



Attachment "G"

Revised Section 02660

Water Distribution

**SECTION 02660
WATER DISTRIBUTION**

PART 1 - GENERAL

1.01 SCOPE:

This section of the specifications covers the material and installation requirements for piping, valves, fittings, specials, crossings, connections, flushing, and testing. Excavation, trenching, and backfill for the installation of underground piping systems shall be specified in Section 02221.

Construction of water mains shall proceed in a continuous operation through flushing and pressure testing, unless otherwise permitted by the City Engineer.

1.02 RELATED SECTIONS:

- A. Section 02200 – Site Preparation.
- B. Section 02220 – Excavation and Backfill for Pipe Systems.

1.03 SUBMITTALS:

- A. Submit product data under provisions of Section 01300, “Submittal Procedures”.

Three copies of all required test reports shall be submitted to the City Engineer. These shall include:

- A. Certified records of tests on ductile iron pipe made by the manufacturer or a commercial testing laboratory for each shipment of pipe. Tests shall be in accord with the procedure outlined in ANSI Standard A21.51 (AWWA C-151).
- B. Certificate by polyvinyl chloride pipe manufacturer that all pipe furnished meets the requirements of A.W.W.A. C-900; PVC pipe shall be blue in color.
- C. Certificate by Polyethylene plastic tubing manufacturer that meets A.W.W.A. C091.
- D. Reports on pressure and leakage tests. Shop drawings shall be submitted for all valves, valve boxes, and pipeline restraints.

1.04 PROJECT RECORD DOCUMENTS:

- A. Submit documents under provisions of Section 01700, “Contract Closeout”.
- B. Accurately record location of pipe runs, connections and elevations.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Pipe:
 - 1. General: All materials will be inspected by the City Engineering inspector prior to installation. All materials shall be new, manufactured either in the year that construction begins or the previous year. AWWA or ASTM Specifications shall be latest issue.
- Ductile Iron Pipe:

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- a. Ductile iron pipe for water main installed underground shall be manufactured in accordance with AWWA C-151 (ANSI Std. A 21.51). Pipe shall be designed for thickness in accordance with AWWA C-150 (ANSI Std. A 21.50), subject to the following design criteria: 150 psi water pressure plus 100 psi surge pressure, Type 2 laying condition, 2 to 1 safety factor, trench width diameter plus 2 feet, and depth of cover as shown on the drawings. The depth of cover for water mains not shown in profile shall be a minimum of 3 feet, unless otherwise shown on the drawings. Where ductile iron pipe is threaded for flanges, the thickness shall be increased to provide for pressures cited above. The depth of cover for the pipe listed in the preceding paragraph is specified as a minimum required depth. The pipe manufacturer shall determine additional wall thickness required where amount of cover exceeds the minimum requirements.
- b. Pipe shall have cement lining and bituminous seal coat in accordance with AWWA C-104 (ANSI Std. A 21.4). Pipe shall also be bituminous coated on the outside. Lining shall be standard thickness. Joints for ductile iron pipe shall be mechanical or push-on type designed in accordance with AWWA C-111. Gasket lubricant shall be labeled with the trade name, pipe manufacturer's name. Fittings for ductile iron pipe shall be manufactured of ductile iron and shall conform to the requirements of AWWA C-110 or AWWA C-153. Fittings shall be designed so as to be compatible with the pipe and so as to provide at least equal resistance to internal and external loads on the pipe. The lining and coating of the fittings shall be as specified for the pipe. Joints for fittings shall be mechanical type for underground service. The joint and bolts and nuts shall conform to AWWA C-111. All fittings shall be rated for not less than 150 psi working pressure plus 100 psi surge pressure.

Saltwater Intrusion and Corrosive Soils Requirements

In saltwater intrusion areas where the installation is subject to groundwater variation, the City shall require the use of V-Bio Enhanced Polyethylene Encasement and ductile iron pipe with a zinc basecoat under the asphaltic topcoat. All ductile iron pipe and fittings shall be wrapped with the V-Bio Polyethylene Enhanced Encasement and have the zinc protective coating factory applied.

For corrosive soils encountered outside of saltwater intrusion areas during construction V-Bio Polyethylene Encasement shall be installed to protect the ductile iron main, fittings and valves.

Zinc Basecoat: The exterior of ductile iron pipe shall be coated with a layer of arc-sprayed zinc per ISO 8179. The mass of the zinc applied shall be 200 g/m² of pipe surface area. A finishing layer topcoat shall be applied to the zinc. The mean dry film thickness of the finishing layer shall not be less than 3 mils with a local minimum not less than 2 mils. The coating system shall conform in every respect to ISO 8179-1 "Ductile iron pipes - External zinc-based coating - Part 1: Metallic zinc with finishing layer. Ductile iron fittings shall also have a zinc protective coating sprayed on at the factory at a minimum of 3 mils.

The V-Bio Polyethylene Enhanced Encasement shall be accordance with AWWA C600 and ANSI/AWWA C105/A21.5, "Polyethylene Encasement of Ductile-Iron Pipe Systems". Color shall be blue for potable water, purple for recycled water, and green for sanitary sewage service. Polyethylene encasement for use with ductile iron pipe systems shall consist of three layers of co-extruded linear low-density polyethylene (LLDPE), fused into a single thickness of not less than 8 mils. The inside layer of the polyethylene wrap to be in contact with the pipe exterior shall be infused with a corrosion inhibitor and antimicrobial biocide to control galvanic corrosion. Product: V-Bio or approved equal.

Polyethylene encasement for ductile-iron pipe shall be supplied as a flat tube meeting the dimensions of Table 1 in AWWA C105 and shall be supplied by the ductile-iron pipe manufacturer.

