasket suitable for water, and bolts and nuts.
- E. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
  - 1. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.
- F. Push-on-Joint, Ductile-Iron Fittings: AWWA C153, ductile-iron compact pattern.

1. Gaskets: AWWA C111, rubber.

- G. Flanges: ASME B16.1, Class 125, cast iron.

## 1.6 SPECIAL PIPE FITTINGS

- A. Ductile-Iron Flexible Expansion Joints:

1. Manufacturers:

- a. EBAA Iron, Inc.
- b. ROMAC Industries Inc.
- c. Star Pipe Products.

2. Description: Compound, ductile-iron fitting with combination of flanged and mechanical-joint ends complying with AWWA C110 or AWWA C153. Include two gasketed ball-joint sections and one or more gasketed sleeve sections. Assemble components for offset and expansion indicated. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.

3. Pressure Rating: 250 psig (1725 kPa) minimum.

## 1.7 ENCASEMENT FOR PIPING

- A. Standard: ASTM A 674 or AWWA C105.

- B. Material: Linear low-density PE film of 0.008-inch (0.20-mm) or High-density, cross-laminated PE film of 0.004-inch (0.10-mm) minimum thickness.

- C. Form: Sheet or tube.

- D. Color: Black or natural.

## 1.8 JOINING MATERIALS

- A. Gaskets for Ferrous Piping and Copper-Alloy Tubing: ASME B16.21, asbestos free.

- B. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series.

## 1.9 PIPING SPECIALTIES

- A. Transition Fittings: Manufactured fitting or coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

- B. Tubular-Sleeve Pipe Couplings:

1. Manufacturers:

- a. Cascade Waterworks Manufacturing.

- b. Dresser, Inc.; Dresser Piping Specialties.
  - c. Ford Meter Box Company, Inc. (The); Pipe Products Division.
  - d. JCM Industries.
  - e. ROMAC Industries Inc.
  - f. Smith-Blair, Inc.; a Sensus company.
  - g. Viking Johnson.
2. Description: Metal, bolted, sleeve-type, reducing or transition coupling, with center sleeve, gaskets, end rings, and bolt fasteners, and with ends of same sizes as piping to be joined.

#### 1.10 CORPORATION VALVES AND CURB VALVES

##### A. Manufacturers:

1. Amcast Industrial Corporation.
2. Ford Meter Box Company, Inc. (The); Pipe Products Division.
3. Jones, James Company.
4. Master Meter, Inc.
5. McDonald, A. Y. Mfg. Co.
6. Mueller Co.; Water Products Division.
7. Red Hed Manufacturing & Supply.

##### B. Corporation Valves: Comply with AWWA C800. Include saddle and valve compatible with tapping machine and manifold.

1. Service Saddle: Copper alloy with seal and AWWA C800, threaded outlet for corporation valve.
2. Corporation Valve: Bronze body and ground-key plug, with AWWA C800, threaded inlet and outlet matching service piping material.
3. Manifold: Copper fitting with two to four inlets as required, with ends matching corporation valves and outlet matching service piping material.

##### C. Curb Valves: Comply with AWWA C800 for high-pressure service-line valves. Valve has bronze body, ground-key plug or ball, wide tee head, and inlet and outlet matching service piping material.

##### D. Service Boxes for Curb Valves: Similar to AWWA M44 requirements for cast-iron valve boxes. Include cast-iron telescoping top section of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over curb valve and with a barrel approximately 3 inches (75 mm) in diameter.

1. Shutoff Rods: Steel; with tee-handle with one pointed end, stem of length to operate deepest buried valve, and slotted end matching curb valve.

##### E. Meter Valves: Comply with AWWA C800 for high-pressure service-line valves. Include angle- or straight-through-pattern bronze body, ground-key plug or ball, and wide tee head, with inlet and outlet matching service piping material.

