SECTION 22 10 00.01
DISTRIBUTION PIPING (WATER)

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. ASME B1.20.1 - Pipe Threads, General Purpose, Inch; 2013 (Reaffirmed 2018).

B. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2021.

C. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2021.

D. ASME B16.24 - Cast Copper Alloy Pipe Flanges, Flanged Fittings, and Valves: Classes 150, 300, 600, 900, 1500, and 2500; 2021.

E. ASTM A746 - Standard Specification for Ductile Iron Gravity Sewer Pipe; 2018 (Reapproved 2022).

F. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2022.

G. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings; 2020a.

H. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast; 2023.

I. AWWA C153/A21.53 - Ductile-Iron Compact Fittings; 2019.

J. AWWA C219 - Bolted Sleeve-Type Couplings for Plain-End Pipe; 2023.

K. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service; 2019.

L. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service; 2023.

M. AWWA C600 - Installation of Ductile-Iron Mains and Their Appurtenances; 2023.

N. AWWA M41 - Ductile-Iron Pipe and Fittings; 2009.

O. AWWA M44 - Distribution Valves: Selection, Installation, Field Testing, and Maintenance; 2016.

P. NFPA 24 - Standard for the Installation of Private Fire Service Mains and Their Appurtenances; 2025.

Q. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

R. NSF 61 - Drinking Water System Components - Health Effects; 2024.

S. UL 194 - Standard for Gasketed Joints for Ductile-Iron Pipe and Fittings for Fire Protection Service; Current Edition, Including All Revisions.

T. UL 262 - Gate Valves for Fire-Protection Service; Current Edition, Including All Revisions.

U. UL 789 - Indicator Posts 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.

1.03 SUMMARY

A. This Section includes distribution piping and related components for water, fire line and sewer piping.

1.04 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with standards of authorities having jurisdiction for potable-water distribution lines piping, including materials, installation, testing, and disinfection.
2. Comply with standards of authorities having jurisdiction for fire-suppression distribution lines piping, including materials, hose threads, installation, and testing.
3. Comply with standards of authorities having jurisdiction for sewer piping, including materials, installation, testing, and disinfection.

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 FMG's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.

E. NSF Compliance:
1. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.

1.05 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 hand wheels 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.

PART 2 PRODUCTS

2.01 COPPER TUBE AND FITTINGS

A. Hard Copper Tube: ASTM B88, Type K, water tube, drawn temper.
1. Copper, Brazing-Joint Fittings: ASME B16.22, wrought-copper, brazing-joint pressure type.

B. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.

C. 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.

2.02 DUCTILE-IRON PIPE AND FITTINGS

A. Mechanical-Joint, Ductile-Iron Pipe: ANSI/AWWA C151/A21.51, class 56 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 ANSI/AWWA C153/A21.53, ductile-iron compact pattern.
2. Glands and Bolts: AWWA C111, ductile- or gray-iron set screw retainer glands, rubber gaskets, and steel bolts.
3. Gaskets: AWWA C111, rubber, field-lock type such as U.S. Pipe “MJ Field Lok”.
4. Socket Clamps: used in preventing underground pipe joints from separating. Used on ductile iron pipe. All sockets clamps include two steel half clamps, two bolts and nuts and two washers. Used with all thread rods, tie lug or tie bolts for joints.
5. Tie Lugs: are made from ductile iron for use in restraining mechanical joints, valves, fittings, pipe and hydrants with ¾” threaded rod. Cast from high strength ductile iron with a tensile strength of 80,000 psi and a yield strength of 60,000 psi.

B. Push-on-Joint, Ductile-Iron Pipe: AWWA C151, class 56 with push-on-joint bell and plain spigot end conforming to US Pipe “Tyton” joint type 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, field-lock type such as U.S. Pipe “Field Lok 350”.

C. Flanges: ASME 16.1, Class 125, cast iron.

D. Pipe to have interior cement lining and exterior asphaltic coating.

E. All pipes are to be restrained using necessary threaded rod, nuts, washers, retainer clamps, tie lugs, etc.

2.03 STEEL PIPE

A. Interior above grade fire distribution lines piping shall be steel pipe schedule 40 meeting ASTM A 53, ASTM A 135, or ASTM A 795 with 350 psi threaded malleable cast iron fire line fitting meeting ASME B16.3. Approved grooved pipe, couplings and fittings for fire line system as manufactured by Victaulic Company may be used.

