

CONSTRUCTION SPECIFICATION

52. STEEL PIPE

1. SCOPE

The work shall consist of furnishing and installing steel pipe complete with lining, coating, fittings, and appurtenances.

2. MATERIALS

Steel pipe and fittings shall conform to the requirements of Material Specification 554.

Unless otherwise specified, special fittings and appurtenances shall be of the same material as the pipe.

Welding electrodes shall conform to the requirements of Material Specification 581.

Coating and lining materials shall conform to the requirements of the following:

- a. AWWA C203, Standard for Coal-Tar Protective Coatings and Linings for Steel Water Pipelines, Enamel and Tape - Hot-Applied;
- b. AWWA C209, Standard for Cold-Applied Tape Coatings for the Exterior of Special Sections, Connections, and Fittings for Steel Water Pipelines;
- c. AWWA C214, Standard for Tape Coating Systems for the Exterior of Steel Water Pipelines;

and as specified below:

Shop coating materials shall conform to the requirements of AWWA Standard C203 and AWWA Standard C214 and as specified in Section 12 of this specification.

Shop lining materials shall conform to the requirements of AWWA Standard C203.

Field coating and coating repair materials shall conform to the requirements of AWWA Standard C203, AWWA Standard C209, AWWA Standard C214 and, as specified in Section 12 of this specification.

Field lining materials shall conform to the requirements of AWWA Standard C203 and as specified in Section 12 of this specification.

3. COATING AND LINING

Shop coating of pipe, specials, and fittings shall be in accordance with either AWWA Standard C203, AWWA Standard C209, or AWWA Standard C214 and as specified in Section 12 of this specification.

Shop lining of pipe, specials, and fittings shall conform to the requirements of AWWA Standard C203.

4. EXCAVATION

Excavation shall be in accordance with Construction Specification 21 or as specified in Section 12 of this specification.

5. LAYING AND BEDDING THE PIPE

Pipe shall be installed to the line and grade shown on the drawings. Unless otherwise specified, the pipe shall be installed so that there are no reversals of grade between joints, and shall also be installed in accordance with the manufacturer's recommendations. The pipe shall be firmly and uniformly bedded to the depth and in the manner specified on the drawings. An ample "bell hole" working area may be left at pipe joints to perform welding, coating, etc., activities. The "bell hole" area shall then be bedded, as specified, prior to backfill operations.

The pipe shall be weighed down sufficiently to prevent its displacement from the bedding during placement of the backfill under the haunches.

6. JOINTS AND CONNECTIONS

Pipe joints shall conform to the details shown on the drawings and shall be sound and watertight at the pressures specified in Section 12 of this specification.

Welded Joints. Welding and welded joints shall conform to the welding procedure details and requirements of AWWA Standard C206. Field welding shall be done in such a way as to avoid burning the protective coating on the pipe except in the immediate vicinity of the weld.

Where welded field joints are used, they shall be single welded butt joints or lap welded slip joints, as shown on the drawings. Special closure lap joints shall be used as described in AWWA Standard C206.

Bell and Spigot Joints. The dimensions of bells and spigots shall be in accordance with the manufacturer's standard design dimensions and tolerances.

The pipe shall be laid with the bell oriented upstream. The spigot end shall be seated in the bell to a depth as recommended by the manufacturer. The spigot, when seated, shall compress the gasket radially in its annular recess to provide a positive seal. Joints with fishmouthed gaskets will be taken apart and re-seated with a new gasket.

Rubber gaskets shall meet the requirements of AWWA Standard C200.

Mechanical Couplings. The ends of pipe to be connected with mechanical couplings shall be machined so as to allow coupling the pipe sections without damaging or displacing the gaskets and to insure uniform end separation of the pipes. Machined ends of the pipe that receive the coupling sleeves shall be free from dents, gouges, rust, or scale. The pipe and couplings shall be assembled with continuous rubber

ring gaskets conforming to the dimensions and tolerances recommended by the pipe manufacturer. Coupling followers shall be drawn up evenly to insure uniform pressure on the gaskets.

Grooved and shouldered joints shall be furnished and installed in accordance with AWWA Standard C606.

Flanged Joints. All steel ring flanges shall be fabricated in accordance with AWWA Standard C207. Gaskets shall be either a neoprene cloth-insert 1/16-inch or 1/8-inch thick or red rubber 1/16-inch thick. The gasket shall be full face where used between flat face flange surfaces. All flanged joints shall be made up tightly and shall not leak.