1.11 GATE VALVES

A. AWWA Gate Valves:

1. Manufacturers:

- a. American AVK Company; Valves & Fittings Division.
- b. American Cast Iron Pipe Company; American Flow Control Division.
- c. American Cast Iron Pipe Company; Waterous Company Subsidiary.
- d. American R/D.
- e. Clow Valve Company; a division of McWane, Inc.
- f. Crane Co.; Crane Valve Group; Stockham Division.
- g. East Jordan Iron Works, Inc.
- h. Kennedy Valve; a division of McWane, Inc.
- i. M&H Valve Company; a division of McWane, Inc.
- j. Mueller Co.; Water Products Division.
- k. NIBCO INC.
- l. Tyler Pipe; a division of McWane, Inc.; Utilities Division.
- m. U.S. Pipe.

2. 200-psig (1380-kPa), AWWA, Iron, Nonrising-Stem, Metal-Seated Gate Valves:

- a. Description: Gray- or ductile-iron body and bonnet; with cast-iron or bronze double-disc gate, bronze gate rings, bronze stem, and stem nut.
- b. Standard: AWWA C500.
- c. Pressure Rating: 200 psig (1380 kPa).
- d. End Connections: Mechanical joint.
- e. Interior Coating: Complying with AWWA C550.

3. 200-psig (1380-kPa), AWWA, Iron, Nonrising-Stem, Resilient-Seated Gate Valves:

- a. Description: Gray- or ductile-iron body and bonnet; with bronze or gray- or ductile-iron gate, resilient seats, bronze stem, and stem nut.
- b. Standard: AWWA C509.
- c. Pressure Rating: 200 psig (1380 kPa).
- d. End Connections: Mechanical or push-on joint.
- e. Interior Coating: Complying with AWWA C550.

4. 200-psig (1380-kPa), AWWA, Iron, OS&Y, Metal-Seated Gate Valves:

- a. Description: Cast- or ductile-iron body and bonnet; with cast-iron double disc, bronze disc and seat rings, and bronze stem.
- b. Standard: AWWA C500.
- c. Pressure Rating: 200 psig (1380 kPa).
- d. End Connections: Flanged or grooved.

5. 200-psig (1380-kPa), AWWA, Iron, OS&Y, Resilient-Seated Gate Valves:

- a. Description: Cast- or ductile-iron body and bonnet; with bronze, gray-iron, or ductile-iron gate; resilient seats; and bronze stem.

- b. Standard: AWWA C509.
  - c. Pressure Rating: 200 psig (1380 kPa).
  - d. End Connections: Flanged or grooved.
6. Class 125, Bronze, Nonrising-Stem Gate Valves:
- a. Description: Class 125, Type 1; bronze with solid wedge and malleable-iron handwheel.
  - b. Standard: MSS SP-80.
  - c. Pressure Rating: 200 psig (1380 kPa).
  - d. End Connections: Solder joint or threaded.
- B. UL-Listed or FM-Approved Gate Valves:
1. Manufacturers:
- a. American AVK Company; Valve & Fittings Division.
  - b. American Cast Iron Pipe Company; American Flow Control Division.
  - c. American Cast Iron Pipe Company; Waterous Company Subsidiary.
  - d. Clow Valve Company; a division of McWane, Inc.
  - e. Crane Co.; Crane Valve Group; Jenkins Valves.
  - f. Crane Co.; Crane Valve Group; Stockham Division.
  - g. East Jordan Iron Works, Inc.
  - h. Hammond Valve.
  - i. Kennedy Valve; a division of McWane, Inc.
  - j. M&H Valve Company; a division of McWane, Inc.
  - k. Milwaukee Valve Company.
  - l. Mueller Co.; Water Products Division.
  - m. NIBCO INC.
  - n. Shurjoint Piping Products.
  - o. Troy Valve; a division of Penn-Troy Manufacturing, Inc.
  - p. Tyco Fire & Building Products LP.
  - q. United Brass Works, Inc.
  - r. U.S. Pipe.
  - s. Watts Water Technologies, Inc.
2. 175-psig (1200-kPa), UL-Listed or FM-Approved, Iron, Nonrising-Stem Gate Valves:
- a. Description: Iron body and bonnet, bronze seating material, and inside screw.
  - b. Standards: UL 262 and "Approval Guide," published by FM Global, listing.
  - c. Pressure Rating: 175 psig (1200) minimum.
  - d. End Connections: Mechanical or push-on joint.
  - e. Indicator-Post Flange: Include on valves used with indicator posts.
3. 175-psig (1200-kPa), UL-Listed or FM-Approved, Iron, OS&Y, Gate Valves:
- a. Description: Iron body and bonnet and bronze seating material.
  - b. Standards: UL 262 and "Approval Guide," published by FM Global, listing.
  - c. Pressure Rating: 175 psig (1200 kPa) minimum.

