

SECTION 33 10 00 - WATER DISTRIBUTION

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. This Section specifies the requirements for furnishing and installing water lines, laterals, stubs, and appurtenances for both potable and non-potable water distribution systems. The pipe shall be of the size, type and location, and to the lines, grades and elevations shown on the plans and constructed in accordance with these specifications.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 31 23 33 Trenching, Backfilling, and Compaction
- B. Section 31 41 33 Trench Safety
- C. Section 32 84 00 Planting Irrigation

1.3 APPLICABLE PUBLICATIONS

- A. The following publications of the latest issues listed below, but referred to thereafter by basic designation only, form a part of these specifications to the extent indicated by reference thereto:
 - 1. American Water Works Association (AWWA)
 - a. C 500 AWWA Standard for Metal-Seated Gate Valves for Water Supply Service.
 - b. C 900 AWWA Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4" through 12", for Water Transmission and Distribution.
 - c. C 151 AWWA Standard for Ductile Iron Pipe, Centrifugally Cast, for Water
 - d. C 110 AWWA Standard for Ductile-Iron and Gray-Iron Fittings.
 - e. C 105 AWWA Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems.
 - f. C 104 AWWA Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings
 - g. C 701-70 AWWA Standard for Cold-Water Meters-Turbine Type, for Customer Service
 - h. C 703-70 AWWA Standard for Cold Water Meters Fire Service Type
 - 2. American Society for Testing and Materials Standards (ASTM).
 - a. F 645 - Standard Guide for Selection, Design, and Installation of Thermoplastic Water-Pressure Piping Systems
 - 3. National Fire Protection Association (NFPA)

- a. NFPA 24 - Standard for the Installation of Private Fire Service Mains and Their Appurtenances
- b. NFPA 70 – national electric code
- 4. National Sanitation Foundation International (NSF)
 - a. NSF 14 Plastics Piping System Components and Related Materials
 - b. NSF 61 Drinking Water System Components - Health Effects

1.4 PROJECT/SITE CONDITIONS

- A. Interruption of Existing Water-Distribution Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water-distribution service according to requirements indicated:
 - 1. Follow the University of Houston’s Plant Operations Planned and Emergency Utility Outage Policy.
- B. Do not proceed with interruption of water-distribution service without prior approval and coordination with local municipal water supplier.

1.5 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.
- C. Coordination Drawings: For piping and specialties including relation to other services in same area, drawn to scale. Show piping and specialty sizes and valves, meter and specialty locations, and elevations.
- D. Field quality-control test reports.

1.6 DEFINITIONS

- A. LLDPE: Linear, low-density polyethylene plastic.
- B. PE: Polyethylene plastic.
- C. PP: Polypropylene plastic.
- D. PVC: Polyvinyl chloride plastic.

1.7 QUALITY ASSURANCE

- A. Regulatory Requirements for potable water systems:

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-service piping, including materials, installation, testing, and disinfection.
 3. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.
- B. Regulatory Requirements for Non-potable water systems
1. The system shall be comprised of purple components. Use purple colored pipe, Pantone 522 embossed or integrally stamped/marked in English and in Spanish "CAUTION RECLAIMED WATER DO NOT DRINK" and "AGUA DE RECUPERACIÓN - NO BEBER".
 2. A minimum of an eight inch by eight inch sign, in English and Spanish, is prominently posted on/in the area that reads "Reclaimed Water – Do not drink" and "AGUA DE RECUPERACIÓN - NO BEBER" on the storage tank of such non-potable system if within the construction site.
- C. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- D. 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.
1. Comply with ASTM F 645 for selection, design, and installation of thermoplastic water piping.
 2. Comply with FMG's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.