Fitting and Coupling Coatings. Compression couplings, mechanical couplings, and flanged fittings shall be shop coated with the AWWA Standard C203 coal tar enamel coating, as recommended by the coating manufacturer, or a factory-applied vinyl coating at least 12 mils thick and as specified in Section 12 of this specification. All bolts furnished for flanges, couplings, and other types of bolted connections shall be stainless steel or low alloy steel and shall be field coated with a coal tar enamel or vinyl coating after installation.

7. FIELD LINING, COATING, WRAPPING, AND REPAIR

Lining and coating or wrapping of field joints or connections and repair of damage to the wrap or coating on pipe, couplings, fittings, and appurtenances shall be made in accordance with Section 12 of this specification and one of the following methods:

Method 1 All field coating, lining, and repair shall be as specified in AWWA Standard C203;

Method 2 All field wrapping and repair shall be as specified in AWWA Standard C209 with Type I or II tape;

Method 3 All field wrapping and repair shall be as specified in AWWA Standard C214;

All Methods The following provisions apply to all methods of field coating, wrapping, and coating repair.

Surface Preparation. Bare steel surfaces shall be prepared for coating by removing all grease and oil or other soluble contaminants with solvent commercial cleaners (wiping, dipping, or steam) or vapor degreasing. After degreasing, surfaces shall be cleaned with hand tools to remove all loose scale rust and other loose detrimental foreign matter.

On previously coated surfaces, all dirt, paper and other foreign matter, and loose coating shall be removed. Kraft paper, whitewash, or other surface protective layers shall be removed at least 12 inches on either side of the bare steel to be coated.

Welds shall be cleaned of all welding slag, splatter, and scale. Sharp edges or burrs that could puncture or cut the coating shall be removed by grinding or filing. All welds shall be allowed to cool before applying primer or coatings.

Primer Application. After surface preparation is complete, primer shall be thoroughly mixed and applied in strict adherence to manufacturer's instructions. The primer shall be permitted to dry to the consistency recommended by the manufacturer prior to applying the coating. No foreign matter shall come in contact with the primed surface prior to application of the coating. Application of primer to surfaces shall be limited to that amount of area that can be wrapped during the same work-shift. Primed areas not wrapped during the same work-shift shall be re-primed. Cold weather applications of primer shall be done in accordance with AWWA Standard C203.

Coating Application. The specified coating shall be applied in accordance with the manufacturer's recommendations, unless otherwise specified.

After assembly, all pipe joints shall be field wrapped in accordance with AWWA C209 or AWWA C214, as appropriate. Surface preparation and primer application to the ends of the pipe to be wrapped shall be as previously described in this specification. A tape or filler tape shall be cigarette wrapped over the annular ring of the joint. The pipe coating shall be primed two (2) inches back from the coating cutback and two (2) layers of tape shall be wrapped overlapping two (2) inches of pipe coating on one side of the joint, extending across the joint and overlapping two (2) inches of coating on the other side of the joint. Coal tar enamel coating cutback edges shall be tapered back until one (1) inch of coal tar is exposed on the taper prior to priming and wrapping. Wraps shall be terminated on the underside of the pipe. Tape widths shall be six (6) inches for pipe greater than eight (8) inches diameter and four (4) inches for pipe two (2) to eight (8) inches in diameter.

Welded field joints, of lined pipe, shall be lined in accordance with AWWA Standard C203, Section 4.3, or as specified in Section 12 of this specification.

Repair and Patching Factory Coatings. All loose or disbanded material shall be removed from the area of the "holiday". All points, burrs, or rough edges shall be smoothed to a feathered edge. The surface shall be cleaned and prepared as specified for joints, couplings, and fittings. The area to be cleaned and prepared shall be at least twice the size of the "holiday". The repair coating shall be worked onto the surface of the steel so as to leave no voids or wrinkles on the surface.

Coal tar enamel coatings shall be repaired in accordance with AWWA Standard C203, Section 2.15. Tape coatings shall be repaired in accordance with AWWA Standard C214, Section 3.4, Coating Repair. The repair shall be made by wrapping tape around the circumference of the pipe.

All damaged vinyl coat areas shall be cleaned and recoated in accordance with the manufacturer's recommendation.