- d. End Connections: Flanged or grooved.
- 4. UL-Listed or FM-Approved, OS&Y Bronze, Gate Valves:
  - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - 1) Crane Co.; Crane Valve Group; Crane Valves.
    - 2) Crane Co.; Crane Valve Group; Stockham Division.
    - 3) Milwaukee Valve Company.
    - 4) NIBCO INC.
    - 5) United Brass Works, Inc.
  - b. Description: Bronze body and bonnet and bronze stem.
  - c. Standards: UL 262 and "Approval Guide," published by FM Global, listing.
  - d. Pressure Rating: 175 psig (1200 kPa) minimum.
  - e. End Connections: Threaded.

#### 1.12 GATE VALVE ACCESSORIES AND SPECIALTIES

##### A. Tapping-Sleeve Assemblies:

- 1. Manufacturers:
  - a. American Cast Iron Pipe Company; Waterous Company Subsidiary.
  - b. Clow Valve Company; a division of McWane, Inc.
  - c. East Jordan Iron Works, Inc.
  - d. Flowserve.
  - e. Kennedy Valve; a division of McWane, Inc.
  - f. M&H Valve Company; a division of McWane, Inc.
  - g. Mueller Co.; Water Products Division.
  - h. U.S. Pipe.
- 2. Description: Sleeve and valve compatible with drilling machine.
- 3. Standard: MSS SP-60.
- 4. Tapping Sleeve: Cast-iron, ductile-iron, or stainless-steel, two-piece bolted sleeve with flanged outlet for new branch connection. Sleeve shall match size and type of pipe material being tapped and have recessed flange for branch valve.
- 5. Valve: AWWA, cast-iron, nonrising-stem, metal or resilient-seated gate valve with one raised-face flange mating tapping-sleeve flange.

##### B. Valve Boxes: Comply with AWWA M44 for cast-iron valve boxes. Include top section, adjustable extension of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over valve and with a barrel approximately 5 inches (125 mm) in diameter.

- 1. Operating Wrenches: Steel; with tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.



C. Indicator Posts:

1. Manufacturers:

- a. American AVK Company; Valves & Fittings Division.
- b. American Cast Iron Pipe Company; American Flow Control Division.
- c. American Cast Iron Pipe Company; Waterous Company Subsidiary.
- d. Clow Valve Company; a division of McWane, Inc.
- e. Crane Co.; Crane Valve Group; Stockham Division.
- f. Kennedy Valve; a division of McWane, Inc.
- g. Mueller Co.; Water Products Division.
- h. NIBCO INC.
- i. Tyco Fire & Building Products LP.

2. Description: Vertical-type, cast-iron body with operating wrench, extension rod, and adjustable cast-iron barrel of length required for depth of burial of valve.

3. Standards: UL 789 and "Approval Guide," published by FM Global, listing.

1.13 WATER METERS

Reference Section 224000 2.1.C.1.c

1.14 WATER METER BOXES

1.15 Reference Section 224000 2.1.C.1.e CONCRETE VAULTS

A. Description: Precast, reinforced-concrete vault, designed for A-16 load designation according to ASTM C 857, and made according to ASTM C 858.

