

SECTION 33 10 00 WATER UTILITIES

PART 1 - GENERAL

1.1 DESCRIPTION

1. This section specifies materials and procedures for construction of underground water distribution for domestic and/or fire supply systems outside the building that are complete and ready for operation. This includes piping, structures, appurtenances and all other incidentals.

1.2 RELATED WORK

1. Excavation, Trench Widths, Pipe Bedding, Backfill, Shoring, Sheeting, Bracing: Section 31 20 11, EARTH MOVING (SHORT FORM).
2. Concrete: Section 03 30 53, CAST IN-PLACE CONCRETE (SHORT FORM).
3. Submittals: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
4. Erosion and Sediment Control: Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.

1.3 DEFINITIONS

- A. Water distribution system: Pipelines and appurtenances which are part of the distribution system outside the building for potable water and fire supply.
- B. Water service line: Pipeline from main line to 5 feet outside of building.

1.4 ABBREVIATIONS

- A. PVC: Polyvinyl chloride plastic.
- B. DI: Ductile iron pipe.
- C. WOG: Water, Oil and Gas.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Ensure that valves are dry and internally protected against rust and corrosion. Protect valves against damage to threaded ends and flange faces.
- B. Use a 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.

- C. 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.
- D. Protect stored piping from moisture and dirt by elevating above grade. Protect flanges, fittings, and specialties from moisture and dirt.
- E. Store plastic piping protected from direct sunlight and support to prevent sagging and bending.
- F. Cleanliness of Piping and Equipment Systems:
 - 1. Care shall be exercised in the storage and handling of equipment and piping material to be incorporated in the work. Debris arising from cutting, threading and welding of piping shall be removed.
 - 2. Piping systems shall be flushed, blown or pigged as necessary to deliver clean systems.

1.6 COORDINATION

- A. Coordinate connection to water main with Public Utility company.
- B. Coordinate water service lines with building contractor.

1.7 QUALITY ASSURANCE:

- A. Products Criteria:
 - 1. When two or more units of the same type or class of materials or equipment are required, these units shall be products of one manufacturer.
 - 2. A nameplate bearing manufacturer's name or trademark, including model number, shall be securely affixed in a conspicuous place on equipment. In addition, the model number shall be either cast integrally with equipment, stamped, or otherwise permanently marked on each item of equipment.
 - 3. Materials and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of the products for at least three years. Digital electronic devices, software and systems such as controls, instruments or computer work stations shall be the current generation of technology and basic design that has a proven satisfactory service record of at least three years.
- B. Regulatory requirements:
 - 1. Comply with the rules and regulations of the public utility company having jurisdiction over the connection to public water lines and the extension and/or modifications to public utility systems. All the work completed in this section shall comply with the Standard Specifications for Public Works Constructions sponsored and distributed by: Regional Transportation Commission of Washoe County and the City of Reno.

2. Comply with the rules and regulations of the Federal State of Nevada having jurisdiction for potable water-service.
3. Comply with rules and regulations of Federal and City of Reno Fire Department, authorities having jurisdiction for fire-suppression water-service piping including materials, hose threads, installation and testing.
4. Provide certification of factory hydrostatic testing of not less than 500 psi (3.5 MPa) in accordance with AWWA C151. Piping materials shall bear the label, stamp or other markings of the specified testing agency.
5. Before any welding is performed, contractor shall submit a certificate certifying that welders comply with the following requirements:
 - a. Qualify welding processes and operators for piping according to ASME "Boiler and Pressure Vessel Code", Section IX, "Welding and Brazing Qualifications".
 - b. Comply with provisions of ASME B31 series "Code for Pressure Piping".
 - c. Certify that each welder has passed American Welding Society (AWS) qualification tests for the welding processes involved, and that certification is current.
 - d. All welds shall be stamped according to the provisions of the American Welding Society.
6. Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished to the COR prior to installation.
7. Applicable codes:
 - a. Plumbing Systems: IPC, International Plumbing Code.
 - b. Electrical components, devices and accessories shall be listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction and marked for intended use.
 - c. Fire-service main products shall be listed in the FM Global "Approval Guide" or Underwriters Laboratories (UL) "Fire Protection Equipment Directory".

