

SECTION 33 11 00.15**DUCTILE IRON PIPE AND FITTINGS****PART 1: GENERAL****1.01 COORDINATION OF WORK**

Connection to existing pipelines may require shutdown of AW facilities. Closely coordinate construction work and connections with AW through AW Project Manager. The AW Project Manager, in consultation with the AW, may select the time for connection to existing pipelines, including Saturdays, Sundays, or holidays, which, in the opinion of the AW Project Manager, will cause the least inconvenience to the AW and/or its customers. Make such connections at such times as may be directed by the AW, at the Contract prices, with no claim for premium time or additional costs.

1.02 RELATED WORK

Section - Piping - General Provisions.
Section - Polyethylene Wrap

1.03 SUBMITTALS

Submit shop drawings and manufacturer's literature for all Contractor supplied materials promptly to the AW Project Manager for approval in accordance with Specification Section - Submittals.

PART 2: PRODUCTS

Research has documented that certain elastomers (such as those used in gasket material) may be subject to permeation by lower-molecular weight organic solvents or petroleum products. Products supplied under this Section assume that petroleum products or organic solvents will not be encountered. If during the course of pipeline installation the Contractor identifies, or suspects the presence of petroleum products or any unknown chemical substance, notify AW immediately. Stop installing piping in the area of suspected contamination until direction is provided by AW Project Manager.

2.01 REDUCTION OF LEAD IN DRINKING WATER ACT COMPLIANCE

- A. The Contractor shall comply with the requirements and standards of the Reduction of Lead in Drinking Water Act.
- B. Any pipe, fitting or fixture (e.g. corp stops, curb valves, gate valves less than 2 inches in diameter, backflow prevention devices, water meters, hose bibs, etc.), solder and flux installed or requiring replacement as of January 4, 2014 must be "lead free". The Contractor shall be responsible to comply with the State, local laws, ordinances, codes, rules, and regulations governing the Reduction of Lead in Drinking Water Act that may have additional limitations or requirements."

- C. The definition of 'lead free' is as follows:
1. Not containing more than 0.2 percent lead when used with respect to solder and flux; and
 2. Not more than a weighted average of 0.25 percent lead when used with respect to the wetted surfaces of pipes, pipe fittings, plumbing fittings, and fixtures.

2.02 PIPE MATERIAL

A. General

Ductile iron pipe shall conform to the latest specifications as adopted by the ANSI and AWWA. Specifically, ductile iron pipe shall conform to AWWA Standard C151.

The pipe or fitting exterior shall be coated with a bituminous coating in accordance with AWWA Standard C151. The pipe or fitting interior shall be cement mortar lined and seal coated in compliance with the latest revision of AWWA Standard C104.

For wastewater systems, the pipe or fitting interior shall be lined with ceramic epoxy in accordance with ASTM Standards.

B. Quality

Pipe and fittings shall meet the following minimum quality requirements by conforming to the following:

1. AWWA C104 / ANSI A21.4 Cement-Mortar Lining for Ductile-Iron Pipe and Fittings
2. AWWA C105 / ANSI A21.5 Water Polyethylene Encasement for Ductile-Iron Pipe Systems
3. AWWA C110 / ANSI A21.10 Ductile Iron and Gray Iron Fittings, 3 NPS through 48 NPS for Water
4. AWWA C111 / ANSI A21.11 Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
5. AWWA C115 / ANSI A21.15 Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges
6. AWWA C116 / ANSI A21.16 Protective Fusion-Bonded Epoxy Coating for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings for Water Supply Service
7. AWWA C150 / ANSI A21.50 Thickness Design of Ductile-Iron Pipe
8. AWWA C151 / ANSI A21.51 Ductile-Iron Pipe, Centrifugally Cast, for Water

9. AWWA C153 / ANSI A21.53 Ductile-Iron Compact Fittings, 3 NPS through 24 NPS and 54 NPS through 64 NPS, for Water Service

Ductile iron water pipe and fittings will be accepted on the basis of the Manufacturer's certification that the material conforms to this specification. The certification for iron fittings shall list a fitting description, quantity, bare fitting weight and source, (AWWA Standard C110, C153 or Manufacturer, if fitting is not listed in either standard). The certification shall accompany the material delivered to the project site. AW reserves the right to sample and test this material subsequent to delivery at the project site. If foreign manufactured fittings are provided, then the Contractor is obligated to notify AW with a submittal and provide the necessary documentation to satisfy AW that the materials provided meet the specified AWWA standards and, among other documentation that may be required, provide certificates of compliance on the component supplied.