B. Ladder: ASTM A 36/A 36M, steel ladder; or PE-encased steel steps.

C. Manhole: ASTM A 48/A 48M, Class No. 35A minimum tensile strength, gray-iron traffic frame and cover.

1. Dimension: 24-inch (610-mm) minimum diameter unless otherwise indicated.

D. Manhole: ASTM A 536, Grade 60-40-18, ductile-iron traffic frame and cover.

1. Dimension: 24-inch (610-mm) minimum diameter unless otherwise indicated.

E. Drain: ASME A112.6.3, cast-iron floor drain with outlet of size indicated. Include body anchor flange, light-duty cast-iron grate, bottom outlet, and integral or field-installed bronze ball or clapper-type backwater valve.

1.16 FIRE HYDRANTS

A. AWWA Dry-Barrel Fire Hydrants:

1. Manufacturers:

- a. American AVK Company; Valves & Fittings Division.
  - b. American Cast Iron Pipe Company; American Flow Control Division.
  - c. American Cast Iron Pipe Company; Waterous Company Subsidiary.
  - d. American Foundry Group, Inc.
  - e. Clow Valve Company; a division of McWane, Inc.
  - f. East Jordan Iron Works, Inc.
  - g. Kennedy Valve; a division of McWane, Inc.
  - h. M&H Valve Company; a division of McWane, Inc.
  - i. Mueller Co.; Water Products Division.
  - j. Troy Valve; a division of Penn-Troy Manufacturing, Inc.
  - k. U.S. Pipe.
2. Description: Post type, with one NPS 4-1/2 (DN 115) and two NPS 2-1/2 (DN 65) outlets; and with 5-1/4-inch (133-mm) main valve, drain valve, and NPS 6 (DN 150) mechanical-joint inlet. Include interior coating according to AWWA C550. Hydrant shall have cast-iron body and compression-type valve opening against pressure and closing with pressure.
  3. Standard: AWWA C502.
  4. Pressure Rating: 150 psig (1035 kPa) minimum or 200 psig (1380 kPa) minimum.

B. UL-Listed, Dry-Barrel Fire Hydrants:

1. Manufacturers:
  - a. American Cast Iron Pipe Company; American Flow Control Division.
  - b. American Cast Iron Pipe Company; Waterous Company Subsidiary.
  - c. American Foundry Group, Inc.
  - d. Clow Valve Company; a division of McWane, Inc.
  - e. East Jordan Iron Works, Inc.
  - f. Kennedy Valve; a division of McWane, Inc.
  - g. M&H Valve Company; a division of McWane, Inc.
  - h. Mueller Co.; Water Products Division.
  - i. Troy Valve; a division of Penn-Troy Manufacturing, Inc.
  - j. U.S. Pipe.
2. Description: Freestanding, with one NPS 4-1/2 (DN 115) and two NPS 2-1/2 (DN 65) outlets; and with 5-1/4-inch (133-mm) main valve, drain valve, and NPS 6 (DN 150) mechanical-joint inlet. Hydrant shall have cast-iron body and compression-type valve opening against pressure and closing with pressure.
3. Standards: UL 246 and "Approval Guide," published by FM Global, listing.
4. Design: Base valve.
5. Pressure Rating: 150 psig (1035 kPa) minimum, 175 psig (1200 kPa) minimum, or 200 psig (1380 kPa) minimum.
6. Outlet Threads: NFPA 1963, with external hose thread used by local fire department. Include cast-iron caps with steel chains.
7. Operating and Cap Nuts: Pentagon, 1-1/2 inches (38 mm) point to flat.
8. Direction of Opening: Hydrant valve opens by turning operating nut to left or counterclockwise.
9. Exterior Finish: Red alkyd-gloss enamel paint unless otherwise indicated.

