

**SECTION 22 11 13**  
**FACILITY WATER DISTRIBUTION PIPING**

**PART 1 - GENERAL**

**1.01 REFERENCE STANDARDS**

- A. ASME A112.6.3 - Floor Drains; 2022.
- B. ASME B1.20.1 - Pipe Threads, General Purpose, Inch; 2013 (Reaffirmed 2018).
- C. ASME B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 Through NPS 24 Metric/Inch Standard; 2025.
- D. ASSE 1048 - Performance Requirements for Double Check Detector Backflow Prevention Assemblies; 2021e.
- E. ASSE 1060 - Performance Requirements for Outdoor Enclosures for Fluid Conveying Components; 2017 (Reaffirmed 2025).
- F. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- G. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999, with Editorial Revision (2022).
- H. ASTM A48/A48M - Standard Specification for Gray Iron Castings; 2022.
- I. ASTM A536 - Standard Specification for Ductile Iron Castings; 2024.
- J. ASTM A674 - Standard Practice for Polyethylene Encasement for Ductile Iron Pipe; 2022.
- K. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2022.
- L. ASTM C857 - Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures; 2019.
- M. ASTM C858 - Standard Specification for Underground Precast Concrete Utility Structures; 2019.
- N. ASTM F645 - Standard Guide for Selection, Design, and Installation of Thermoplastic Water-Pressure Piping Systems; 2025.
- O. ASTM F1267 - Standard Specification for Metal, Expanded, Steel; 2018 (Reapproved 2023).
- P. AWWA C219 - Bolted Sleeve-Type Couplings for Plain-End Pipe; 2023.
- Q. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service; 2019.
- R. AWWA C502 - Dry-Barrel Fire Hydrants; 2024.
- S. AWWA C503 - Wet-Barrel Fire Hydrants; 2021.
- T. AWWA C504 - Rubber-Seated Butterfly Valves; 2023.
- U. AWWA C508 - Swing-Check Valves for Waterworks Service, 2-In. Through 48-In. (50-mm Through 1,200-mm) NPS; 2025.
- V. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service; 2023.
- W. AWWA C550 - Protective Interior Coatings for Valves and Hydrants; 2024.
- X. AWWA C600 - Installation of Ductile-Iron Mains and Their Appurtenances; 2023.
- Y. AWWA C606 - Grooved and Shouldered Joints; 2022.
- Z. AWWA C651 - Disinfecting Water Mains; 2023.
- AA. AWWA C700 - Cold-Water Meters -- Displacement Type, Metal Alloy Main Case; 2024.
- BB. AWWA C800 - Underground Service Line Valves and Fittings; 2021.
- CC. AWWA M17 - Fire Hydrants: Installation, Field Testing, and Maintenance; 2016.
- DD. AWWA M23 - PVC Pipe—Design and Installation; 2020.
- EE. AWWA M41 - Ductile-Iron Pipe and Fittings; 2009.

- FF. AWWA M44 - Distribution Valves: Selection, Installation, Field Testing, and Maintenance; 2016.
- GG. AWWA M45 - Fiberglass Pipe Design; 2014, with Errata (2020).
- HH. MSS SP-60 - Connecting Flange Joints Between Tapping Sleeves and Tapping Valves; 2021.
- II. MSS SP-80 - Bronze Gate, Globe, Angle, and Check Valves; 2019.
- JJ. NFPA 24 - Standard for the Installation of Private Fire Service Mains and Their Appurtenances; 2025.
- KK. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- LL. NFPA 1963 - Standard for Fire Hose Connections; 2019.
- MM. NSF 61 - Drinking Water System Components - Health Effects; 2024.
- NN. UL 194 - Standard for Gasketed Joints for Ductile-Iron Pipe and Fittings for Fire Protection Service; Current Edition, Including All Revisions.
- OO. UL 246 - Hydrants for Fire-Protection Service; Current Edition, Including All Revisions.
- PP. UL 262 - Gate Valves for Fire-Protection Service; Current Edition, Including All Revisions.
- QQ. UL 312 - Check Valves for Fire-Protection Service; Current Edition, Including All Revisions.
- RR. UL 789 - Indicator Posts for Fire-Protection Service; Current Edition, Including All Revisions.
- SS. UL 1091 - Standard for Butterfly Valves for Fire-Protection Service; Current Edition, Including All Revisions.

## **1.02 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B.

## **1.03 SUMMARY**

- A. This Section includes water-distribution piping and related components outside the building for water, fire standpipe distribution.
- B. Utility-furnished products include water meters that will be furnished to the site, ready for installation.

## **1.04 ACTION SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Detail precast concrete vault assemblies and indicate dimensions, method of field assembly, and components.