C. Pipe Class

The pressure class of pipe to be furnished shall be in accordance with Table 1 and the notes listed below.

Table 1	
MINIMUM RATED WORKING PRESSURE FOR DUCTILE IRON PIPE MANUFACTURED IN ACCORDANCE WITH AWWA Standard C151	
Pipe Size (Inch)	Pressure Class
6	350
8	350
12	350
16	300
20	300
24	250

NOTES:

1. Larger pipe sizes up to 54-inch can be installed as pressure Class 200 with cover up to 9 feet and an operating pressure of 200 psi, where approved by the AW Project Manager. When trench depths exceed 15 feet for pipe sizes of 16-inch or larger, AW shall direct the Contractor on the proper class pipe to use.
2. The noted pressure class is adequate to support 3/4 and 1-inch corporation stops. Use a full saddle for larger taps (e.g., air relief valves or larger corporations) due to limited wall thickness.

3. There are special conditions where a larger wall thickness is required. AW shall direct the Contractor on the proper pressure class pipe to use in specific instances; e.g. at treatment plant or booster station sites where frequent excavation can be anticipated in the vicinity of pipe, where the pipeline is laid on a river channel bottom to prevent external damage to the pipe and minimize the potential for costly pipe replacement, etc.

D. Testing

Perform a hydrostatic test of all pipe and appurtenances as required by AWWA Standard C151 and Section - Pressure and Leakage Tests.

E. Joints

1. Mechanical and Push-On

Mechanical and push-on joints including accessories shall conform to AWWA Standard C111.

2. Flanged

Flanged joints shall conform to AWWA Standard C110 or ANSI B16.1 for fittings and AWWA Standard C115 for pipe. Do not use flanged joints in underground installations except within structures.

Furnish all flanged joints with 1/8-inch thick, red rubber or styrene butadiene rubber gaskets. The bolts shall have American Standard heavy unfinished hexagonal head and nut dimensions all as specified in American Standard for Wrench Head Bolts and Nuts and Wrench Openings (ANSI B18.2). For bolts of 1-3/4-inches in diameter and larger, bolt studs with a nut on each end are recommended. The high-strength, low-alloy steel for bolts and nuts shall have the characteristics listed in Table 6 of AWWA Standard C111.

Stainless steel nuts and bolts are required on piping within wastewater treatment plants and pump stations.

3. Restrained Joint Pipe

Restrained joints for pipes shall be of the boltless push-on type which provides joint restraint independent of the joint seal. Restrained push-on joints allowed for pipe only shall have accessories conforming to AWWA Standard C111. Restrained system shall be suitable for the following minimum working pressures:

<u>Size</u>	<u>Pressure</u>
<u>(Inch)</u>	<u>(psi)</u>
Less than 20	300
20	300
24	250
30 - 64	200

2.03 FITTINGS

A. Ductile Iron Fittings

Standard fittings shall be ductile iron conforming to AWWA Standard C110. Compact ductile iron fittings shall meet the requirements of AWWA Standard C153.

1. Working Pressures

Fittings shall be suitable for the following working pressures unless otherwise noted in AWWA Standard C110 or C153:

Working Pressure		
<u>Size</u>	Compact Fittings	Standard Fittings
<u>(Inch)</u>	Ductile Iron (psi)	
3 - 24	300	250, 300 (with special gaskets)
30 - 48	250	250
54 - 64	150	N/A

The use of standard ductile iron fittings having a 250 psi pressure rating with ductile iron pipe (having a rating of 350 psi) is not permitted except by the express written approval of the AW Project Manager.

2. Coating and Lining

The fittings shall be coated on the outside with a petroleum asphaltic coating in accordance with AWWA Standard C110 or fusion-bonded epoxy in accordance with AWWA Standard C116 and lined inside with cement-mortar and seal coated in accordance with AWWA Standard C104 or fusion-bonded epoxy in accordance with AWWA Standard C116.

B. Joints

1. Mechanical and Push-On

Mechanical and push-on joints including accessories shall conform to AWWA Standard C111. Anti-Rotation T-Bolts shall be used on mechanical joints shall be of domestic origin, high strength, low alloy

steel bolts only, meeting the current provisions of ANSI/AWWA C111/A21.1 for rubber gasket joints for cast iron or ductile iron pipe and fittings. Bolt manufacturer's certification of compliance must accompany each shipment. T-bolts shall be corrosion resistant to handle corrosive conditions on any buried bolts.