1.8 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

- B. American National Standards Institute (ANSI):
 - MSS SP-60-2004 ...Connecting Flange Joint Between Tapping Sleeves and Tapping Valves
 - MSS SP-108-2002..Resilient-Seated Cast Iron, Eccentric Plug Valves
 - MSS SP-123-1998(R2006)Non-Ferrous Threaded and Solder-Joint Unions for Use With Copper Water Tube
- C. American Society of Mechanical Engineers (ASME):
 - A112.1.2-2004Air Gaps in Plumbing Systems (for Plumbing Fixtures and Water-Connected Receptors))
 - A112.6.3-2001Floor Drains
 - B16.1-2010Gray Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250
 - B16.18-2001Cast Copper Alloy Solder Joint Pressure Fittings
 - B16.22-2001Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
 - B16.24-2006Cast Copper Alloy Pipe Flanges and Flanged Fittings; Classes 150, 300, 600, 900, 1500 and 2500
 - B31Code for Pressure Piping Standards
- D. American Society for Testing and Materials (ASTM):
 - A36/A36M-08.....Carbon Structural Steel
 - A48/A48M-08(2008) Gray Iron Castings
 - A536-84(2009).....Ductile Iron Castings
 - A674-10Polyethylene Encasement for Ductile Iron Pipe for Water or Other Liquids
 - B61-08Steam or Valve Bronze Castings
 - B62-09Composition Bronze or Ounce Metal Castings
 - B88/B88M-09.....Seamless Copper Water Tube
 - C651-05Disinfecting Water Mains
 - C858-10e1Underground Precast Utility Structures
 - D1785-06Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
 - D2239-03.....Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter
 - D2464-06Threaded Poly (Vinyl Chloride) PVC Pipe Fittings, Schedule 80
 - D2466-06Poly (Vinyl Chloride) (PVC) Pipe Fittings, Schedule 40

- D2467-06Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
- D2609-02(2008).....Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe
- D3350-10aPolyethylene Plastics Pipe and Fittings Materials
- F714-10Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter
- F1267-07Metal, Expanded, Steel
- E. American Water Works Association (AWWA):
 - B300-10Hypochlorites
 - B301-10Liquid Chlorine
 - C104-08Cement–Mortar Lining for Ductile Iron Pipe and Fittings
 - C105/A21.5-10.....Polyethylene Encasement for Ductile Iron Pipe Systems
 - C110-08Ductile Iron and Gray-Iron Fittings
 - C111/A21.11-07.....Rubber-Gasket Joints for Ductile Iron Pressure Pipe and Fittings
 - C115/A21.11-11.....Flanged Ductile Iron Pipe with Ductile Iron or Gray-Iron Threaded Flanges
 - C151/A21.51-09.....Ductile Iron Pipe, Centrifugally Cast
 - C153/A21.53-11.....Ductile Iron Compact Fittings for Water Service
 - C502-05Dry-Barrel Fire Hydrants
 - C503-05Wet-Barrel Fire Hydrants
 - C504-10Rubber-Seated Butterfly Valves
 - C508-09Swing-Check Valves for Waterworks Service, 2-In. Through 24-In. (50-mm Through 600-mm) NPS
 - C509-09Resilient-Seated Gate Valves for Water Supply Service
 - C510-07Double Check Valve Backflow Prevention Assembly
 - C511-07Reduced-Pressure Principle Backflow Prevention Assembly
 - C512-07Air Release, Air/Vacuum and Combination Air Valves
 - C550-05Protective Interior Coatings for Valves and Hydrants
 - C600-10Installation of Ductile Iron Mains and Their Appurtenances

