

San Antonio Water System Standard Specifications for Construction

ITEM NO. 820

Concrete Steel Cylinder Pipe Installation

820.1 DESCRIPTION: This item shall consist of concrete steel cylinder pipe installation in accordance with these specifications and as directed by the Engineer.

820.2 REFERENCED STANDARDS: Reference standards cited in this Specification Item No. 820 refer to the current reference standard published at the time of the latest revision date logged at the end of this Specification Item No. 820, unless a date is specifically cited.

1. San Antonio Water System (SAWS):
 - a. Specifications for Water and Sanitary Sewer Construction
 - b. SAWS Materials Specifications
2. City Of San Antonio (COSA) Standard Specifications for Construction
3. Texas Commission of Environmental Quality (TCEQ) Chapter 290 Public Water Supply
4. American Society for Testing and Materials (ASTM) International:
 - a. ASTM A 648 - Standard Specification for Steel Wire, Hard Drawn for Prestressing Concrete Pipe.
 - b. ASTM A1032 – Standard Test Method for Hydrogen Embrittlement Resistance for Steel Wire Hard Drawn Used for Prestressing Concrete Pipe
 - c. ASTM C 33 - Standard Specification for Concrete Aggregates.
 - d. ASTM C 35 - Standard Specification for Inorganic Aggregates for Use in Gypsum Plaster.
 - e. ASTM C 150 - Standard Specification for Portland Cement.
 - f. ASTM C 497 - Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile.
 - g. ASTM C 1107 (CRD C-621) - Standard Specification for Packaged Dry, Hydraulic- Cement Grout (Nonsrink).
 - h. ASTM D 512 - Standard Test Methods for Chloride Ion In Water.
 - i. ASTM D 1293 - Standard Test Methods for pH of Water.
 - j. ASTM E 165 - Standard Test Methods for Dye Penetration.
 - k. ASTM E 340 - Standard Test Methods for Macroetching Metals and Alloys.
 - l. ASTM E 709 - Standard Test Methods for Magnetic Particle Testing.
 - m. ASTM E 1032 - Standard Test Methods for Radiographic Examination of Weldments.
5. American National Standard Institute (ANSI)
 - a. ANSI/AWS A3.0 - Standard Welding Terms and Definitions.

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6. American Water Works Association (AWWA)
 - a. AWWA C 206 - Standard for Field Welding of Steel Water Pipe.
 - b. AWWA C 207 - Standard for Steel Pipe Flanges for Waterworks Service - Sizes 4 in. through 144 in.
 - c. AWWA C 301 - Standard for Prestressed Concrete Pressure Pipe, Steel-Cylinder Type, for Water and Other Liquids.
 - d. AWWA C 304 - Standard for Design of Prestressed Concrete Cylinder Pipe.
 - e. AWWA M 9 –Concrete Pressure Pipe.

820.3 SUBMITTALS: Contractor shall submit manufacturer's product data, instructions, recommendations, shop drawings, and certifications.

1. Submit shop drawings and certification signed and sealed by Professional Engineer registered in State of Texas showing following:
2. Manufacturer's pipe design and thrust restraint calculations in accordance with AWWA M9, latest edition.
3. Provide lay schedule of pictorial nature indicating alignment and grade, laying dimensions, welding procedures, fabrication, fitting, flange, and special details, with plan view of each pipe segment sketched, detailing pipe invert elevations, horizontal bends, welded joints, and other critical features.
4. Indicate station numbers for pipe and fittings corresponding to Drawings.
5. Do not start production of pipe and fittings prior to review and approval by SAWS Engineer.
6. Provide final approved lay schedule.
7. Include hot tapping procedure.
 - a. Tapping of CSC pipe is only allowed by manufacturer's contractor.
 - i. Contractor must be trained by CSC Manufacturer of pipe brand being tapped.
 - ii. Contractor must be approved for pipe tapping by CSC Manufacturer of pipe brand being tapped.
 - iii. Contractor must have experience tapping specific brand of CSC pipe proposed for tapping.
 - iv. Contractor must have experience with similar pipe size being tapped.
 - v. SAWS must approve Contractor after CSC Manufacturer has trained and approved Contractor.
8. Submit certification from manufacturer that design was performed for project in accordance with requirements of this section.
9. Following Notice to Proceed and before initiation of manufacture of prestressing wire, submit following:
 - a. Name and location of prestressing wire manufacturer.
 - b. General description of quality control procedures used by wire manufacturer.
 - c. Include physical and chemical property tests utilized, testing frequency and test records; and description of methods employed to assure compliance