2.04 JOINING MATERIALS

A. Brazing Filler Metals: AWS A5.8, BCuP Series containing no more than 15% silver and to be cadmium and lead free.

B. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.05 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: Subject to compliance with requirements, provide products by one of the following:
   a. Cascade Waterworks Manufacturing.
   b. Dresser, Inc.; Dresser Piping Specialties.
   c. Ford Meter Box Company, Inc. (The); Pipe Products Div.
   d. Hays Fluid Controls; a division of ROMAC Industries Inc.
   e. JCM Industries.
   f. Smith-Blair, Inc.
   g. Viking Johnson.
   h. Or approved equal
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.

a. Standard: AWWA C219.
b. Center-Sleeve Material: Manufacturer's standard.
c. Gasket Material: Natural or synthetic rubber.
d. Pressure Rating: 150 psig minimum.
e. Metal Component Finish: Corrosion-resistant coating or material.

C. Seals: Seals around pipes thru building walls shall be modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the conduit and wall opening. Wall seals shall be LINK-SEAL as manufactured by Thunderline Corporation or equal.

D. Escutcheons

2.06 NEAT, SPUN OR STAMPED NO. 25 USSG STEEL, FIRMLY SECURED TO THE PIPES BY MEANS OF EXPANSION BOLTS, CLAMPS OR SET SCREWS. ESCUTCHEONS SHALL BE OF SUFFICIENT OUTSIDE DIAMETER TO AMPLY COVER UP THE SLEEVED OPENINGS FOR THE PIPES.

A. Dielectric Fittings: Combination of copper alloy and ferrous; threaded, solder, or plain end types; and matching piping system materials.
1. Dielectric Unions: Factory-fabricated union assembly, designed for 250-psig minimum working pressure at 180 deg F. Include insulating material that isolates dissimilar metals and ends with inside threads according to ASME B1.20.1.
2. Dielectric Flanges: Factory-fabricated companion-flange assembly, for 150- or 300-psig minimum working pressure to suit system pressures.
3. Dielectric-Flange Insulation Kits: Field-assembled companion-flange assembly, full-face or ring type. Components include neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
a. Provide separate companion flanges and steel bolts and nuts for 150- or 300-psig minimum working pressure to suit system pressures.
4. Dielectric Couplings: Galvanized-steel couplings with inert and noncorrosive thermoplastic lining, with threaded ends and 300-psig minimum working pressure at 225 deg F.
5. Dielectric Nipples: Electroplated steel nipples with inert and noncorrosive thermoplastic lining, with combination of plain, threaded, or grooved end types, and 300-psig minimum working pressure at 225 deg.

2.07 GATE VALVES

A. AWWA, Cast-Iron Gate Valves:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. American AVK Co.; Valves & Fittings Div.
b. American Cast Iron Pipe Co.; American Flow Control Div.
c. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
d. Crane Co.; Crane Valve Group; Stockham Div.
e. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
f. McWane, Inc.; Kennedy Valve Div.
g. McWane, Inc.; M & H Valve Company Div.
h. McWane, Inc.; Tyler Pipe Div.; Utilities Div.
i. Mueller Co.; Water Products Div.
j. NIBCO INC.
k. U.S. Pipe and Foundry Company.
l. Or approved equal
2. 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.

3. 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. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. American Cast Iron Pipe Co.; American Flow Control Div.
   b. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
   c. Crane Co.; Crane Valve Group; Stockham Div.
   d. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
   e. McWane, Inc.; Kennedy Valve Div.
   f. McWane, Inc.; M & H Valve Company Div.
   g. Mueller Co.; Water Products Div.
   h. NIBCO INC.
   i. U.S. Pipe and Foundry Company.
   j. Or approved equal
2. 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: Mechanical.
3. Model G-635-O by Stockham or equal.
4. 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.
      4)

2.08 GATE VALVE ACCESSORIES AND SPECIALTIES

A. 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" for water distribution piping or “FIRE” for fire distribution piping, and bottom section with base that fits over valve and with a barrel approximately 5 inches in diameter. Valve boxes to be Bingham and Taylor Fig. No. 4905 or equal.

B. 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 (for fire distribution line): 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. Window of post shall be approximately 30 inches above grade. Indicator posts shall be Mueller #A-20806, Kennedy #2945A, or equal.

2.09 MANHOLE

A. General
   1. Manholes shall be in strict compliance with requirements of the New York City Department of Environmental Protection.