- C605-11Underground Installation of Polyvinyl Chloride (PVC)
Pressure Pipe and Fittings for Water
- C606-11Grooved and Shouldered Joints
- C651-05Disinfecting Water Mains
- C700-09Cold-Water Meters, "Displacement Type," Bronze
Main Case
- C800-05Underground Service Line Valves and Fittings
- C900-09Polyvinyl Chloride (PVC) Pressure Pipe and
Fabricated Fittings, 4 In. Through 12 In. (100 mm
Through 300 mm), for Water Transmission and
Distribution
- C906-07Polyethylene (PE) Pressure Pipe and Fittings, 4 In.
(100 mm) Through 64 In. (1,600 mm), for Water
Distribution and Transmission
- C907-04Injection-Molded PVC Pressure Fittings, 4 Inch
through 12 Inch (100 mm through 300 mm), for Water
Distribution
- M23-2nd Ed.PVC Pipe, Design and Installation
- M44-2nd Ed.Distribution Valves: Selection, Installation, Field
Testing and Maintenance
- F. National Fire Protection Association (NFPA):
 - NFPA 24-2010 Ed...Installation of Private Fire Service Mains and Their
Appurtenances
 - NFPA 1963-2009 Ed..... Fire Hose Connections
 - 1. NSF International (NSF):
 - NSF/ANSI 14 (2013)..... Plastics Piping System Components and
Related Materials
 - NSF/ANSI 61-2012 .Drinking Water System Components - Health Effects
 - NSF/ANSI 372-2011 Drinking Water System Components – Lead
Content
- G. American Welding Society (AWS):
 - A5.8/A5.8M-2004 ...Filler Metals for Brazing and Braze Welding
 - 1. American Society of Safety Engineers (ASSE):
 - 1003-2009Water Pressure Reducing Valves
 - 1015-2009.....Double Check Backflow Prevention Assemblies and
Double Check Fire Protection Backflow Prevention
Assemblies

- 1020-2004.....Pressure Vacuum Breaker Assembly
- 1047-2009.....Performance Requirements for Reduced Pressure
Detector Fire Protection Backflow Prevention
Assemblies
- 1048-2009.....Performance Requirements for Double Check
Detector Fire Protection Backflow Prevention
Assemblies
- 1060-2006.....Performance Requirements for Outdoor Enclosures
for Fluid Conveying Components
- H. Underwriters' Laboratories (UL):
 - 246.....Hydrants for Fire-Protection Service
 - 262.....Gate Valves for Fire-Protection Service
 - 312.....Check Valves for Fire-Protection Service
 - 405.....Fire Department Connection Devices
 - 753.....Alarm Accessories for Automatic Water-Supply
Control Valves for Fire Protection Service
 - 789.....Indicator Posts for Fire-Protection Service
 - 1091.....Butterfly Valves for Fire-Protection Service
 - 1285.....Pipe and Couplings, Polyvinyl Chloride (PVC), and
Oriented Polyvinyl Chloride (PVCO) for Underground
Fire Service

1.9 WARRANTY

- A. The Contractor shall remedy any defect due to faulty material or workmanship and pay for any damage to other work resulting therefrom within a period of two years/ from final acceptance. Further, the Contractor will furnish all manufacturers' and supplier's written guarantees and warranties covering materials and equipment furnished under this Contract.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Material or equipment containing a weighted average of greater than 0.25 percent lead shall not be used in any potable water system intended for human consumption, and shall be certified in accordance with NSF/ANSI 61 or NSF 372.
- B. Plastic pipe, fittings, and solvent cement shall meet NSF/ANSI 14 and shall be NSF listed for the service intended.

2.2 FACTORY-ASSEMBLED PRODUCTS

- A. Standardization of components shall be maximized to reduce spare part requirements. The contractor shall guarantee performance of assemblies of components, and shall repair or replace elements of the assemblies as required to deliver specified performance of the complete assembly.