2. Flanged

Flanged joints shall meet the requirements of AWWA Standard C115 or ANSI B16.1. Do not use flanged joints in underground installations except within structures. Furnish all flanged joints with minimum 1/8-inch, thick red rubber or styrene butadiene rubber full-face gaskets. The bolts shall have heavy unfinished hexagonal head and nut dimensions all as specified in ANSI B18.2. Corrosion resistant hex bolts to handle corrosive conditions shall be used on any buried flanged bolts.

Bolts and nuts shall be threaded in accordance with ASME/ANSI B1.1, Unified Inch Screw Threads (UN and UNR Thread Form) class 2A external and class 2B internal. For bolts of 1-³/₄-inches in diameter and larger, stud bolts with a nut on each end are recommended. Material for bolts and nuts shall conform to ASTM A307, 60,000 PSI Tensile Strength, Grade B, unless otherwise specified. Bolt manufacturer's certification of compliance must accompany each shipment.

3. Restrained

Restrained joints for valves and fittings shall be of the boltless push-on type which provides joint restraint independent of the joint seal. Field Lok gaskets are not permitted on valves or fittings. Restrained push-on joints allowed for pipe only shall have accessories conforming to AWWA Standard C111. Restrained system shall be suitable for the following minimum working pressures:

<u>Size</u> <u>(Inch)</u>	<u>Pressure</u> <u>(psi)</u>
Less than 20	300
20	300
24	250
30 - 64	250

Where adjacent fittings are to be placed (as in a mechanical joint hydrant tee and a mechanical joint hydrant valve), the use of a suitably sized Foster adaptor is permitted to facilitate restraint between the fittings.

2.04 POLYETHYLENE WRAP

Polyethylene wrap shall only be used on projects where explicitly required in the Scope of Work within the project Request for Proposal (RFP). The determination for use of polyethylene wrap shall be determined by the AW Project Manager.

PART 3: EXECUTION

3.01 INSTALLATION

Follow the provisions of Section- Piping - General Provisions in addition to the following requirements:

A. Push-On Joints

Clean the surfaces that the gasket will contact thoroughly, just prior to assembly using a bacteria free solution (bleach, potable water or NSF approved material). Insert the gasket into the groove in the bell. Apply a liberal coating of special lubricant to the gasket and the spigot end of the pipe before assembling the joint. Center the spigot end in the bell and push home the spigot end.

B. Mechanical Joints

Clean and lubricate all components with soapy water prior to assembly. Slip the follower gland and gasket over the pipe plain end making sure that the small side of the gasket and lip of the gland face the bell socket. Insert the plain end into socket. Push gasket into position with fingers. Seat gasket evenly. Slide gland into position, insert bolts, and tighten nuts by hand. Tighten bolts alternately (across from one another) to the recommended manufacturing rating or if not provided, to the following normal torques:

	Range of Torque
<u>Bolt Size</u>	<u>In Foot-Pounds</u>
5/8	40 - 60
3/4	60 - 90
1	70 - 100
1-1/4	90 - 120

After field installation, all bolts shall receive petrolatum tape or petroleum wax protection or other approved coating material. Protection shall be applied before applying polywrap per Section - Polyethylene Wrap, if required.

C. Restrained Joints

1. Ball and Socket

Assemble and install the ball and socket joint according to the manufacturer's recommendations. Thoroughly clean and lubricate the joint. Check the retainer ring fastener.

2. Push-On

Assemble and install the push-on joint according to the manufacturer's recommendations. Thoroughly clean and lubricate the joint. Check the retainer ring fastener.

Protect pipe from damage from the jacking device (backhoe bucket, pipe jack, etc.) when "pushing home" any pipe by using wood or other suitable (non metallic) material.

3. Mechanical Joint

Assemble and install the mechanical joint according to the manufacturer's recommendations. Thoroughly clean and lubricate the joint. Use approved restrained joint device on fittings and valves where required and approved for use by AW.

D. Pipe Protection

Protect pipe from damage from the jacking device (backhoe bucket, pipe jack, etc.) when "pushing home" any pipe. Wood or other suitable material (non metallic) shall be used to push home the pipe.

E. Gaskets

Gaskets shall be as provided or recommended by the manufacturer and satisfy AWWA Standard C111 in all respects with the exception of requirements noted in Part 2.

END OF SECTION 33 11 00.15