## **1.05 INFORMATIONAL SUBMITTALS**

- A. Coordination Drawings: For piping and specialties including relation to other in same area, drawn to scale. Show piping and specialty sizes and valves, meter and specialty locations, and elevations.
- B. Field quality-control test reports.

## **1.06 CLOSEOUT SUBMITTALS**

- A. Operation and Maintenance Data: For water valves and specialties to include in emergency, operation, and maintenance manuals.

## **1.07 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 potable-water piping, including materials, installation, testing, and disinfection.
  - 3. Comply with standards of authorities having jurisdiction for fire-suppression water 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, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. Comply with ASTM F645 for selection, design, and installation of thermoplastic water piping.
- E. Comply with FMG's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire main products.
- F. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-service-main piping for fire suppression.
- G. NSF Compliance:
  - 1. Comply with NSF 61 Annex G for materials for water piping and specialties for domestic water.

## **1.08 DELIVERY, STORAGE, AND HANDLING**

- A. Preparation for Transport: Prepare valves, including fire hydrants, according to the following:
  - 1. Ensure that valves are dry and internally protected against rust and corrosion.
  - 2. Protect valves against damage to threaded ends and flange faces.
  - 3. Set valves in best position for handling. Set valves closed to prevent rattling.
- B. During Storage: Use precautions for valves, including fire hydrants, according to the following:
  - 1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
  - 2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.
- C. Handling: Use sling to handle valves and fire hydrants if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.
- D. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.
- E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.
- F. Protect flanges, fittings, and specialties from moisture and dirt.
- G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

## **1.09 PROJECT CONDITIONS**

- A. Interruption of Existing Water-Distribution: Do not interrupt to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water-distribution according to requirements indicated:
  - 1. Notify NYCHA Field Manager no fewer than two days in advance of proposed interruption of service.
  - 2. Do not proceed with interruption of water-distribution service without NYCHA Field Manager's written permission.

## 1.10 COORDINATION

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

## PART 2 - PRODUCTS

### 2.01 DUCTILE-IRON PIPE AND FITTINGS

- A. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.
  - 1. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
  - 2. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.
- B. Push-on-Joint, Ductile-Iron Pipe: AWWA C151, with push-on-joint bell and plain spigot end unless grooved or flanged ends are indicated.
  - 1. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
  - 2. Gaskets: AWWA C111, rubber.
- C. Grooved-Joint, Ductile-Iron Pipe: AWWA C151, with cut, rounded-grooved ends.
  - 1. Grooved-End, Ductile-Iron Pipe Appurtenances:
    - a. Grooved-End, Ductile-Iron Fittings: ASTM A47/A47M, malleable-iron castings or ASTM A536, ductile-iron castings with dimensions matching pipe.
    - b. 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.
- D. Flanges: ASME 16.1, Class 125, cast iron.

### 2.02 SPECIAL PIPE FITTINGS

- A. Ductile-Iron Rigid Expansion Joints:
  - 1. Description: Three-piece, ductile-iron assembly consisting of telescoping sleeve with gaskets and restrained-type, ductile-iron, bell-and-spigot end sections complying with AWWA C110 or AWWA C153. Select and assemble components for expansion indicated. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.
    - a. Pressure Rating: 250 psig minimum.
- B. Ductile-Iron Flexible Expansion Joints:
  - 1. 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.
    - a. Pressure Rating: 250 psig minimum.
- C. Ductile-Iron Deflection Fittings:
  - 1. Description: Compound, ductile-iron coupling fitting with sleeve and 1 or 2 flexing sections for up to 15-degree deflection, gaskets, and restrained-joint ends complying with AWWA C110 or AWWA C153. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.
    - a. Pressure Rating: 250 psig minimum.

### 2.03 JOINING MATERIALS

- A. Brazing Filler Metals: AWS A5.8, BCuP Series.
- B. Bonding Adhesive for Fiberglass Piping: As recommended by fiberglass piping manufacturer.