2.3 SAFETY GUARDS

- A. All equipment shall have moving parts protected to prevent personal injury. Pump shafts and couplings shall be fully guarded by a sheet steel guard, covering coupling and shaft but not bearings. Material shall be minimum 16-gauge sheet steel; ends shall be braked and drilled and attached to pump base with minimum of four 1/4 inch (6 mm) bolts. Reinforce guard as necessary to prevent side play forcing guard onto couplings.

2.4 LIFTING ATTACHMENTS

- A. Equipment shall be provided with suitable lifting attachments to enable equipment to be lifted in its normal position. Lifting attachments shall withstand any handling conditions that might be encountered, without bending or distortion of shape, such as rapid lowering and braking of load.

2.5 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, 350 psi (2400 kPa).
 - 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, 350 psi (2400 kPa).
 - 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, round-grooved ends.
 - 1. Grooved-End, Ductile-Iron Pipe Appurtenances: ASTM A47, malleable-iron castings or ASTM A536, ductile-iron castings with dimensions matching pipe, 350 psi (3400 kPa).

2. 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.
3. Gaskets: AWWA C111.
- D. Flanged Ductile Iron Pipe: AWWA C115/A21.11, with factory applied screwed long hub flanges.
 1. Flanges: ASME B16.1 for 125 psi (850 kPa) pressure ratings, as necessary.
 2. Wall Sleeve Castings, size and types shown on the drawings, shall be hot dipped galvanized per ASTM A123.
- E. Cement Mortar Internal Lining: Cement mortar lining and bituminous seal coat as per AWWA C104.
- F. Exterior Pipe Coating: The exterior of pipe shall have the standard asphaltic coating.

2.6 POLYVINYL CHLORIDE PIPE AND FITTINGS

- A. PVC, Schedule 40 Pipe: ASTM D1785.
 1. PVC, Schedule 40 Socket Fittings: ASTM D2466.
- B. PVC, Schedule 80 Pipe: ASTM D1785.
 1. PVC, Schedule 80 Socket Fittings: ASTM D2467.
 2. PVC, Schedule 80 Threaded Fittings: ASTM D2464.
- C. PVC, AWWA Pipe: AWWA C900, Class 150, with bell end with gasket, and with spigot end.
 1. Comply with UL 1285 for fire-service mains if indicated.
 2. PVC Fabricated Fittings: AWWA C900, Class 150, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.
 3. PVC Molded Fittings: AWWA C907, Class 150, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.
 4. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
 - a. Gaskets: AWWA C111, rubber.
 5. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
 - a. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

2.7 PE PIPE AND FITTINGS

- A. PE, ASTM Pipe: ASTM D2239, SDR No. 5.3, 7, or 9; with PE compound number required to give pressure rating not less than 160 psi (1100 kPa).
 - 1. Insert Fittings for PE Pipe: ASTM D2609, made of PA, PP, or PVC with serrated male insert ends matching inside of pipe. Include bands or crimp rings.
 - 2. Molded PE Fittings: ASTM D3350, PE resin, socket- or butt-fusion type, made to match PE pipe dimensions and class.
- B. PE, AWWA Pipe: AWWA C906, DR No. 7.3, 9, or 9.3; with PE compound number required to give pressure rating not less than 160 psi (1100 kPa).
 - 1. PE, AWWA Fittings: AWWA C906, socket- or butt-fusion type, with DR number matching pipe and PE compound number required to give pressure rating not less than 160 psi (1100 kPa) 200 psi (1380 kPa) .
- C. PE, Fire-Service Pipe: ASTM F714, AWWA C906, or equivalent for PE water pipe; FMG approved, with minimum thickness equivalent to FMG Class 150.
 - 1. Molded PE Fittings: ASTM D3350, PE resin, socket-or butt-fusion type, made to match PE pipe dimensions and class.

