

## Section 4150. Water Main, Valve, Fire Hydrant, and Appurtenance Materials

### 4150.01 DESCRIPTION.

- A. Pipe and fittings for constructing water mains.
- B. Valves, fire hydrants, and appurtenances associated with water main construction.

### 4150.02 PIPE AND FITTINGS.

#### A. Water Main.

##### 1. Polyvinyl Chloride Pipe.

Comply with AWWA C900 or AWWA C905 with gray iron pipe equivalent outside diameters.

###### a. Minimum Wall Thickness.

- 1) 4 inch (100 mm) through 24 inch (600 mm) sizes: DR 18.
- 2) Sizes over 24 inch (600 mm): As specified in the contract documents.

###### b. Joint Type.

Use push-on joint type, except as otherwise required in the contract documents or as authorized by the Engineer.

- 1) **Push-on:** According to AWWA C900 or AWWA C905.
- 2) **Integral Restrained Joint:** AWWA C900 or AWWA C905 pipe with restraining system manufactured integrally into pipe end.
- 3) **Mechanical Restrained Joint:** Ductile iron mechanical device designed for joint restraint of AWWA C900 or AWWA C905 pipe complying with the requirements of ASTM F 1674.

###### c. Markings on Pipe.

- 1) Name of manufacturer.
- 2) Size and class.
- 3) Spigot insertion depth gage.
- 4) National Sanitation Foundation (NSF) seal.

##### 2. Ductile Iron Pipe.

###### a. Minimum Thickness Class:

- 1) **4 inch (100 mm) through 24 inch (600 mm) sizes:** Special thickness Class 52 according to AWWA C151.
- 2) **Sizes over 24 inches (600 mm):** As specified in the contract documents.

###### b. Cement-mortar Lined:

According to AWWA C104 with asphalt seal coat.

###### c. External coating:

Asphalt according to AWWA C 151.

###### d. Joint Type:

Use push-on type, except as otherwise required in the contract documents or as authorized by the Engineer.

- 1) **Push-on:** According to AWWA C111.
- 2) **Mechanical:** According to AWWA C111.
- 3) **Restrained, Buried:** Pipe manufacturer's standard field removable system.
- 4) **Restrained, in Structures:** Restraining gland, flanged or grooved.
- 5) **Flanged:** According to AWWA C111.
- 6) **Grooved:** According to AWWA C606.
- 7) **Gaskets:** According to AWWA C111.

###### e. Markings on Pipe:

- 1) Name of manufacturer.
- 2) Size and class.
- 3) Spigot insertion depth gage.

#### B. Bolts for Water Main and Fittings.

Use corrosion resistant bolts.

##### 1. Tee-bolts and Hexagonal Nuts for Mechanical Joints.

- a. High strength, low alloy steel manufactured according to AWWA C111.
- b. Provide ceramic filled, baked on, fluorocarbon resin coating for bolts and nuts.
- c. Include factory applied lubricant that produces low coefficient of friction for ease of installation.

2. **Other Bolts and Nuts.**
  - a. Stainless steel.
  - b. Ductile iron.
  - c. Zinc, zinc chromate, or cadmium plated.

**C. Fittings.**

1. **DIP and PVC Pipe.**
  - a. Comply with AWWA C110 (ductile iron or gray iron) or AWWA C153 (ductile iron).
  - b. Joint Type:
    - 1) For pipe sizes 16 inches (400 mm) and less, use mechanical joint complying with AWWA C111.
    - 2) For pipe sizes greater than 16 inches (400 mm), use restrained mechanical joint system. Provide follower gland using breakaway torque bolts to engage thrust restraint.
      - a) Minimum pressure rating same as connecting pipe. For fittings between dissimilar pipes, the minimum pressure rating is the lesser of the two pipes.
      - b) Suitable for buried service.
      - c) Joint restraint system to be field installable, field removable, and re-installable.
    - 3) Use of alternate restraint systems must be approved by the Engineer.
  - c. Cement mortar lined complying with AWWA C104 with asphalt coating.
  - d. Wall Thickness: Comply with AWWA C153.
  - e. Gaskets: Comply with AWWA C111.
2. **Flange Adapter.**
  - a. Body: Ductile iron complying with ASTM A 536.
  - b. End Rings (Follower Rings): Ductile iron complying with ASTM A 536.
  - c. Gaskets: New rubber compounded for water service and resistant to permanent set.
  - d. Bolts and Nuts: High strength, low alloy corrosion resistant steel or carbon steel bolts complying with ASTM A 307.
3. **Pipe Coupling.**
  - a. Center Sleeve (Center Ring): Steel pipe or tubing complying with ASTM A 53/A 53M or ASTM A 512, or formed carbon steel with a minimum yield of 30,000 psi (207 MPa).
  - b. End Ring (Follower Ring): ductile iron complying with ASTM A 536, or steel meeting or exceeding the requirements of ASTM A 576, grade 1010-1020.
  - c. Gaskets: New rubber compounded for water service and resistant to permanent set.
  - d. Bolts and nuts: High strength, low alloy corrosion resistant steel.