- C. Plastic Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

## 2.04 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. 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.
    - a. Standard: AWWA C219.
    - b. Center-Sleeve Material: Manufacturer's standard.
    - c. Gasket Material: Natural or synthetic rubber.
    - d. Pressure Rating: 150 psig, 200 psig minimum.
    - e. Metal Component Finish: Corrosion-resistant coating or material.
- C. Split-Sleeve Pipe Couplings:
  - 1. Description: Metal, bolted, split-sleeve-type, reducing or transition coupling with sealing pad and closure plates, O-ring gaskets, and bolt fasteners.
    - a. Standard: AWWA C219.
    - b. Sleeve Material: Manufacturer's standard.
    - c. Sleeve Dimensions: Of thickness and width required to provide pressure rating.
    - d. Gasket Material: O-rings made of EPDM rubber, unless otherwise indicated.
    - e. Pressure Rating: 150 psig, 200 psig minimum.
    - f. Metal Component Finish: Corrosion-resistant coating or material.
- D. Flexible Connectors:
  - 1. Nonferrous-Metal Piping: Bronze hose covered with bronze wire braid; with copper-tube, pressure-type, solder-joint ends or bronze flanged ends brazed to hose.
  - 2. Ferrous-Metal Piping: Stainless-steel hose covered with stainless-steel wire braid; with ASME B1.20.1, threaded steel pipe nipples or ASME B16.5, steel pipe flanges welded to hose.
- E. Dielectric Fittings:
  - 1. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.
  - 2. Dielectric Unions:
    - a. Description:
      - 1) Standard: ASSE 1079.
      - 2) Pressure Rating: 125 psig minimum at 180 degrees Fahrenheit, 150 psig, 250 psig.
      - 3) End Connections: Solder-joint copper alloy and threaded ferrous.
        - (a) Dielectric Flanges:
    - b. Description:
      - 1) Standard: ASSE 1079.
      - 2) Factory-fabricated, bolted, companion-flange assembly.
      - 3) Pressure Rating: 125 psig minimum at 180 degrees Fahrenheit, 150 psig 175 psig, 300 psig
      - 4) End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.
  - 3. Dielectric-Flange Insulating Kits:
    - a. Description:
      - 1) Nonconducting materials for field assembly of companion flanges.
      - 2) Pressure Rating: 150 psig.

- 3) Gasket: Neoprene or phenolic.
- 4) Bolt Sleeves: Phenolic or polyethylene.
- 5) Washers: Phenolic with steel backing washers.
4. Dielectric Nipples:
  - a. Description:
    - 1) Standard: IAPMO PS 66
    - 2) Electroplated steel nipple complying with ASTM F 1545.
    - 3) Pressure Rating: 300 psig at 225 degrees Fahrenheit.
    - 4) End Connections: Male threaded or grooved.
    - 5) Lining: Inert and noncorrosive, propylene.

## 2.05 CORROSION-PROTECTION PIPING ENCASEMENT

- A. Encasement for Underground Metal Piping:
  1. Standards: ASTM A674 or AWWA C105.
  2. Form: Sheet or tube.
  3. Material: LLDPE film of 0.008-inch (0.20-mm) minimum thickness.
  4. Material: LLDPE film of 0.008-inch (0.20-mm) minimum thickness, or high-density, crosslaminated PE film of 0.004-inch (0.10-mm) minimum thickness.
  5. Material: High-density, crosslaminated PE film of 0.004-inch (0.10-mm) minimum thickness.
  6. Color: Natural.

## 2.06 GATE VALVES

- A. AWWA, Cast-Iron Gate Valves:
  1. 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.
      - 1) Standard: AWWA C500.
      - 2) Minimum Pressure Rating: 200 psig.
      - 3) End Connections: Mechanical joint.
      - 4) Interior Coating: Complying with AWWA C550.
  2. 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.
      - 1) Standard: AWWA C509.
      - 2) Minimum Pressure Rating: 200 psig.
      - 3) End Connections: Mechanical joint.
      - 4) Interior Coating: Complying with AWWA C550.
  3. Nonrising-Stem, High-Pressure, Resilient-Seated Gate Valves:
    - a. Description: Ductile-iron body and bonnet; with bronze or ductile-iron gate, resilient seats, bronze stem, and stem nut.
      - 1) Standard: AWWA C509.
      - 2) Minimum Pressure Rating: 250 psig.
      - 3) End Connections: Push on or mechanical joint.
      - 4) Interior Coating: Complying with AWWA C550.
  4. OS&Y, Rising-Stem, 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.
      - 1) Standard: AWWA C500.
      - 2) Minimum Pressure Rating: 200 psig.
      - 3) End Connections: Flanged.
  5. OS&Y, Rising-Stem, Resilient-Seated Gate Valves:

- a. Description: Cast- or ductile-iron body and bonnet, with bronze or gray- or ductile-iron gate, resilient seats, and bronze stem.
    - 1) Standard: AWWA C509.
    - 2) Minimum Pressure Rating: 200 psig.
    - 3) End Connections: Flanged.
- B. UL/FMG, Cast-Iron Gate Valves:
  - 1. UL/FMG, Nonrising-Stem Gate Valves:
    - a. Description: Iron body and bonnet with flange for indicator post, bronze seating material, and inside screw.
      - 1) Standards: UL 262 and FMG approved.
      - 2) Minimum Pressure Rating: 175 psig.
      - 3) End Connections: Flanged.
  - 2. OS&Y, Rising-Stem Gate Valves:
    - a. Description: Iron body and bonnet and bronze seating material.
      - 1) Standards: UL 262 and FMG approved.
      - 2) Minimum Pressure Rating: 175 psig.
      - 3) End Connections: Flanged.
- C. Bronze Gate Valves:
  - 1. OS&Y, Rising-Stem Gate Valves:
    - a. Description: Bronze body and bonnet and bronze stem.
      - 1) Standards: UL 262 and FMG approved.
      - 2) Minimum Pressure Rating: 175 psig.
      - 3) End Connections: Threaded.
  - 2. Nonrising-Stem Gate Valves:
    - a. Description: Class 125, Type 1, bronze with solid wedge, threaded ends, and malleable-iron handwheel.
      - 1) Standard: MSS SP-80.