2.8 COPPER TUBE AND FITTINGS

- A. Soft Copper Tubing: ASTM B88, Type K ASTM B88, Type A and ASTM B88, Type L ASTM B88, Type B water tube, annealed temper.
- B. Hard Copper Tubing: ASTM B88, Type K ASTM B88, Type A and ASTM B88, Type L ASTM B88, Type B water tube, drawn temper.
- C. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper alloy solder joint pressure fittings.
- D. Brazing Alloy: AWS A5.8/A5.8M, Classification BCuP.
- E. Bronze Flanges: ASME B16.24, Class 150, with solder joint ends.
- F. Copper Unions: ANSI MSS SP-123, cast copper alloy, hexagonal-stock body with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.

2.9 VALVES

- A. Gate Valves: AWWA C509, Non-rising Stem, Resilient Seat, 200 psi (1380 kPa).
 - 1. Valves 3 inches (75 mm) and larger: Resilient seat valve with gray- or ductile iron body and bonnet; cast iron or bronze double-disc gate; bronze gate rings; non-rising bronze stem and stem nut.
 - 2. Interior and exterior coating: AWWA C550, thermo-setting or fusion epoxy.

3. Underground valve nut: Furnish valves with 2 inch (50 mm) nut for socket wrench operation.
 4. Aboveground and pit operation: Furnish valves with hand wheels.
 5. End connections shall main line pipe.
- B. Gate Valve Accessories and Specialties
1. Tapping-Sleeve Assembly: ANSI MSS SP-60; sleeve and valve to be compatible with the drilling matching.
 - a. Tapping Sleeve: Cast or Ductile Iron, two-piece bolted sleeve. Sleeve to match the size and type of pipe material being tapped.
 - b. Valve shall include one raised face flange mating tapping-sleeve flange.
 2. Valve Boxes: AWWA M44 with 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.
 3. Operating Wrenches: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut. (Provide two wrenches for Project.)
 4. 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.
- C. Swing Check Valves:
1. Valves smaller than 2 inches (25 mm): ASTM B61, resilient seat, bronze body and bonnet, pressure rating of 200 psi (1380 kPa). Ends to match main line piping.
 2. Valves 2 inches (25 mm) or larger: AWWA 508, resilient seat valve with iron body and bonnet, pressure rating of 200 psi (1380 kPa).
 3. Coating: AWWA C550, fusion epoxy coated.
- D. Detector Check Valves
1. 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, 175 psi (1207 kPa).
 - b. 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. 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, 175 psi (1207 kPa).

E. Butterfly Valves

1. Rubber-Seated Butterfly Valve: AWWA C504.
 - a. Provide rubber seated butterfly valve cast or ductile iron body wafer or flanged, minimum pressure of 150 psi (1035 kPa).
2. UL Butterfly Valve: UL 1091 and FMG approved.
 - a. Provide metal on resilient material seating butterfly valves that are UL 1091 and FMG approved, cast or ductile iron body, wafer or flanged minimum pressure of 175 psi (1207 kPa).

F. Plug Valves: ANSI MSS SP-108, resilient-seated eccentric plug valve, minimum pressure of 175 psi (1207 kPa).

G. Corporation Valves and Curb Valves

1. Service-Saddle Assemblies: AWWA C800.
 - a. Service Saddle: Copper alloy with seal and threaded outlet for corporation valve.
 - b. Corporation Valve: Bronze body and ground-key plug, with threaded inlet and outlet matching service piping material.
 - c. Manifold: Copper fitting with two to four inlets as required, with ends matching corporation valves and outlet matching service piping material.
2. Curb Valves: AWWA C800, bronze body, ground-key plug or ball, wide tee head, with inlet and outlet matching service piping material, minimum pressure of 200 psi (1375 kPa).
3. Service Boxes for Curb Valves: AWWA M44, cast iron telescoping top section; plug shall include lettering "WATER"; bottom section with base that fits over curb valve.
4. Shutoff Rods: Steel, tee-handle with one pointed end. Stem length shall extend 2 feet (600 mm) above top of valve box for operation of deepest buried valve, with slotted end matching curb valve.

