

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 μ 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.

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 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. **Stem:** Stainless steel according to ASTM A 240/A 240M, Type 304, turned, ground, and polished.
4. **Seat:** Synthetic rubber compound bonded or mechanically retained to the body.
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

Outlet Flange Size, inches (mm)	Minimum Sleeve Length, inches (mm)
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).