## 2.07 GATE VALVE ACCESSORIES AND SPECIALTIES

- A. Tapping-Sleeve Assemblies:
  - 1. Description: Sleeve and valve compatible with drilling machine.
    - a. Standard: MSS SP-60.
    - b. Tapping Sleeve: Cast- or ductile-iron or stainless-steel, two-piece bolted sleeve with flanged outlet for new branch connection. Include sleeve matching size and type of pipe material being tapped and with recessed flange for branch valve.
    - c. Valve: AWWA, cast-iron, nonrising-stem, metal, 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 in diameter.
  - 1. Operating Wrenches: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.
- C. Indicator Posts: UL 789, FMG-approved, vertical-type, cast-iron body with operating wrench, extension rod, and adjustable cast-iron barrel of length required for depth of burial of valve.

## 2.08 CHECK VALVES

- A. AWWA Check Valves:
  - 1. Description: Swing-check type with resilient seat. Include interior coating according to AWWA C550 and ends to match piping.
    - a. Standard: AWWA C508.

- b. Pressure Rating: 175 psig.
- B. UL/FMG, Check Valves:
  1. Description: Swing-check type with pressure rating; rubber-face checks, unless otherwise indicated; and ends matching piping.
    - a. Standards: UL 312 and FMG approved.
    - b. Pressure Rating: 250 psig.

## 2.09 DETECTOR CHECK VALVES

- A. Detector Check Valves:
  1. Description: Galvanized cast-iron body, bolted cover with air-bleed device for access to internal parts, and flanged ends. Include one-piece bronze disc with bronze bushings, pivot, and replaceable seat. Include threaded bypass taps in inlet and outlet for bypass meter connection. Set valve to allow minimal water flow through bypass meter when major water flow is required.
    - a. Standards: UL 312 and FMG approved.
    - b. Pressure Rating: 175 psig.
    - c. Water Meter: AWWA C700, disc type, at least one-fourth size of detector check valve. Include meter, bypass piping, gate valves, check valve, and connections to detector check valve.
  2. Description: Iron body, corrosion-resistant clapper ring and seat ring material, flanged ends, with connections for bypass and installation of water meter.
    - a. Standards: UL 312 and FMG approved.
    - b. Pressure Rating: 175 psig.

## 2.10 BUTTERFLY VALVES

- A. AWWA Butterfly Valves:
  1. Description: Rubber seated.
    - a. Standard: AWWA C504.
    - b. Body: Cast or ductile iron.
    - c. Body Type: Wafer or flanged
    - d. Pressure Rating: 150 psig.
- B. UL Butterfly Valves:
  1. Description: Metal on resilient material seating.
    - a. Standards: UL 1091 and FMG approved.
    - b. Body: Cast or ductile iron.
    - c. Body Type: Wafer or flanged.
    - d. Pressure Rating: 175 psig.
- 1) CORPORATION VALVES AND CURB VALVES
- C. Manufacturers:
- D. Service-Saddle Assemblies: Comply with AWWA C800. Include saddle and valve compatible with tapping machine.
  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.
- E. Curb Valves: Comply with AWWA C800. Include bronze body, ground-key plug or ball, and wide tee head, with inlet and outlet matching service piping material.

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

## 2.11 BACKFLOW PREVENTERS

- A. Double-Check, Detector-Assembly Backflow Preventers:
1. Standards: ASSE 1048 and UL listed or FMG approved.
  2. Operation: Continuous-pressure applications.
  3. Pressure Loss: 5 psig maximum, through middle 1/3 of flow range.
  4. Body: Cast iron with interior lining complying with AWWA C550 or that is FDA approved] [Steel with interior lining complying with AWWA C550 or that is FDA approved, Stainless steel.
  5. End Connections: Flanged.
  6. Configuration: Designed for horizontal, straight through vertical inlet, horizontal center section, and vertical outlet, vertical flow.
  7. Accessories:
    - a. Valves: UL 262, FMG-approved, OS&Y gate type with flanged ends on inlet and outlet.
    - b. Bypass: With displacement-type water meter, shutoff valves, and reduced- pressure backflow preventer.
- B. Backflow Preventer Test Kits:
1. Description: Factory calibrated, with gages, fittings, hoses, and carrying case with test-procedure instructions.