H. Post-Indicator: NFPA 24 and be fully compatible with the valve and supervisory switches.

I. Pressure Reducing Valves

1. Not required
- J. Water Control Valves
 1. Not required.
- K. Relief Valves
 1. Air/Vacuum Valve: AWWA C512, Direct-acting, float-operated, hydromechanical device with large orifice to automatically release accumulated air or to admit air during filling of piping.
- L. Pressure Vacuum Breaker Assembly
 1. Not required
- M. Backflow Preventer
 1. Backflow Preventer shall not be located in any area containing fumes that are toxic, poisonous or corrosive.
 2. Direct connections between potable water piping and sewer connected wastes shall not exist under any condition with or without backflow protection.
 3. Backflow Preventer shall be accessed and have clearances for the required testing, maintenance and repair. Access and clearances shall maintain a minimum of 1 foot (305 mm) between the lowest portion of the assembly and grade, floor or platform. Installations elevated more than 5 feet (1524 mm) above the floor or grade shall be provided with a permanent platform capable of supporting a tester or maintenance person.
- N. Reduced-Pressure-Principle Backflow Preventer:
 1. Not required.
- O. Double-Check, Backflow-Prevention Assemblies:
 1. Not required
- P. Reduced-Pressure-Detector, Fire-Protection Backflow Preventer Assemblies: ASSE 1047 and UL listed or FMG approved for continuous-pressure applications.
 1. Not required

2.10 PROTECTIVE ENCLOSURES

- A. Freeze-Protection Enclosures: Designed to protect aboveground water piping, equipment, or specialties from freezing and damage, with heat source to maintain minimum internal temperature of 40 deg F (4 deg C) when external temperatures reach as low as minus 34 deg F (minus 36 deg C) meeting the requirements of ASSE 1060.
 1. Class I, for equipment or devices other than pressure or atmospheric vacuum breakers.

2. Class I-V, for pressure or atmospheric vacuum breaker equipment or devices. Include drain opening in housing.
3. Reinforced -aluminum or -fiberglass housing with dimensions indicated, but not less than those required for access and service of protected unit. Include a drain opening for units with drain connection; access doors with locking devices; insulation inside housing; and anchoring devices for attaching the housing to the concrete base.
4. Include an electric heating cable or heater with self-limiting temperature control.

2.11 FLUSHING HYDRANTS

- A. Post-Type Flushing Hydrants: Non-freeze and drainable, of length required for shutoff valve installation below frost line.
 1. Pressure Rating: 150 psi (1035 kPa) minimum
 2. Outlet: One, with horizontal discharge
 3. Hose Thread: NPS 2-1/2 (DN 65) Insert NPS (Insert DN) , with NFPA 1963 external hose thread for use by local fire department, and with cast iron cap with brass chain
 4. Barrel: Cast iron or steel pipe with breakaway feature
 5. Valve: Bronze body with bronze-ball or plunger closure , and automatic draining
 6. Security: Locking device for padlock
 7. Exterior Finish: Red alkyd-gloss enamel paint.
 8. Inlet: NPS 2 (DN 50) minimum
 9. Operating Wrench: One for each unit
- B. Post-Type Sampling Station: Non-freeze and drainable, of length required for shutoff valve installation below frost line.
 1. Pressure Rating: 100 psi (690 kPa) minimum
 2. Sampling Outlet: One unthreaded nozzle with handle
 3. Valve: Bronze body with bronze-ball or plunger closure . Include operating handle.
 4. Drain: Tubing with separate manual vacuum pump
 5. Inlet: NPS 3/4 (DN 20) minimum
 6. Housing: Weatherproof material with locking device. Include anchor device
 7. Operating Wrench: One for each unit