**D. Concrete Thrust Blocks.**

1. Use Class C concrete.
2. Refer to the contract documents for dimensions and installation of thrust blocks.
3. Use for all pipe sizes 16 inches (400 mm) in diameter or smaller when specified.

**E. Pipeline Accessories.**

1. **Polyethylene Wrap.**
  - a. Comply with AWWA C105.
  - b. Provide tubes or sheets with 8 mil (200  $\mu$ m) minimum thickness.
2. **Tracer System.**

Refer to the contract documents for details.

  - a. Tracer Wire: #12 AWG solid single copper conductor.
    - 1) Insulation Material: Linear low-density polyethylene (LLDPE) installation suitable for direct burial applications.
    - 2) Insulation Thickness: 0.045 inches (1 mm), minimum.
  - b. Ground Rod: 3/8 inch (10 mm) diameter, 60 inch (1.5 m) steel rod uniformly coated with metallurgically bonded electrolytic copper.
  - c. Ground-rod Clamp: High-strength, corrosion-resistant copper alloy.

- d. Splice Kit: Inline resin splice kit with split bolt for 1 kV and 5 kV. Insulates and seals single conductor and unshielded cable splices for direct bury and submersible applications.
- e. Tracer Wire Station: ~~Contact the Engineer for requirements~~ Comply with the contract documents.

**F. Special Gaskets.**

- 1. For soils contaminated with gasoline, use neoprene or nitrile gaskets.
- 2. For soils contaminated with volatile organic compounds, use nitrile or fluorocarbon gaskets.
- 3. For other soil contaminants, contact the Engineer for the required gasket.

**G. Water Service Pipe and Appurtenances.**

**1. Controlling Standards.**

Local plumbing and fire codes.

**2. Materials.**

**a. Copper Pipe.**

- 1) Comply with ASTM B 88.
- 2) Wall Thickness: Type K.

**b. DIP.**

As specified in [Article 4150.02, A](#). Polyethylene wrap is required.

**c. PVC Pipe.**

ASTM D 1785, SDR 21, Schedule 80, Type S joints.

**d. Brass Pipe.**

Red, seamless, according to ASTM B 43.

**e. Polyethylene Pipe.**

Class 200, according to AWWA C901.

**3. Corporations, Stops, and Stop Boxes.**

Contact the Engineer for requirements.

**H. Non-shrink Grout.**

Comply with [Materials I.M. 491.13](#)

**I. Casing Pipe.**

Apply [Section 2553](#).

**4150.03 VALVES.**

**A. General.**

- 1. **Valve Body:** Manufacturer's name and pressure rating cast on valve body.
- 2. **Direction of Opening:** The opening direction is counterclockwise as viewed from the top, unless specified otherwise in the contract documents or as directed by the Engineer.
- 3. **Joints.**
  - a. For buried installations, use mechanical joints per AWWA C111. Apply [Article 4150.02, B](#), for joint nuts and bolts.
  - b. For installation within structures, flanged with dimensions and drillings according to AWWA C110 or ANSI B16.1 Class 125.

**B. Gate Valves.**

- 1. **Standards:** Comply with AWWA C509 (gray iron or ductile iron) or AWWA C515 (ductile iron) and NSF 61
- 2. **Stem Seals:** Double O-rings permanently lubricated between seals. Lubricant certified for use in potable water.

3. **External Bolts and Hex Nuts:** Stainless steel according to ASTM A 240/A 240M, Type 304.

**C. Butterfly Valves.**

1. **Standards:** Comply with AWWA C504 Class 150B (gray iron or ductile iron) and NSF 61.

2. **Disc:** Ductile iron or gray iron with plasma applied nickel-chromium edge or stainless steel edge according to ASTM A 240/A 240M, Type 316, and mechanically fixed stainless steel pins.