## 2.12 CONCRETE VAULTS

- A. Description: Precast, reinforced-concrete vault, designed for A-16 load designation according to ASTM C857 and made according to ASTM C858.
1. Ladder: ASTM A36/A36M, steel or polyethylene-encased steel steps.
  2. Manhole: ASTM A48/A48M Class No. 35A minimum tensile strength, gray-iron traffic frame and cover.
    - a. Dimension: 24-inch (610-mm) minimum diameter, unless otherwise indicated.
  3. Manhole: ASTM A536, Grade 60-40-18, ductile-iron traffic frame and cover.
    - a. Dimension: 24-inch- (610-mm-) minimum diameter, unless otherwise indicated.
  4. 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.

## 2.13 PROTECTIVE ENCLOSURES

- A. Freeze-Protection Enclosures:
1. Description: Insulated enclosure designed to protect aboveground water piping, equipment, or specialties from freezing and damage, with heat source to maintain minimum internal temperature of 40 degrees Fahrenheit when external temperatures reach as low as minus 34 degrees Fahrenheit.
    - a. Standard: ASSE 1060.
    - b. Class I: For equipment or devices other than pressure or atmospheric vacuum breakers.
    - c. Class I-V: For pressure or atmospheric vacuum breaker equipment or devices. Include drain opening in housing.
      - 1) Housing: Reinforced-aluminum or -fiberglass construction.

- (a) Size: Of dimensions indicated, but not less than those required for access and service of protected unit.
    - (b) Drain opening for units with drain connection.
    - (c) Access doors with locking devices.
    - (d) Insulation inside housing.
    - (e) Anchoring devices for attaching housing to concrete base.
  - 2) Electric heating cable or heater with self-limiting temperature control.
- B. Weather-Resistant Enclosures:
  - 1. Description: Uninsulated enclosure designed to protect aboveground water piping, equipment, or specialties from weather and damage.
    - a. Standard: ASSE 1060.
    - b. Class III: For equipment or devices other than pressure or atmospheric vacuum breakers.
    - c. Class III-V: For pressure or atmospheric vacuum breaker equipment or devices. Include drain opening in housing.
      - 1) Housing: Reinforced-aluminum or -fiberglass construction.
        - (a) Size: Of dimensions indicated, but not less than those required for access and service of protected unit.
        - (b) Drain opening for units with drain connection.
        - (c) Access doors with locking devices.
        - (d) Anchoring devices for attaching housing to concrete base.
- C. Expanded-Metal Enclosures:
  - 1. Description: Enclosure designed to protect aboveground water piping, equipment, or specialties from damage.
    - a. Material: ASTM F1267, expanded metal side and top panels, of weight and with reinforcement of same metal at edges as required for rigidity.
    - b. Type: Type I, expanded, II, expanded and flattened.
    - c. Class: Class 1, uncoated carbon steel. 2, hot-dip, zinc-coated carbon steel, 3, corrosion-resisting steel.
    - d. Finish: Manufacturer's enamel paint.
    - e. Size: Of dimensions indicated, but not less than those required for access and service of protected unit.
    - f. Locking device.
    - g. Lugs or devices for securing enclosure to base.
- D. Enclosure Bases:
  - 1. Description: 4-inch-, 6-inch- minimum thickness precast concrete, of dimensions required to extend at least 6 inches beyond edges of enclosure housings. Include openings for piping.

## 2.14 FIRE HYDRANTS

- A. Dry-Barrel Fire Hydrants:
  - 1. Description: Freestanding, with one NPS 4-1/2 (DN 115) and two NPS 2-1/2 (DN 65) outlets, 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, compression-type valve opening against pressure and closing with pressure.
    - a. Standard: AWWA C502.
    - b. Pressure Rating: 150 psig minimum, 250 psig.
  - 2. Description: Freestanding, with one NPS 4-1/2 (DN 115) and two NPS 2-1/2 (DN 65) outlets, 5-1/4-inch (133-mm) main valve, drain valve, and NPS 6 (DN 150) mechanical-joint inlet. Hydrant shall have cast-iron body, compression- type valve opening against pressure and closing with pressure.