8. HANDLING THE PIPE

The Contractor shall furnish such equipment as is necessary to place the pipe without damaging the pipe or coating. Coated pipe shall be handled in the manner specified in AWWA Standard C203 or C214, as appropriate.

9. PRESSURE TESTING

If pressure testing of the conduit is specified, it shall be performed as follows:

- a. Placement of backfill before pressure testing shall be as specified in Section 10 of this specification.
- b. Before pressure testing, the pipeline shall be flushed and cleaned.
- c. The pipeline shall not be pressure tested until concrete in the anchor and thrust blocks has attained the minimum specified compressive strength.
- d. The total conduit, or section of the conduit, to be tested shall be filled with clean water at the rate specified and tested at the pressure specified in Section 12 of this specification.
- e. The section of conduit being tested shall be allowed to stand full of water for a minimum of 24 hours before the start of pressure and leakage test. Test pressure shall be held constant for 2 hours. If the amount of water loss exceeds the limit specified, the leaks shall be repaired and the conduit shall be re-tested. The procedure shall be repeated until the amount of water loss is within the limits specified in Section 12 of this specification.

10. BACKFILL

Method 1 Backfill, in accordance with Construction Specification 23 and Section 12 of this specification, shall be made only in sufficient amount to hold the conduit in place during testing, with the following exceptions:

- a. Compacted backfill shall be placed to its final depth as shown on the drawings at vertical and horizontal angle points, road crossings, and thrust blocks. Backfill shall be placed in such a way that the conduit and joints will not be subject to displacement or damage.
- b. All joints and connections shall be completely exposed for visual inspection during testing, except at locations that maybe exempt as outlined in 10.a.

Method 2 Backfill, in accordance with Construction Specification 23 and Section 12 of this specification, shall be to its final depth as shown on the drawings for the section of conduit being tested.

Use with Either Method The Contractor shall be fully responsible for any and all work required to repair any leakage when water loss exceeds the amount specified in Section 12 of this specification. After pressure testing is satisfactorily completed, the backfill shall be placed in accordance with Construction Specification 23 and Section 12 of this specification.

11. MEASUREMENT AND PAYMENT

Method 1 For items of work for which specific unit prices are established in the contract, the quantity of each type and size of pipe will be determined to the nearest 0.1 foot by measurement of the installed length of pipe along the centerline of the pipe. Payment for each type and size of pipe will be made at the contract unit price for that type and size of pipe. Such payment will constitute full compensation for furnishing, transporting, and installing the pipe, including the necessary fittings and all other items necessary and incidental to the completion of the work.

Method 2 For items of work for which specific unit prices are established in the contract, the quantity of each type and size of pipe will be determined to the nearest 0.1 foot by measurement of the installed length of pipe along the centerline of the pipe. Payment for each type and size of pipe will be made at the contract unit price for that type and size of pipe. Such payment will constitute full compensation for furnishing, transporting, and installing the pipe, complete in place, including the necessary fittings and all other items necessary and incidental to the completion of the work except the special fittings and appurtenances listed separately in the bid schedule. Payment for each special fitting and appurtenance will be made at the contract unit price for that type and size of fitting or appurtenance.

Method 3 For items of work for which specific unit prices are established in the contract, the quantity of each type and size of pipe will be determined to the nearest 0.1 foot by measurement of the installed length of pipe along the centerline of the pipe. Payment for each type and size of pipe will be made at the contract unit price for that type and size of pipe. Such payment will constitute full compensation for furnishing, transporting, and installing the pipe, including excavation, shoring, backfill, and all the necessary fittings and all other items necessary and incidental to the completion of the work.

Method 4 For items of work for which specific unit prices are established in the contract, the quantity of each type and size of pipe will be determined to the nearest 0.1 foot by measurement of the installed length of pipe along the centerline of the pipe. Payment for each type and size of pipe will be made at the contract unit price for that type and size of pipe. Such payment will constitute full compensation for furnishing, transporting, and installing the pipe, complete in place, including excavation, shoring, backfill, and all the necessary fittings and all other items necessary and incidental to the completion of the work except the special fittings and appurtenances listed separately in the bid schedule. Payment for each special fitting and appurtenance will be made at the contract unit price for that type and size of fitting or appurtenance.

All Methods The following provisions apply to all methods of measurement and payment. Compensation for any item of work described in the contract, but not listed in the bid schedule, will be included in the payment for the item of work to which it is made subsidiary. Such items, and the items to which they are made subsidiary, are identified in Section 12 of this specification.