Plastic adhesive tape shall consist of polyolefin backing and adhesive which bonds to common pipeline coatings including polyethylene. Products: Canusa Wrapid Tape; Tapecoat H35; Polyken 934; AA Thread Seal Tape, Inc.; or approved equal.

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Install the polyethylene to completely encase the pipe and fittings to provide a watertight corrosion barrier. Continuously secure overlaps and ends of sheet and tube with polyethylene tape. Make circumferential seams with two or more complete wraps, with no exposed edges. Tape longitudinal seams and longitudinal overlaps, extending tape beyond and beneath circumferential seams. Wrap bell-spigot interfaces, restrained joint components, and other irregular surfaces with wax tape or moldable sealant prior to placing polyethylene encasement. Minimize voids beneath polyethylene.

Place circumferential or spiral wraps of polyethylene tape at 2-foot intervals along the barrel of the pipe to minimize the space between the pipe and the polyethylene. Overlap adjoining polyethylene tube coatings a minimum of 1 foot and wrap prior to placing concrete anchors, collars, supports, or thrust blocks. Hand-wrap the polyethylene sheet, apply two complete wraps with no exposed edges to provide a watertight corrosion barrier, and secure in place with 2-inch-wide plastic adhesive tape. Repair polyethylene material that is damaged during installation. Use polyethylene sheet, place over damaged or torn area, and secure in place with 2-inch-wide plastic adhesive tape.

Repair polyethylene encasement at all service connections in accordance with AWWA C600-10, Section 4.8.

Asphaltic Coating

All pipe and fittings shall be outside-coated with an asphaltic material applied by means of the airless spray method. The exterior coating shall meet ANSI/AWWA C151/A21.51-09 for this type of coating, shall be smooth without pinholes, thin, bare or overly thick areas. Smoothness shall be such that when hand rubbed, no "sand paper" feeling will be experienced and such that the spigot area will readily slide through the gasket without pulling, tearing, rolling or otherwise disturbing the sealing capabilities of the gasket. Spigot ends shall be beveled prior to painting and to an extent that will permit ready insertion of the spigot through the gasket area.

B. Polyvinyl Chloride (PVC) Pipe:

- a. Polyvinyl chloride pipe for risers shall meet the requirements of AWWA C-900.

C. Restraining:

- a. Restrained Joints: Restrained joints shall be provided for all buried piping systems at the location required to resist system thrust. Pipe joints and fittings shall be restrained as specified below.
- b. Restrained joints for field-cut ductile iron pipe: When prior approval is obtained from the Engineer, fittings and push-on ductile iron pipe may be restrained using a follower gland which includes a restraining mechanism. When actuated during installation, the restraining device shall impart multiple wedging action against the pipe wall which increases resistance as internal pressure in the pipeline increases.
- c. The joint shall maintain flexibility after installation. Glands shall be manufactured of ductile iron conforming to ASTM A536 and restraining devices shall be of heat treated ductile iron with a minimum hardness of 370 BHN. The gland shall have standard dimension and bolting patterns for mechanical joints conforming to ANSI/AWWA C111 and C153, latest revisions.

D. Gate Valves:

- a. Gate valves shall be designed for a working pressure of not less than 150 psi, of a resilient seat wedge type, and when fully open, have a clean waterway equal to the nominal diameter of the pipe. The valve shall open by turning to the left or counterclockwise when viewed from the stem. The operating nut shall have an arrow cast in the metal indicating the direction of opening. Each valve shall have the manufacturer's distinctive marking, pressure rating, and year of manufacture cast on the body. Prior to shipment from the factory, each valve shall be tested by applying to it a hydraulic pressure equal to twice the specified working pressure.

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- b. Valves 3" and larger shall be iron body, fully bronze mounted, resilient seat valves and shall conform to the specifications for Gate Valves for Ordinary Water Works Service, AWWA C-500 and C-509 and shall be fitted with an O-ring seal of standard manufacture. Valves to be located underground shall be non-rising stem type designed for buried service with a two-inch square operating nut. The valves shall have mechanical joint connections. Valves to be used above ground shall have outside screw and yoke operation, handwheels and standard flanged ends in accordance with AWWA C-110.
- c. Valves two inches (2") and smaller shall be all brass, ball valve curb stop type and shall conform to AWWA standards and ASTM B62 Index - 115-85-5-5-5.

PART 3 - INSTALLATION

3.01 GENERAL:

- A. Pipe and fittings for the reclaimed water main shall be strung out along the route of construction with the bells pointing in the direction of construction. Pipe shall be placed where it will cause least interference with traffic. Pipe shall be handled by mechanical equipment. Before the pipe is lowered into the trench, it shall be swabbed or brushed out to insure that no dirt or foreign material gets into the finished line. Trench waters shall be kept out of the pipe and the pipe kept closed by means of a test plug whenever work is not in progress. The Contractor shall provide the means for dewatering the trench, and the cost thereof shall be included in the price for installing the pipe.
- B. Deflections from a straight line or grade made necessary by vertical curves or horizontal curves or offsets shall not exceed the manufacturer's recommendations. If the specified or required alignment requires deflections in excess of those recommended, the Contractor shall either provide special bends as approved by the City Engineer or a sufficient number of shorter lengths of pipe to provide angular deflections within the required limit.

3.02 SURFACE RESTORATION:

- A. Restore the top surfaces of the backfill to the original or planned conditions. Carefully examine trenches upon the completion of backfilling and remove surface irregularities that are dangerous or obstructive to traffic. Where existing pavement, curbing, curb and gutter, sidewalk or valley gutter is removed for the purpose of construction water mains, etc. Replace and restore such pavement, etc. to as good condition, as determined by the Engineer, as before removal, at no additional cost to the City. The replacement pavement is to be of the same or similar type as that removed.

END OF SECTION