PART 2 - PRODUCTS

2.1 PIPE

- A. For water line construction 9 feet or more from any existing or proposed sanitary sewer, all materials and equipment shall be:
1. New, or best grade and standard manufacture.
 2. PVC pipe and joints shall conform to AWWA C-900, latest edition, schedule 40 for 150 PSI rated systems and schedule 80 for 200 PSI rated systems.
 3. Ductile iron pipe shall conform to AWWA C 151, pipe class per Table 51.1, latest edition, standard outside coating with cement mortar lining to AWWA C 104 standards. All ductile iron pipe and fittings shall be wrapped with polyethylene per AWWA C 105.
 4. Fittings shall conform to AWWA C 110, latest edition, Pressure Rated 150 psi, 250 psi, 350 psi as directed by the engineer wrapped with polyethylene per AWWA C 105.

- B. For construction within 9 feet of any existing or proposed sanitary sewer and all water services, all materials and equipment shall be:
 - 1. New, or best grade and standard manufacture.
 - 2. Ductile iron pipe shall conform to AWWA C 151, latest edition, standard outside coating with cement mortar lining to AWWA C104 standards. Wrap pipe with 8 mil polyethylene.
 - 3. PVC pipe and joints shall conform to AWWA C-900 - 200 psi pressure pipe.
 - 4. Fittings shall conform to AWWA C 110, latest edition, Pressure Rated 250 PSI, wrapped with polyethylene per AWWA C 105.
- C. For offsets of water mains 6" and larger required to miss conflicts with other lines or objects, steel pipe shall be used meeting the requirements of AWWA 200, Schedule 40.

2.2 VALVES

- A. Line Valves:
 - 1. Valves shall have a minimum working pressure of not less than 175 PSI.
 - 2. The operating nut shall be 2-inch square and shall have an arrow, cast in the metal, indicating the counter-clockwise direction of opening.
 - 3. Gate valves shall conform to AWWA C 500, latest edition, standard NRS bronze double disk type.
 - 4. Valves shall have push-on or mechanical joint hubs.
- B. Tapping Valves:
 - 1. Tapping valves shall conform to AWWA Standard C 500, latest edition, standard NRS bronze double disc type water works valve.
 - 2. The operating nut shall be 2-inch square and shall have an arrow, cast in the metal, indicating the counter-clockwise direction of opening.
 - 3. Inlet shall be a Class 125 flange with a machined projection.
 - 4. Outlet shall be a standard push-on or mechanical joint.
 - 5. Valves shall have a minimum working pressure of not less than 175 psi.
- C. Valves for Meter Installation:
 - 1. Commercial meter valves shall meet the specifications for line valves except that they shall have a handwheel, Class 125 flanges and shall open counter-clockwise.
 - 2. Fire flow meter valves shall be OS&Y double disc valves (line valves only), Fire Marshall approved, clockwise to close with Class 125 flanges.

2.3 VALVE BOXES

- A. Valve boxes shall be installed over each line and tapping valve except as otherwise noted.
- B. Lids shall be cast with the word "Water".
- C. Valve boxes shall be extension type with screw or locking slide adjustment with flapped base.

2.4 FIRE HYDRANTS

- A. Fire hydrants shall be as manufactured by Mueller Company, or approved equal, AWWA type, No. A 24015, 3 way 5 1/4 inch valve opening, bury as shown to a depth shown, 6 inch MJ shoe, open left, 1 1/2 inch top operating nut, 2 1/2 inch hose coupling, 4 1/2 inch pumper connection with national standard threads.

2.5 METERS

- A. Meters for closed loop chilled water, hot water, condenser solutions for HVAC; process water and water mixtures; and domestic water applications shall be Onicon F-1200 Series Turbine Flow with BACnet option installed (Basis of Design) or approved equal.
- B. For general purpose detector situations involving water and wastewater, reclaimed water, bi-directional flow applications, chemical, pharmaceutical, and food and beverage applications, meter shall be Badger Mag Meter M2000 (Basis of Design) or approved equal.

2.6 WATER

- A. All water used for testing and sterilizing must be supplied by municipal supplies approved by the state's Department of Health.