- a. Standards: UL 246, FMG approved.
  - b. Pressure Rating: 150 psig minimum, 250 psig.
  - c. Outlet Threads: NFPA 1963, with external hose thread used by local fire department. Include cast-iron caps with steel chains.
  - d. Operating and Cap Nuts: Pentagon, 1-1/2 inches point to flat.
  - e. Direction of Opening: Open hydrant valve by turning operating nut to left or counterclockwise.
  - f. Exterior Finish: Red alkyd-gloss enamel paint, unless otherwise indicated.
- B. Wet-Barrel Fire Hydrants:
- 1. Description: Freestanding, with one NPS 4-1/2 (DN 115) and two NPS 2-1/2 (DN 65) outlets, 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.
    - a. Standard: AWWA C503.
    - b. Pressure Rating: 150 psig minimum.
  - 2. Description: Freestanding, with one NPS 4-1/2 (DN 115) and two NPS 2-1/2 (DN 65) outlets, NPS 6 (DN 150) threaded or flanged inlet, and base section with NPS 6 (DN 150) mechanical-joint inlet.
    - a. Standards: UL 246 and FMG approved.
    - b. Pressure Rating: 150 psig minimum.
    - c. Outlet Threads: NFPA 1963, with external hose thread used by local fire department. Include cast-iron caps with steel chains.
    - d. Operating and Cap Nuts: Pentagon, 1-1/2 inches point to flat.
    - e. Direction of Opening: Open hydrant valves by turning operating nut to left or counterclockwise.
    - f. Exterior Finish: Red alkyd-gloss enamel paint, unless otherwise indicated.

## 2.15 FLUSHING HYDRANTS

- A. Post-Type Flushing Hydrants:
- 1. Description: Nonfreeze and drainable, of length required for shutoff valve installation below frost line.
    - a. Pressure Rating: 150 psig minimum.
    - b. Outlet: One, with horizontal discharge.
    - c. Hose Thread: NPS 2-1/2 (DN 65), with NFPA 1963 external hose thread for use by local fire department, and with cast-iron cap with brass chain.
    - d. Barrel: Cast-iron or steel pipe with breakaway feature.
    - e. Valve: Bronze body with bronze-ball or plunger closure, and automatic draining.
    - f. Security: Locking device for padlock.
    - g. Exterior Finish: Red alkyd-gloss enamel paint, unless otherwise indicated.
    - h. Inlet: NPS 2 (DN 50) minimum.
    - i. Operating Wrench: One for each unit.

## PART 3 - EXECUTION

### 3.01 EARTHWORK

- A. Refer to Section 310000 "Earth Moving" for excavating, trenching, and backfilling.

### 3.02 PIPING APPLICATIONS

- A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications.
- B. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.

- C. Do not use flanges or unions for underground piping.
- D. Flanges, unions, grooved-end-pipe couplings, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.
- E. Underground water piping NPS 4 to NPS 8 shall be any of the following:
  - 1. Ductile-iron, push-on-joint pipe; ductile-iron, push-on-joint fittings; and gasketed, mechanical-joint pipe; ductile-iron, mechanical-joint fittings; and mechanical, grooved-end pipe; ductile-iron-pipe appurtenances; and grooved joints with retaining glands and necessary rodding.
- F. Aboveground water piping NPS 4 to NPS 8 shall be any of the following:
  - 1. Hard copper tube, ASTM B88, Type L ((ASTM B88M)), Type B); wrought-copper, solder-joint fittings; and brazed joints.
  - 2. Ductile-iron, grooved-end pipe; ductile-iron, grooved-end appurtenances; and grooved joints.
- G. Underground Fire- Main Piping NPS 4 to NPS 12 shall be any of the following:
  - 1. Ductile-iron, push-on-joint pipe; ductile-iron, push-on-joint fittings; and gasketed, mechanical-joint pipe; ductile-iron, mechanical-joint fittings; and mechanical, grooved-end pipe; ductile-iron-pipe appurtenances; and grooved joints with retaining glands and necessary rodding.
- H. Aboveground Fire Main Piping NPS 4 to NPS 12 shall be Schedule 40 steel pipe, grooved-end pipe; ductile-iron-pipe appurtenances; and grooved joints.
- I. Underground Combined Water and Fire Main Piping NPS 6 to NPS 12 shall be any of the following:
  - 1. Ductile-iron, push-on-joint pipe; ductile-iron, push-on-joint fittings; and gasketed, mechanical-joint pipe; ductile-iron, mechanical-joint fittings; and mechanical, grooved-end pipe; ductile-iron-pipe appurtenances; and grooved joints with retaining glands and necessary rodding.