C. AWWA Wet-Barrel Fire Hydrants:

1. Manufacturers:
  - a. American AVK Company; Valves & Fittings Division.
  - b. Clow Valve Company; a division of McWane, Inc.
  - c. Jones, James Company.
  - d. Mueller Co.; Water Products Division.
2. Description: Post type, with one NPS 4-1/2 (DN 115) and two NPS 2-1/2 (DN 65) outlets and with NPS 6 (DN 150) threaded or flanged inlet, and base section with NPS 6 (DN 150) mechanical-joint inlet. Include interior coating according to AWWA C550.
3. Standard: AWWA C503.
4. Pressure Rating: 150 psig (1035 kPa) minimum, 200 psig (1380 kPa) minimum, or 250 psig (1725 kPa).

D. UL-Listed, Wet-Barrel Fire Hydrants:

1. Manufacturers:
  - a. American AVK Company; Valves & Fittings Division.
  - b. Clow Valve Company; a division of McWane, Inc.
  - c. Jones, James Company.
  - d. Mueller Co.; Water Products Division.
2. Description: Freestanding, with one NPS 4-1/2 (DN 115) and two NPS 2-1/2 (DN 65) outlets and with NPS 6 (DN 150) threaded or flanged inlet, and base section with NPS 6 (DN 150) mechanical-joint inlet.
3. Standards: UL 246 and "Approval Guide," published by FM Global, listing.
4. Design: Wet barrel.
5. Pressure Rating: 150 psig (1035 kPa) minimum, 175 psig (1200 kPa) minimum, or 200 psig (1380 kPa)].
6. Outlet Threads: NFPA 1963, with external hose thread used by local fire department. Include cast-iron caps with steel chains.
7. Operating and Cap Nuts: Pentagon, 1-1/2 inches (38 mm) point to flat.
8. Direction of Opening: Hydrant valves open by turning operating nut to left or counterclockwise.
9. Exterior Finish: Red alkyd-gloss enamel paint unless otherwise indicated.

1.17 FIRE-DEPARTMENT CONNECTIONS

A. Manufacturers:

1. Elkhart Brass Mfg. Company, Inc.
2. Fire-End & Croker Corporation.
3. Guardian Fire Equipment, Inc.
4. Kidde Fire Fighting.
5. Potter Roemer.
6. Reliable Automatic Sprinkler Co., Inc.

- B. Description: Freestanding, with cast-bronze body, thread inlets according to NFPA 1963 and matching local fire-department hose threads, and threaded bottom outlet. Include lugged caps, gaskets, and chains; lugged swivel connection and drop clapper for each hose-connection inlet; 18-inch- (460-mm-) high brass sleeve; and round escutcheon plate.
- C. Standard: UL 405.
- D. Connections: Two NPS 2-1/2 (DN 65) inlets and one NPS 4 (DN 100) or NPS 6 (DN 150) outlet.
- E. Connections: Three or Four NPS 2-1/2 (DN 65) inlets and one NPS 6 (DN 150) outlet.
- F. Connections: Six NPS 2-1/2 (DN 65) inlets and one NPS 6 (DN 150) outlet.
- G. Inlet Alignment: Inline, horizontal or square.
- H. Finish Including Sleeve: Polished chrome plated, Rough chrome plated, or Polished bronze.
- I. Escutcheon Plate Marking: "AUTO SPKR & STANDPIPE."

#### 1.18 ALARM DEVICES

- A. General: UL 753 and "Approval Guide," published by FM Global, listing, of types and sizes to mate and match piping and equipment.
- B. Water-Flow Indicators: Vane-type water-flow detector, rated for 250-psig (1725-kPa) working pressure; designed for horizontal or vertical installation; with two single-pole, double-throw circuit switches to provide isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal when cover is removed.
- C. Supervisory Switches: Single pole, double throw; designed to signal valve in other than fully open position.
- D. Pressure Switches: Single pole, double throw; designed to signal increase in pressure.

END OF SECTION 21 1113