PART 3 - EXECUTION

3.1 LOWERING/RELOCATING EXISTING WATER LINES

- A. Water lines to be lowered/relocated shall not be shut down without prior approval of the local governing agency.
- B. Contractor shall install necessary valves so as not to disrupt service outside limits of water lines to be lowered/relocated whether or not indicated on the plans.
- C. Whether or not indicated on the plans, the lowered/relocated water line shall have minimum of four (4) feet of cover. Location shall be a minimum distance from existing location as necessary to facilitate construction.
- D. If the lowered/relocated water lines are of potable water systems, they shall be required to meet same hydrostatic and sterilization test results as new water lines.
- E. Installation of lowered/relocated water lines shall meet the same requirements of new water lines as in paragraph 3.2 below.

3.2 INSTALLATION

- A. The interior of the pipe shall be thoroughly cleaned of all foreign matter before lowered into the trench, and shall be kept clean during these operations.
- B. Pipes for potable water lines shall not be laid in water, or when trench or weather conditions are unsuitable for work.
- C. For potable water line installation, when work is not in progress, open ends of pipes and fittings shall be securely closed so that water, earth, or other substances will not enter the pipes or fittings.
- D. All bends, tees, valves, and plugs shall have thrust blocks installed in accordance with the details on the plans. Thrust blocking will be installed such that joints will be accessible for inspection and repair. Concrete used in thrust blocking shall have a compressive strength of at least 3,000 psi.
- E. For potable water line installation, when a water line is to be installed such that it will cross over an existing or proposed sanitary sewer, a section of pipe at least 18' long of either ductile iron or PVC pipe C-900 (200 PSI) shall be installed such that it will be centered over the sanitary sewer. Water lines shall in no case be installed below a sanitary sewer.
- F. For potable water line installation, when a water line is being installed parallel to a sanitary sewer, a horizontal distance of separation of nine (9) feet (outside to outside) must be maintained.
- G. A minimum clearance of 6" must be maintained between water lines and all other utility lines.
- H. When trenches exceed five feet in depth Contractor shall utilize trench safety measures per Section 31 41 33 Trench Safety.

3.3 TESTING

- A. All water lines to be installed shall be hydrostatic tested and all potable water lines shall also be sterilized.
- B. Hydrostatic Test
 - 1. General
 - a. After the pipe has been laid and initial backfill completed, the water line shall be subjected to a hydrostatic pressure of 150 psi. Joints shall remain exposed during testing whenever possible.
 - b. The Contractor shall furnish, install, and operate, at his expense, the necessary connections, pumps, meters, and gauges necessary to conduct the test. The meters used in the testing shall be tested, sealed and approved at the Contractor's expense prior to running any test.
 - 2. Procedures
 - a. Before applying the specified pressure test, all air shall be expelled from the pipe by slowly filling each valved section of pipe with water and providing taps if necessary to expel trapped air.

- b. All pipe, fittings, and joints will be examined during testing.
- c. Any defective material shall be replaced with sound material and the test repeated until satisfactorily completed and approved.
- d. Allowable leakage shall not exceed 25 gallons per inch of diameter per mile of pipe per 24 hours. Minimum duration of testing for each section shall be 2 hours when joints are exposed and 8 hours when joints are covered.
- e. All visible leaks at exposed joints and all leaks evident on the surface where joints are covered, shall be replaced, regardless of total leakage shown.
- f. Where practicable, pipe lines shall be tested in lengths between valves or plugs of no more than 1500 feet. Contractor must have written approval for test sections greater than 1500 feet.

C. Sterilization

1. General

- a. After approved completion of the hydrostatic tests, the water distribution system shall be sterilized before acceptance for domestic operation.

2. Procedures

- a. Distribution system shall be disinfected using chlorine or chlorine compounds added to the water resulting in 50 ppm (parts per million) chlorine.
- b. After the water containing this amount of chlorine has been in contact with the pipe and appurtenances at least 24 hours, the water shall be replaced with water to be transported normally, and samples of water taken and tested to assure that the disinfection procedure was effective.
- c. No main shall be placed in service or accepted until water samples are approved by applicable regulatory agency.
- d. Prepare reports of purging and disinfecting activities.

END OF SECTION