2.12 FIRE HYDRANTS

- A. All hydrants shall have removable interiors capable of replacement without digging up the hydrant and be packable under pressure. Threaded joints or spindles shall be bronze and upper and lower barrels shall be of equal diameter. Upper barrel shall be of sufficient length to permit setting hydrant with barrel flange not more than 4 inches (100 mm) above finished grade. All fire hydrants shall have 6 inch (150 mm) bottom connection. Provide one of hydrant wrench not less than 14 inches (350 mm) long. Pressure Rating: 150 psi (1035 kPa) minimum. Hydrant valve shall open by turning operating nut to left or counterclockwise. Exterior finish shall be red alkyd-gloss enamel paint, unless otherwise indicated. Outlet threads shall meet NFPA 1963, with external hose thread used by local fire department. Include cast iron caps with steel chains and Pentagon, 1-1/2 inch (38 mm) point to flat operating and cap nuts.
- B. Dry-Barrel Fire Hydrants:
1. AWWA C502, freestanding, 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; interior coating according to AWWA C550; cast iron body, compression-type valve opening against pressure and closing.
 2. UL 246, freestanding, 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; cast iron body, compression-type valve opening against pressure and closing.
- C. Wet-Barrel Fire Hydrants:
1. AWWA C503, 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; interior coating according to AWWA C550.
 1. SPEC WRITER NOTE: Retain subparagraph below for UL/FMG, wet-barrel fire hydrants.
 - b. UL 246, freestanding, 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.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

- A. Use pipe, fittings, and joining methods for piping systems according to the following applications.

1. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.
 2. Do not use flanges or unions for underground piping.
 3. Flanges, unions, grooved-end-pipe couplings, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.
- B. Underground water-service piping NPS 3/4 to NPS 3 (DN 20 to DN 80) shall be the following:
1. Soft copper tube with wrought-copper, solder-joint fittings; and brazed joints.
- C. Underground water-service piping NPS 4 to NPS 8 (DN 100 to DN 200) Insert pipe size range shall be the following:
1. Ductile iron, push-on-joint pipe; ductile iron, push-on-joint fittings; and gasketed.
- D. Water Meter Box Water-Service Piping NPS 3/4 to NPS 2 (DN 20 to DN 50) shall be same as underground water-service piping.
- E. Aboveground Water-Service Piping NPS 3/4 to NPS 3 (DN 20 to DN 80) shall be any of the following:
1. Hard copper tube with wrought-copper, solder-joint fittings; and brazed.
- F. Aboveground water-service piping NPS 4 to NPS 8 (DN 100 to DN 200) shall be any of the following:
1. Ductile iron, grooved-end pipe; ductile iron, grooved-end appurtenances; and grooved joints.
- G. Underground Fire-Service-Main Piping NPS 4 to NPS 12 (DN 100 to DN 300) Insert pipe size range shall be 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.
- H. Aboveground Fire-Service-Main Piping NPS 4 to NPS 12 (DN 100 to DN 300) shall be ductile iron, grooved-end pipe.
- I. Underground Combined Water-Service and Fire-Service-Main Piping NPS 6 to NPS 12 (DN 150 to DN 300) shall be any of the following:
1. Ductile iron, push-on-joint pipe; Ductile Iron, push-on-joint fittings; and gasketed grooved-end pipe; Ductile Iron-pipe appurtenances; and grooved joints.

2. Aboveground and Vault Combined Water Service and Fire-Service-Main Piping NPS 6 to NPS 12 (DN 150 to DN 300) shall be ductile iron, grooved-end pipe; ductile iron-pipe appurtenances; and grooved joints.

3.2 VALVE APPLICATIONS

- A. Use mechanical-joint-end valves for NPS 3 (DN 80) and larger underground installation. Use threaded- or flanged-end valves for installation in vaults. Use UL/FMG, non-rising-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 3 (DN 80) and Larger: AWWA, cast iron, non-rising-stem, metal resilient seated gate valves with valve box.
 2. Underground Valves, NPS 4 (DN 100) and Larger, for Indicator Posts: UL/FMG, cast iron, non-rising-stem gate valves with indicator post.
 3. Use the following for valves in vaults and aboveground:
 - a. Gate Valves, NPS 2 (DN 50) and Smaller: Bronze, non-rising rising stem.
 - b. Gate Valves, NPS 3 (DN 80) and Larger: AWWA, cast iron, OS&Y rising stem, metal seated, cast iron, OS&Y rising stem.
 - c. Check Valves: AWWA C508, swing type.