### 3.03 VALVE APPLICATIONS

- A. General Application: Use mechanical-joint-end valves for NPS 3 (DN 80) and larger underground installation. Use threaded- or flanged-end valves for installation in vaults.
  - 1. Use UL/FMG, nonrising-stem gate valves for installation with indicator posts. Use corporation valves and curb valves with ends compatible with piping, for NPS 2 (DN 50) and smaller installation.
- B. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
  - 1. Underground Valves, NPS 4 (DN 100) and Larger, for Indicator Posts: UL/FMG, cast-iron, nonrising-stem gate valves with indicator post.
  - 2. Use the following for valves in vaults and aboveground:
    - a. Gate Valves, NPS 3 (DN 80) and Larger: AWWA, cast iron, OS&Y rising stem, metal seated, AWWA, cast iron, OS&Y rising stem, resilient seated, UL/FMG, cast iron, OS&Y rising stem.
    - b. Check Valves: AWWA C508, UL/FMG, swing type.
  - 3. Pressure-Reducing Valves: Use for water piping in vaults and aboveground to control water pressure.
  - 4. Relief Valves: Use for water- piping in vaults and aboveground.
    - a. Air-Release Valves: To release accumulated air.
    - b. Air/Vacuum Valves: To release or admit large volume of air during filling of piping.
    - c. Combination Air Valves: To release or admit air.
  - 5. Detector Check Valves: Use for water piping in vaults and aboveground to detect unauthorized use of water.

### 3.04 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. See Section 330500 "Common Work Results for Utilities" for piping-system common requirements.

### 3.05 PIPING INSTALLATION

- A. Water-Main Connection: Arrange with utility company for tap of size and in location indicated in water main.
- B. Water-Main Connection: Tap water main according to requirements of water utility company and of size and in location indicated.
- C. Make connections larger than NPS 2 (DN 50) with tapping machine according to the following:
  - 1. Install tapping sleeve and tapping valve according to MSS SP-60.
  - 2. Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
  - 3. Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water piping.
  - 4. Install gate valve onto tapping sleeve. Comply with MSS SP-60. Install valve with stem pointing up and with valve box.
- D. Make connections NPS 2 (DN 50) and smaller with drilling machine according to the following:
  - 1. Install service-saddle assemblies and corporation valves in size, quantity, and arrangement required by utility company standards.
  - 2. Install service-saddle assemblies on water pipe to be tapped. Position outlets for corporation valves.
  - 3. Use drilling machine compatible with service-saddle assemblies and corporation valves. Drill hole in main. Remove drilling machine and connect water-service piping.
  - 4. Install corporation valves into service-saddle assemblies.
  - 5. Install manifold for multiple taps in water main.
  - 6. Install curb valve in water-service piping with head pointing up and with service box.
- E. Comply with NFPA 24 for fire main piping materials and installation.
  - 1. Install PE corrosion-protection encasement according to ASTM A674 or AWWA C105.
  - 2. Install copper tube and fittings according to CDA's "Copper Tube Handbook."
- F. Install ductile-iron, water piping according to AWWA C600 and AWWA M41.
  - 1. Install PE corrosion-protection encasement according to ASTM A674 or AWWA C105.
- G. Install fiberglass AWWA pipe according to AWWA M45.
- H. Bury piping with depth of cover over top at least 30 inches, with top at least below level of maximum frost penetration, and according to the following:
  - 1. Under Driveways: With at least 36 inches cover over top.
  - 2. In Loose Gravelly Soil and Rock: With at least 12 inches additional cover.
- I. Install piping by tunneling or jacking, or combination of both, under streets and other obstructions that cannot be disturbed.
- J. Extend water piping and connect to water-supply source and building-water-piping systems at outside face of building wall in locations and pipe sizes indicated.
  - 1. Terminate water piping at building wall until building-water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building-water-piping systems when those systems are installed.
- K. Sleeves are specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."
- L. Mechanical sleeve seals are specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."
- M. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.

### 3.06 JOINT CONSTRUCTION

- A. See Section 330500 "Common Work Results for Utilities" for basic piping joint construction.
- B. Make pipe joints according to the following:
  - 1. Copper-Tubing, Pressure-Sealed Joints: Use proprietary crimping tool and procedure recommended by copper, pressure-seal-fitting manufacturer.
  - 2. Ductile-Iron Piping, Gasketed Joints for Water Piping: AWWA C600 and AWWA M41.
  - 3. Ductile-Iron Piping, Gasketed Joints for Fire Main Piping: UL 194.
  - 4. Ductile-Iron Piping, Grooved Joints: Cut-groove pipe. Assemble joints with grooved-end, ductile-iron-piping couplings, gaskets, lubricant, and bolts according to coupling manufacturer's written instructions.
  - 5. PE Piping Insert-Fitting Joints: Use plastic insert fittings and fasteners according to fitting manufacturer's written instructions.
  - 6. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
    - a. Dielectric Fittings for NPS 5 and Larger: Use dielectric flange kits.

