

University of Houston Master Specification

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SECTION 33 1000 – WATER DISTRIBUTION

Maintain Section format, including the UH master spec designation and version date in bold in the center columns of the header and footer. Complete the header and footer with Project information

Edit and finalize this Section, where prompted by Editor's notes, to suit Project specific requirements. Make selections for the Project at text identified in bold.

This Section uses the term "Architect." Change this term to match that used to identify the design professional as defined in the General and Supplementary Conditions.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

Delete hidden text after this Section has been edited for the Project.

PART 1 - GENERAL

1.1 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. The Contractor's attention is specifically directed, but not limited, to the following documents for additional requirements:
 - 1. The current version of the *Uniform General Conditions for Construction Contracts*, State of Texas, available on the web site of the Texas Facilities Commission.
 - 2. The University of Houston's *Supplemental General Conditions and Special Conditions for Construction*.

1.2 SUMMARY

- 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 Drawings and constructed in accordance with these Specifications.

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.

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- b. C 900 – AWWA Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 inches through 12 inches, 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
2. American Society for Testing and Materials Standards (ASTM).
 - a. ASTM 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 Guidelines. See “COORDINATION” Article in this Section.
- 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, tracer wire test stations, and elevations.

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- 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.
 - a. Register backflow preventers with City of Houston.
 - b. Coordinate with Owner and provide exact physical address and GIS coordinates.
 - 2. Comply with standards of Authorities Having Jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.
 - 3. Comply with standards of University of Houston Fire Marshal 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. Provide a minimum 8 inch by 8 inch sign, in English and Spanish, prominently posted on/in the area that reads "Reclaimed Water – Do Not Drink" and "AGUA DE RECUPERACIÓN - NO BEBER" and 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.

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1.8 COORDINATION

- A. Complete the Outage Planning Form in the University of Houston's Planned and Emergency Utility Outage Guidelines available in Section 00 6000 of these Specifications.

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. Blue colored Polyvinyl chloride (PVC) pressure pipe, 6-inch through 12-inch. Pipe shall conform to the current AWWA – C900 DR 14, be UL listed, and be approved by the Texas State Board of Insurance and the National Sanitation Foundation. The outside diameter shall be identical to ductile-iron pipe (CIOD Standard, Table 2, AWWA – C900). All pipe shall be new and have the AWWA designation, pressure class, DR pressure rating and size of pipe stamped on the outside of each joint (follow requirements of C900 2.5.2 Markings). Partial pieces from other projects will not be approved for installation.
 3. Ductile iron pipe conforming 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 conforming to AWWA C 110, latest edition, Pressure Rated 150 psi, 250 psi, 350 psi as directed by the Engineer and 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 conforming 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 conforming to AWWA C-900 - 200 psi pressure pipe.
 4. Fittings conforming to AWWA C 110, latest edition, Pressure Rated 250 PSI, wrapped with polyethylene per AWWA C 105.
- C. For offsets of water mains 6 inches 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 175 PSI or more.
 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.

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3. Gate valves shall conform to AWWA C 500, latest edition, standard NRS bronze double disk type.
4. Valves shall have mechanical joint hubs conforming to AWWA C111. Bolts and nuts for mechanical joints shall be of high-strength low alloy corrosion resistant steel.

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 conforming to ASA B16.1. Bolts and nuts for flanged ends buried in the ground shall be Type 304 stainless steel.
4. Outlet shall have mechanical joint ends. Mechanical joint ends shall conform to AWWA C111.
5. Valves shall have a minimum working pressure of 175 psi or more.

C. Valves for Meter Installation:

1. Commercial meter valves shall meet the Specifications for line valves except that they shall have a handwheel and 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.

D. Operator Extension Shafts

1. Operator extension shafts are required on all valves when the operating nut is over 5 feet below finished grade. Extension shaft shall bring the operating nut to within four to five feet of the top of the valve box. Extension shaft shall have a centering collar placed directly below operating nut and shall be bolted to valve operating nut with stainless steel set screw.

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. Valve boxes shall not have a diameter less than 5-1/4 inches.
- D. A concrete valve box collar (24 inches x 24 inches x 6 inches) shall be installed with each valve box outside of paved areas.

2.4 FIRE HYDRANTS

- A. Fire hydrants shall be as manufactured by Mueller Company, 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

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top operating nut, 2-1/2 inch hose coupling, 4-1/2 inch pumper connection with national standard threads.

1. If proposing another manufacturer refer to Section 01 2500 "Substitution Procedures."

B. Set the hydrant perpendicular with large steamer nozzle facing nearest curb and at a depth such that the center of the steamer nozzle is not less than 18 inches, nor more than 24 inches, above nearest grade. Assure that the hydrant is set at the bury line.

C. Polyethylene encasement of 8 mils thick shall be installed on all piping and appurtenances in contact with soil and shall conform to AWWA C105. Joint tape shall be self-sticking PVC or polyethylene, 8 mils thick.

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.

1. If proposing another manufacturer refer to Section 01 2500 "Substitution Procedures."

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.

1. If proposing another manufacturer refer to Section 01 2500 "Substitution Procedures."

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.

2.7 ACCESSORIES

A. Tracing Tape: Fourteen gauge minimum solid copper with thermoplastic insulation recommended for direct burial. Each trace wire access point shall be composed of one Copperhead® SnakePit® Magnetized Tracer Box, Traffic Rated, Test and Monitoring Station installed in each proposed 24 inch x24 inch x6 inch concrete pad.

1. If proposing another manufacturer refer to Section 01 2500 "Substitution Procedures."

B. Backflow Preventer Enclosures: Provide welded steel frame with expanded metal mesh, lockable enclosures for above ground backflow preventers, valves, and other exposed piping specialties in sizes and configurations indicated on Drawings.

1. Steel Frame Members: ASTM A500/A500M (cold formed).

2. Expanded Metal Panels: ASTM F1267, Type II (expanded and flattened), Class 1 (uncoated).

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3. Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - a. Color: Green.
4. Locking Device: Manufacturer's standard key operated locks.
 - a. Provide two locks and two keys per enclosure.
5. Manufacturer: To establish standards of manufacture, operation, performance, and appearance, Drawings and Specifications are based on products of Gorilla Cages GC Series. For substitution requests, comply with Section 01 2500 "Substitution Procedures."

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 Drawings.
- C. Whether or not indicated on the Drawings, the lowered/relocated water line shall have minimum of four 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, the 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 Drawings. Thrust blocking shall be installed such that joints are accessible for inspection

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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 feet 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 separation distance of 9 feet (outside to outside) must be maintained.
- G. A minimum clearance of 6 inches must be maintained between water lines and all other utility lines.
- H. When trenches exceed 5 feet in depth Contractor shall use trench safety measures per Section 31 4133 "Trench Safety."
- I. Trace wire shall be installed on all water mains. The wire shall be installed in such a manner as to be able to properly trace all water mains and/or sewer force mains without loss or deterioration of signal or without the transmitted signal migrating off the tracer wire.

3.3 TESTING

- A. All water lines installed shall be hydrostatic tested in accordance with Section 33 1310 "Hydrostatic Tests."
- B. All potable water lines shall be sterilized in accordance with Section 33 1300 "Disinfection of Waterlines."
- C. Contractor shall perform a continuity test on all trace wire in the presence of the Inspector or the Owner's representative. If the trace wire is found to be not continuous after testing, Contractor shall repair or replace the failed segment of the wire.

END OF SECTION 33 1000

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