3. **2. Stem:** Stainless steel according to ASTM A 240/A 240M, Type 304, turned, ground, and polished.

3. **For Seat on Body Valves:**

a. **Disc:** Ductile iron or gray iron with plasma applied nickel-chromium edge or stainless steel edge according to ASTM A 240, Type 316, and mechanically fixed stainless steel pins.

b. **Seat:** Synthetic rubber compound mechanically retained to the body.

4. **For Seat on Disc Valves:** Synthetic rubber compound bonded or mechanically retained to the body.

a. **Disc:** Ductile iron according to ASTM A 536 with synthetic rubber compound seat mechanically retained to the disc.

b. **Seat:** Continuous Type 316 stainless steel seat.

5. **External Bolts and Hex Nuts:** Stainless steel according to ASTM A 240/A 240M, Type 304.

**D. Tapping Valve Assemblies.**

Use tapping valve assemblies only where specified in the contract documents.

1. **Tapping Valve.**

Gate valve complying with AWWA C509 or AWWA C515.

2. **Sleeve.**

a. Minimum 14 gage.

b. Stainless steel according to ASTM A 240/A 240M, Type 304.

c. Working pressure 150 psi (1035 kPa).

d. Must fully surround pipe.

e. Flanged with dimensions and drillings according to AWWA C110 or ANSI B16.1 Class 125.

3. **Minimum Sleeve Length.**

Apply Table 4150.03-1

**Table 4150.03-1: Minimum Sleeve Length**

<b>Outlet Flange Size, inches (mm)</b>	<b>Minimum Sleeve Length, inches (mm)</b>
4 (100)	15 (375)
6 (150)	15 (375)
8 (200)	20 (500)
10 (250)	25 (625)
12 (300)	25 (625)
over 12 (300)	As approved by the Engineer

4. **Gasket.**

a. To completely surround pipe.

b. Minimum thickness 0.125 inch (3 mm).

c. Use nitrile rubber.

5. **Outlet Flange.**

a. Stainless steel, according to ASTM A 240/A 240M, Type 304.

b. ANSI B16.1, 125 pound pattern.

**6. Hex Nuts and Bolts.**

Stainless steel according to ASTM A 240/A 240M, Type 304.

**4150.04 FIRE HYDRANT ASSEMBLY.**

**A. Material.**

Comply with AWWA C502.

**B. Manufacturers.**

As allowed in the contract documents.

**C. Features.**

1. **Breakaway Items:** Stem coupling and breakaway flange.
2. **Inlet Nominal Size:** 6 inch (150 mm) diameter.
3. **Inlet Connection Type:** Mechanical joint.
4. **Hose Nozzles:** Two, each 2 1/2 inches (63 mm) in diameter.
5. **Direction of Opening:** Counterclockwise, unless specified otherwise.
6. **Items to be Specified:** The following items will be specified in the contract documents.
  - a. Operating nut.
  - b. Pumper nozzle.
  - c. Nozzle threads.
  - d. Main valve nominal opening size.

**D. Painting.**

1. Shop coating according to AWWA C502.
2. Above grade exterior coating type and color will be selected by the Engineer.

**E. External Bolts and Hex Nuts.**

Stainless steel according to ASTM A 193/A 193M, Grade B 8.

**F. Gate Valve.**

Apply [Article 4150.03](#).

**G. Pipe and Fittings.**

Apply [Article 4150.02](#).

**4150.05 APPURTENANCES.**

**A. Flushing Device (Blowoff):** As specified in the contract documents.

**B. Valve Box.**

1. **Applicability:** For all buried valves.
2. **Manufacturer:** As specified in the contract documents.
3. **Type:**
  - a. In paved areas, use a slide type.
  - b. In all other areas, use a screw extension type.
4. **Material:** Gray iron.
5. **Cover:** Gray iron, labeled "WATER"

6. **Wall Thickness:** 3/16 inch (4.8 mm), minimum.
  7. **Inside Diameter:** 5 inches (125 mm), minimum.
  8. **Length:** Adequate to bring top to finish grade, including valve box extensions, if necessary.
  9. **Factory Finish:** Asphalt coating.
  10. **Valve Box Centering Ring:** Include in installation.
- C. Valve Stem Extension.**  
For all buried valves, provide as necessary to raise 2 inch (50 mm) operating nut to within 3 feet (1 m) of the finish grade. Stem diameter according to valve manufacturer's recommendations, but not less than 1 inch (25 mm).