### 3.07 ANCHORAGE INSTALLATION

- A. Anchorage, General: Install water-distribution piping with restrained joints. Anchorages and restrained-joint types that may be used include the following:
  - 1. Concrete thrust blocks.
  - 2. Locking mechanical joints.
  - 3. Set-screw mechanical retainer glands.
  - 4. Bolted flanged joints.
  - 5. Heat-fused joints.
  - 6. Pipe clamps and tie rods.
- B. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:
  - 1. Gasketed-Joint, Ductile-Iron, Water Piping: According to AWWA C600.
  - 2. Gasketed-Joint, PVC Water Piping: According to AWWA M23.
  - 3. Bonded-Joint Fiberglass, Water Piping: According to AWWA M45.
  - 4. Fire Main Piping: According to NFPA 24.
- C. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

### 3.08 VALVE INSTALLATION

- A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.
- B. AWWA Valves Other Than Gate Valves: Comply with AWWA C600 and AWWA M44.
- C. UL/FMG, Gate Valves: Comply with NFPA 24. Install each underground valve and valves in vaults with stem pointing up and with vertical cast-iron indicator post.
- D. UL/FMG, Valves Other Than Gate Valves: Comply with NFPA 24.
- E. MSS Valves: Install as component of connected piping system.
- F. Corporation Valves and Curb Valves: Install each underground curb valve with head pointed up and with box.
- G. Pressure-Reducing Valves: Install in vault or aboveground between shutoff valves. Install full-size valved bypass.
- H. Relief Valves: Comply with AWWA C512. Install aboveground with shutoff valve on inlet.

### **3.09 DETECTOR-CHECK VALVE INSTALLATION**

- A. Install in vault or aboveground.
- B. Install for proper direction of flow. Install bypass with water meter, gate valves on each side of meter, and check valve downstream from meter.
- C. Support detector check valves, meters, shutoff valves, and piping on brick or concrete piers.

### **3.10 BACKFLOW PREVENTER INSTALLATION**

- A. Install backflow preventers of type, size, and capacity indicated. Include valves and test cocks. Install according to requirements of plumbing and health department and authorities having jurisdiction.
- B. Do not install backflow preventers that have relief drain in vault or in other spaces subject to flooding.
- C. Do not install bypass piping around backflow preventers.
- D. Support NPS 2-1/2 and larger backflow preventers, valves, and piping near floor and on brick or concrete piers.

### **3.11 PROTECTIVE ENCLOSURE INSTALLATION**

- A. Install concrete base level and with top approximately 2 inches above grade.
- B. Install protective enclosure over valves and equipment.
- C. Anchor protective enclosure to concrete base.

### **3.12 FIRE HYDRANT INSTALLATION**

- A. General: Install each fire hydrant with separate gate valve in supply pipe, anchor with restrained joints or thrust blocks, and support in upright position.
- B. Wet-Barrel Fire Hydrants: Install with valve below frost line. Provide for drainage.
- C. AWWA Fire Hydrants: Comply with AWWA M17.
- D. UL/FMG Fire Hydrants: Comply with NFPA 24.

### **3.13 FLUSHING HYDRANT INSTALLATION**

- A. Install post-type flushing hydrants with valve below frost line and provide for drainage. Support in upright position. Include separate gate valve or curb valve and restrained joints in supply piping.
- B. Install ground-type flushing hydrants with valve below frost line and provide for drainage. Install hydrant box flush with grade. Include separate gate valve or curb valve and restrained joints in supply piping.
- C. Install sampling stations with valve below frost line and provide for drainage. Attach weather-resistant housing and support in upright position. Include separate curb valve in supply piping.

### **3.14 CONNECTIONS**

- A. Connect water-distribution piping to interior domestic water and fire-suppression piping.

### **3.15 FIELD QUALITY CONTROL**

- A. Piping Tests: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.
- B. Hydrostatic Tests: Test at not less than one-and-one-half times working pressure for two hours for domestic water. 300 psi for one hour for fire line.
  - 1. Increase pressure in 50-psig (350-kPa) increments and inspect each joint between increments. Hold at test pressure for 1 hour; decrease to 0 psig. Slowly increase again to test pressure and hold for 1 more hour. Maximum allowable leakage is 2 quarts (1.89 L) per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.
- C. Prepare reports of testing activities.

### 3.16 IDENTIFICATION

- A. Install continuous underground detectable warning tape during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping. Underground warning tapes are specified in Section 312000 "Earth Moving."
- B. Permanently attach equipment nameplate or marker indicating plastic water piping, on main electrical meter panel. See Section 330500 "Common Work Results for Utilities" for identifying devices.
- C.

### 3.17 CLEANING

- A. Clean and disinfect water-distribution piping as follows:
  - 1. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.
  - 2. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in NFPA 24 for flushing of piping. Flush piping system with clean, potable water until dirty water does not appear at points of outlet.
  - 3. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or do as follows:
    - a. Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow to stand for 24 hours.
    - b. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow to stand for 3 hours.
    - c. After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.
    - d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.
- B. Prepare reports of purging and disinfecting activities.

**END OF SECTION 22 11 13 22 11 13**