05-30

SPECIFICATION FOR STEEL WATER PIPE

REVISED DECEMBER 2011

1. SCOPE

This specification covers steel pipe 4-inches and larger in size and manufactured for the purpose of conveying water.

2. GENERAL REQUIREMENTS

A. Quality Assurance

Commercial Standards: (All manufacturing tolerances referenced in the below standards apply unless specifically excluded).

ANSI/AWWA C-200 Standard for Steel Water Pipe 6 Inches and Larger

ANSI/AWWA C-205 Standard for Cement-Mortar Protective Lining and Coating for Steel Water Pipe- 4 in. and Larger-Shop Applied

ANSI/AWWA C-206 Standard for Field Welding of Steel Water Pipe

ANSI/AWWA C-207 Standard for Steel Pipe Flanges for Water Works Service, 4" - 144"

ANSI/AWWA C-208 Standard for Dimensions for Fabricated Steel Water Pipe Fittings

ANSI/AWWA C-209 Standard for Cold-Applied Tape Coatings for the Exterior of Special Sections, Connections, and Fittings for Steel Water Pipelines

ANSI/AWWA C-210 Standard for Liquid-Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines

ANSI/AWWA C-214 Standard for Tape Coating Systems for the Exterior of Steel Water Pipelines

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ANSI/AWWA C-216	Standard for Heat-Shrinkable Cross-Linked Polyolefin Coatings for the Exterior of Special Sections, Connections, and Fittings for Steel Water Pipelines
ANSI/AWWA C-218	Standard for Coating the Exterior of Aboveground Steel Water Pipelines and Fittings
ANSI/AWWA C-219	Standard for Bolted Sleeve-Type Couplings for Plain-End Pipe
ANSI/AWWA C-222	Standard for Polyurethane Coatings for the Interior and Exterior of Steel Water Pipelines and Fittings
AWWA M-11	Steel Pipe - A guide for Design and Installation
ASTM A 106	Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service.
ASTM A 53	Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless
ASTM E 165	Method for Liquid Penetrate Examination
ASTM E 709	Guide for Magnetic Particle Examination
ASME Section V	Nondestructive Testing Examination
ASME Section IX	Welding and Brazing Qualification.
AWS B2.1	Standard for Welding Procedure and Welding Qualifications.

B. Qualifications

1. Manufacturers who are fully experienced, reputable, and qualified in the manufacture of the products to be furnished shall furnish all Steel pipe and fittings. The pipe and fittings shall be designed, constructed and installed in accordance with the best practices and methods and shall comply with these specifications as applicable.

2. Pipe shall be the product of one manufacturer that has not less than five (5) years successful experience manufacturing pipe in the United States of the particular type and size indicated. All pipe manufacturing including cylinder production, lining, coating and fittings shall be produced by one manufacture. The pipe manufacturer must have a certified quality assurance program. This certified program shall be ISO 9001: 2000 or other equivalent nationally recognized program.

3. MATERIALS

A. Pipe

1. Steel pipe with nominal diameters from 4-inch to 20-inch shall conform to ASTM A 106, A 53 Grade B or A 139 Grade B standard weight class as the minimum.

2. Steel Pipe greater than 20-inches shall conform to AWWA C200 and AWWA M-11 except as modified herein or as required by the engineer for special circumstances.

3. Pipe shall be designed for a minimum of 150 psi working pressure with an additional 50% of the working pressure allowance for surge pressure unless otherwise specified. Pipe design shall be in accordance with AWWA M-11.

4. Pipe shall be designed to cover conditions as shown on the plans. The design for deflection shall be in accordance with AWWA M-11.

   Use of an enhanced /better soil backfill to limit deflection will be allowed with approval by the engineer. (Criteria will be based on AWWA M-11)

5. Pipe for use with sleeve-type couplings shall have plain ends at right angles to the axis.

6. Pipe is to be furnished in joint lengths up to 50 ft. net laying lengths with special lengths, field trim pieces and closure pieces as required by plan and profile for location of elbows, tees, reducers and other in- line fittings. The pipe fabricator shall prepare a pipe-laying schedule showing the location of each piece by mark number with station and invert elevation at each bell end.

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B. Fittings

Unless otherwise shown on the Plans, all specials and fittings shall conform to the dimensions of AWWA Standard C208. Pipe material used in fittings shall be of the same material and thickness as the pipe. The minimum radius of elbows shall be 2.5 times the pipe diameter and the maximum miter angle on each section of the elbow shall not exceed 11 1/4 degrees (One cut elbow up to 22 1/2 deg.). If elbow radius is less than 2.5 x pipe diameter, stresses shall be checked per AWWA M-11 and wall thickness or yield strength increased if necessary. Fittings shall be equal in pressure design strength. Specials and fittings, unless otherwise shown on the Plans, shall be made of segment ally welded sections from hydrostatically tested pipe, with ends compatible with the type of joint or coupling specified for the pipe. All welds made after hydrostatic testing of the straight sections of pipe shall be checked per the requirements of AWWA C-200 Section 5.2.2.1

C. Joints

1. Rolled-Groove Rubber Gasket Joint: the standard joint shall be rolled-groove rubber gasket joint unless otherwise noted on the plans. Rolled-grooved rubber gasket joints shall conform to AWWA C200 Standard and as shown in Chapter 8 of AWWA M-11.