B. Precast Manhole
   1. Manholes shall be precast reinforced concrete manholes and base, complete with steps, cast iron framed cover and inlets and outlets as required.
   2. Manholes shall consist of vertical precast reinforced concrete sections in accordance with ASTM Spec's C478-H-20 loading. Precast concrete structure, joints, shall be sealed with a continuous ring rubber gasket in accordance with ASTM Spec's C-361 and installed in accordance with manufacturer's instructions. Pipe inlets and outlets shall be sealed with manhole assembly with sealant manufactured by Kor-N-Seal or RES-Seal or approved equal. Cast concrete structures shall be as manufactured by Carolo Industries, Leonard, OMEGA Concrete Products Inc. or equal.
   3. Steps shall be cast iron or steel reinforced copolymer plastic, not less than 10" wide and 12" O.C. extending to within 18" of bottom.
   4. Concrete shall be 4000 psi test strength in 28 days.
   5. Frame and cover shall be cast iron as manufactured by Campbell Foundry Co. 1302A for Lawn and Walkways, 1041 for Traffic and Parking.

2.10 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils 0 inch thick, continuously inscribed with a description of the utility; colored as follows:
   1. Blue: Water systems.

PART 3 EXECUTION

3.01 EARTHWORK

A. Refer to Division 31 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 distribution lines piping (NPS 3 to NPS 12) shall be the following:
   1. Ductile-iron, push-on-joint or mechanical joint pipe.

F. Aboveground water-distribution lines piping (NPS 3 to NPS 8) shall be the following:
   1. Hard copper tube, ASTM B88, Type K and brazed joints.
   2. For pipe > 8” NPS shall be stainless steel as per NYC Plumbing code section 609.

G. Underground Fire distribution lines piping shall be the following:
   1. Ductile-iron, push-on-joint pipe.

H. Aboveground Fire-distribution lines piping shall be steel pipe schedule 40 as indicated on 2.03

I. For emergency piping repairs: Use stainless steel pipe repair clamps manufactured by
   1. The ford Meter Box company

2. Daniel L Jerman Model #DLJ 226 stainless steel pipe repair clamps
3. Romac Industries ,Inc.

J. Underground sewer piping shall be the following:
1. Ductile-iron, push-on-joint pipe as specified above except complying with ASTM A746 and provided with ASTM C564, compression type gaskets.
2.

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.

B. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
1. Underground Valves, NPS 3 (DN 80) and Larger: AWWA, cast-iron, non-rising-stem, metal or resilient seated gate valves with valve box.
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.

3.04 PIPING INSTALLATION

A. Comply with NFPA 24 for fire distribution line piping materials and installation.
1. Install copper tube and fittings according to CDA's "Copper Tube Handbook."

B. Install ductile-iron, water distribution lines piping according to AWWA C600 and AWWA M41.

C. Bury water/fire line piping with depth of cover over top at least 48 inches with top at least and according to the following:
1. In Loose Gravelly Soil and Rock: With at least 12 inches additional cover.

D. Install piping by tunneling or jacking, or combination of both, under streets and other obstructions that cannot be disturbed.

E. Extend site piping and connect to supply source and building- systems at inside of building wall in locations and pipe sizes indicated.
1. New piping shall enter building wall through new core drill opening.

F. For new wall openings, cut opening in wall. Provide new "Link Seals" between wall and pipe. Loosely assemble links with bolts to form a continuous rubber belt around the pipe with a pressure plate under the sleeve. Tightening of the bolts shall cause the rubber sealing elements to expand and provide an absolutely water-tight seal between the pipe and wall opening.

G. Where exposed pipes pass through floors, or ceilings, they shall be fitted with escutcheons, firmly secured to the pipes by means of expansion bolts, clamps or set screws. Escutcheons will not be required in crawl spaces or pipe access spaces. Escutcheons shall be of sufficient outside diameter to amply cover up the sleeved openings for the pipes. Escutcheons shall be primed and painted same color as piping.

3.05 JOINT CONSTRUCTION

A. Make pipe joints according to the following:
1. Ductile-Iron Piping, Gasketed Joints for Water-Service Piping: AWWA C600 and AWWA M41.
2. Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194.
3. 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.

4. Dissimilar Materials Piping Joints: Use adapters compatible with both piping materials, with OD, and with system working pressure.

3.06 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. Valve box to finish flush with surrounding paving or grade.

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.

3.07 CONNECTIONS

A. Connect distribution piping to existing main.

B. Connect distribution piping to interior piping inside buildings with new companion flanges and new nuts and bolts.

3.08 FIELD QUALITY CONTROL

A. Piping Tests: Conduct piping tests before joints are covered. 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.
   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.

3.09 IDENTIFICATION

A. Install continuous underground warning tape during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping.

3.10 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.

B. Prepare reports of purging and disinfecting activities.

END OF SECTION 22 10 00.01 22 10 00.01