3.3 DUCTILE IRON PIPE

- A. Install Ductile Iron, water-service piping according to AWWA C600 and AWWA M41-3rd Edition.
 1. Install PE corrosion-protection encasement according to ASTM A674 or AWWA C105/A21.5.
- B. Pipe shall be sound and clean before laying. When laying is not in progress, the open ends of the pipe shall be closed by watertight plug or other approved means.
- C. When cutting pipe is required, the cutting shall be done by machine, leaving a smooth cut at right angles to the axis of the pipe. Bevel cut ends of pipe to be used with push-on bell to conform to the manufactured spigot end. Cement lining shall be undamaged.
- D. Push on joints shall be made in strict accordance with the manufacturer's instruction. Pipe shall be laid with bell ends looking ahead.

3.4 ANCHORAGE INSTALLATION

- A. Install water-distribution piping with restrained joints. Anchorages and restrained-joint types that may be used include: concrete thrust blocks.
- 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-Service Piping: According to AWWA C600.
 - 2. Gasketed-Joint, PVC Water-Service Piping: According to AWWA M23.
 - 3. Fire-Service-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.

3.5 VALVE INSTALLATION

- A. AWWA Valves: Install each underground valve with stem pointing up and with valve box.
- B. UL/FMG, Valves: Install each underground valve and valves in vaults with stem pointing up and with vertical cast iron indicator post.
- C. MSS Valves: Install as component of connected piping system.
- D. Corporation Valves and Curb Valves: Install each underground curb valve with head pointed up and with service box.
- E. Relief Valves: Install aboveground with shutoff valve on inlet.
- F. Raise or lower existing valve and curb stop boxes and fire hydrants to finish grade in areas being graded.

3.6 DETECTOR-CHECK VALVE INSTALLATION

- A. Install in vault or aboveground and for proper direction of flow. Install bypass with water meter, gate valves on each side of meter, and check valve downstream from meter.
- B. Support detector check valves, meters, shutoff valves, and piping on brick or concrete piers.
 - 1. (50 mm) Insert dimension above surface.

3.7 VACUUM BREAKER ASSEMBLY INSTALLATION

- A. Install pressure vacuum breaker assemblies 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 pressure vacuum breaker assemblies in vault or other space subject to flooding.

3.8 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 (DN 65) and larger backflow Preventers, valves, and piping near floor and on brick or concrete piers.

3.9 CONCRETE VAULT INSTALLATION

- A. Install precast concrete vaults according to ASTM C891.

3.10 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.

3.11 FIRE HYDRANT INSTALLATION

- 1. Install each fire hydrant with separate gate valve in supply pipe, anchor with restrained joints or thrust blocks, and support in upright position.
- 2. Install Wet-Barrel Fire Hydrants with valve below frost line. Provide for drainage.

3.12 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties. Install water service lines to a point of connection within approximately 5 feet (1500 mm) outside of building(s) to which service is to be connected and make connections thereto. If building services have not been installed provide temporary caps and mark for future connection.

3.13 FIELD QUALITY CONTROL

- A. 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. Prior to final acceptance, provide a video record of all piping from the building to the municipal connection to show the lines are free from obstructions, properly sloped and joined.
- C. Perform hydrostatic tests at not less than one-and-one-half times working pressure for two hours.
 - 1. Increase pressure in 50-psi (350-kPa) increments and inspect each joint between increments. Hold at test pressure for 1 hour; decrease to 0 psi (0 kPa). 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.
 - 2. Prepare reports of testing activities.

3.14 IDENTIFICATION

- A. Install continuous underground warning tape 12 inches (300 mm) directly over piping.

3.15 CLEANING

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

END OF SECTION 33 10 00