   The o-ring rubber gasket shall have sufficient volume to approximately fill the area of the groove and shall conform to AWWA C200.

   The joint shall be suitable for a safe working pressure equal to the class of pipe furnished and shall operate satisfactorily with a deflection angle, the tangent of which is not to exceed 1.00/D where D is the outside diameter of the pipe in inches with a pull-out of 1 inch.

   Rolled-Groove Rubber Gasket Joints may be furnished only by a manufacturer who has furnished pipe with joints of similar design for comparable working pressure. Pipe diameter, pipe length, and wall thickness that has been in successful service for a period of at least 5 years.

2. Lap weld: Lap field welded joints shall be used where tied joints are indicated on the plans. The standard bell shall provide for a 2 1/2-inch lap. The minimum lap shall be 1 inch. The design maximum joint deflection or offset shall be a 1" joint pull.

3. Mechanical Couplings: Mechanical couplings where indicated on the plans shall be Smith Blair Style 411, Baker Style 200, Brico Depend-O-Loc or equal. Insulating mechanical couplings where indicated on the plans shall be double insulated Smith Blair Style 416, Baker Style 216, or equal. Mechanical couplings shall be rated to meet or exceed the working pressures and surge pressure of the pipe.

   Couplings for buried service shall have all metal parts painted with Epoxy paint and conform to AWWA C219.

   Pipe ends for mechanical couplings shall conform to AWWA C200 and M-11. The shop applied outside coating shall be held back as required for field assembly of the mechanical coupling or to the harness lugs or rings. Harness lugs or rings and pipe ends shall be painted with one shop coat of epoxy conforming to AWWA C210. The inside lining shall be continuous to the end of the pipe.

4. **Flanges**

   a) Flanges shall be in accordance with AWWA C207 Class D for operating pressures to 175 psi on 4 inch through 12 inch diameter, and operating pressures to 150 psi on diameters over 12 inches; or Flanges shall be AWWA C207 Class E for operating pressures up to 275 psi; or Flanges shall be AWWA C207 Class F for pressures to 300 psi. (drilling matches ANSI B 16.5 Class 250) Shop lining and coating shall be continuous to the end of the pipe or back of the flange. Flange faces shall be shop coated with a soluble rust preventive compound.

   b) Gaskets: Full face, 1/8-inch thick, cloth-inserted rubber, Garlock 3000, John Crane Co. Style 777 or equal.

   c) Bolts and Nuts for Flanges

1. Bolts for flanges located indoors and in enclosed vaults and structures shall be carbon steel, ASTM A307, Grade B for class B and D flanges and nuts shall be ASTM A563, Grade A heavy hex. Bolts for class E and F flanges shall be ASTM A 193 grade B7 and nuts shall be ASTM A194, grade 2 H, heavy hex.

2. Bolts for buried and submerged flanges and flanges located outdoors above ground or in open vaults in structures shall be TYPE 316 stainless steel conforming to ASTM A193, Grade B8M, Class 1 for class B and D Flanges with ASTM 194, Grade 8M nuts. For Class E and F flanges the bolts shall be ASTM A194 grade 2H nuts with bolt and nuts to be zinc plated in accordance with ASTM B633

D. Linings and Coatings

1. Polyethylene Tape Coating

a) Prefabricated Multi-layer Cold Applied Tape Coating - the coating system for straight-line pipe shall be in accordance with AWWA Standard C214. The system shall consist of three layers of polyethylene material with a nominal thickness of 80 mills when complete.

b) Coating Repair

Coating repair shall be made using tape and primer conforming to AWWA Standard C209, Type II. The tape and primer shall be compatible with the tape system used for straight-line pipe.

c) Coating of Fittings, Specials and Joints

1. General – Fittings, specials and joints which cannot be machine coated in accordance with above, shall be coated in accordance with AWWA Standard C209. Prefabricated tape shall be Type II and shall be compatible with the tape system used for straight-line pipe. The system shall consist of 3 layers consisting of the following: Alternate coating methods for fittings specials and field joints would be Shrink sleeves per C-216, or paint per C-210, C-218, or C-222. The field coating shall completely encapsulate the joint bonds on o-ring joints.

2. Coating Repair - Coating repair for fittings and specials shall be in accordance with the procedure described above for straight-line pipe and as recommended by the manufacturer.

2. Other Coating Systems if specified shall be governed by the appropriate American Water Works Association standard.

3. Cement Mortar per AWWA C205

a) Cement Mortar Lining of Steel Pipe

1. Except as otherwise provided in AWWA Standard C205, interior surface of all steel pipe, fittings and specials shall be cleaned and lined in the shop with cement-mortar lining applied centrifugally in conformity with AWWA Standard C205.

2. The pipe ends shall be left bare where field joints occur as shown on the Plans. Ends of the linings shall be left square and uniform. Feathered or uneven edges will not be permitted.

3. Defective linings as identified in AWWA C- 205 shall be removed from the pipe wall and shall be replaced to the full thickness required. Defective linings shall be cut back to a square shoulder in order to avoid feather edged joints.

4. Cement mortar lining shall be kept moist during storage and shipping.

b) Fittings

1. Fittings shall be lined and coated per AWWA C205.

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MAY 1992
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