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- with AWWA C301 regarding wire surface temperature, type of thermometer, location of temperature measurement, frequency of temperature tests and test records.
- d. Approximate dates when wire will be manufactured for use in pipe.
 10. Submit inspection procedures to be used by manufacturer and for quality control and assurance for materials and welding.
 11. Submit standard repair procedures that describe in detail shop and field work to be performed.
 12. Steel reports as required in AWWA C301,
 13. Hydrostatic testing, acid etching, dye penetration, magnetic particle and x-ray weld test reports as required.
 14. Compressive strength (28 day) test results for each type of coating, lining and core mix design.
 15. Pipe manufacturer's certification that PCCP:
 - a. Cylinder assembly has been hydrostatically tested at factory for two (2) minutes minimum in accordance with AWWA C301.
 16. Submit following for nonshrink grout for special applications:
 - a. Manufacturer's technical literature including specifications for mixing, placing, and curing grout.
 - b. Results of tests performed by certified independent testing laboratory showing conformance to ASTM C 1107, Nonshrink Grout.
 - c. Certification product is suitable for use in contact with potable water.
 17. Submit proof of certification for welders
 18. Cylinder and Joint Ring Assembly:
 - a. Inspect physical dimensions and overall condition of joint rings and cylinder/joint ring assembly to verify compliance with requirements of AWWA C 301.
 - b. Test cylinder/joint ring weld for tensile strength.
 - c. Reject dented steel cylinders.
 19. Prestressing Wire:
 - a. Inspect wire spacing during wire placement on core.
 - b. Test wire splices for each production run.
 20. Pipe Cores and Coating:
 - a. Review mill certificates for each load of cement for conformance to ASTM C 150.
 - b. Perform sieve analysis weekly for each source of coarse and fine aggregate for conformance to ASTM C 33.
 21. Prior to prestressing, inspect each core for voids, chips, cracks, deleterious surfaces and foreign matter.
 22. Gaskets: Randomly test rubber cord for diameter, tensile strength, elongation, compression set, hardness, and specific gravity after oven aging on one out of 100 gaskets.
 23. Weld Testing:
 - a. Perform macroetching tests for complete -penetration production welds on normal production weld tests.
 - i. Complete joint penetration welds are defined in ANSI/AWS A3.0.

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- ii. Verify complete joint penetration by means of macroetch of joint weld cross section. Macroetch technique in accordance with ASTM E 340.
- 24. Perform ultrasonic or x-ray testing of manual butt welds for fittings and special pipes.
- 25. Perform dye penetration testing of manual lap welds for fittings and special pipes and for joint ring weld onto cylinder.
- 26. Perform minimum of one set of weld test specimens in accordance with ANSI/AWS A3.0 on each size, grade and wall thickness at minimum of every 3,000 feet of pipe manufactured.
 - a. Perform no less than one test per project by each welding machine and each operator.
- 27. Make available copy of Physical and Chemical testing reports and provide reports at request of SAWS Engineer or Inspector.

820.4 MATERIALS: The materials for concrete steel cylinder pipe installation shall conform to the specifications contained within the latest revision of SAWS' Material Specification Item No. 05-20, "Pre-stressed Concrete Pressure Pipe Steel Cylinder Type."

- 1. Cathodic Protection:
 - a. Connect each joint of pipe with bonding straps or approved devices to maintain continuity of current. Provide bonding straps free of foreign material.
 - b. Electrically isolate water line from other connections. Use insulating type joints or nonmetallic pipe unless otherwise indicated on Drawings.

820.5 CONSTRUCTION METHOD: Concrete steel cylinder pipe shall be installed as specified within Item No. 812, "Water Main Installation" of these specifications.

- 1. All joints shall be full weld. No skip weld shall be permitted.
- 2. Bell holes for concrete steel cylinder pipe shall be of sufficient size to properly join the pipe and place the required grout.
- 3. Subject to the above provisions, the length of excavation for bell holes below grade of the trench bottom shall be kept to a minimum.
- 4. All exterior and interior joints and exposed steel shall be grouted.
- 5. CSC in casing requires brush coat. No other spacer will be approved.
- 6. All CSC pipe to be constructed per approved manufacturer's make and lays.

820.6 MEASUREMENT: Concrete steel cylinder pipe will be measured by the linear foot for each size and type as follows:

- 1. Measurements will be from the center line intersection of runs and branches of tees to the end of the valve of a dead end run.
- 2. Measurements will also be between the center line intersection of runs and branches of tees.
- 3. Where the branch is plugged for future connection, the measurement will include the entire laying length of the branch or branches of the fitting.
- 4. The measurement of each line of pipe of each size will be continuous and shall include the full laying lengths of all fittings and valves installed between the ends

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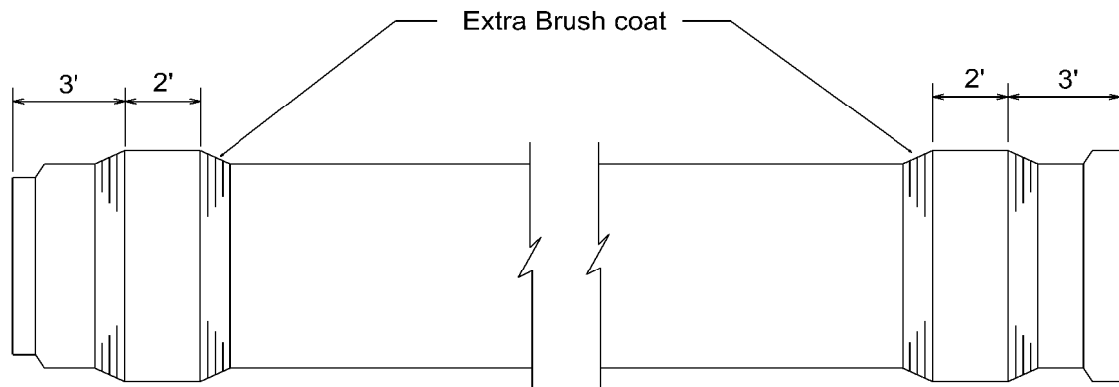
of such line except that the laying length of reducers will be divided equally between the connected pipe sizes.

5. Lines leading to a tapping connection with an existing main will be measured to the center of the tapped main.

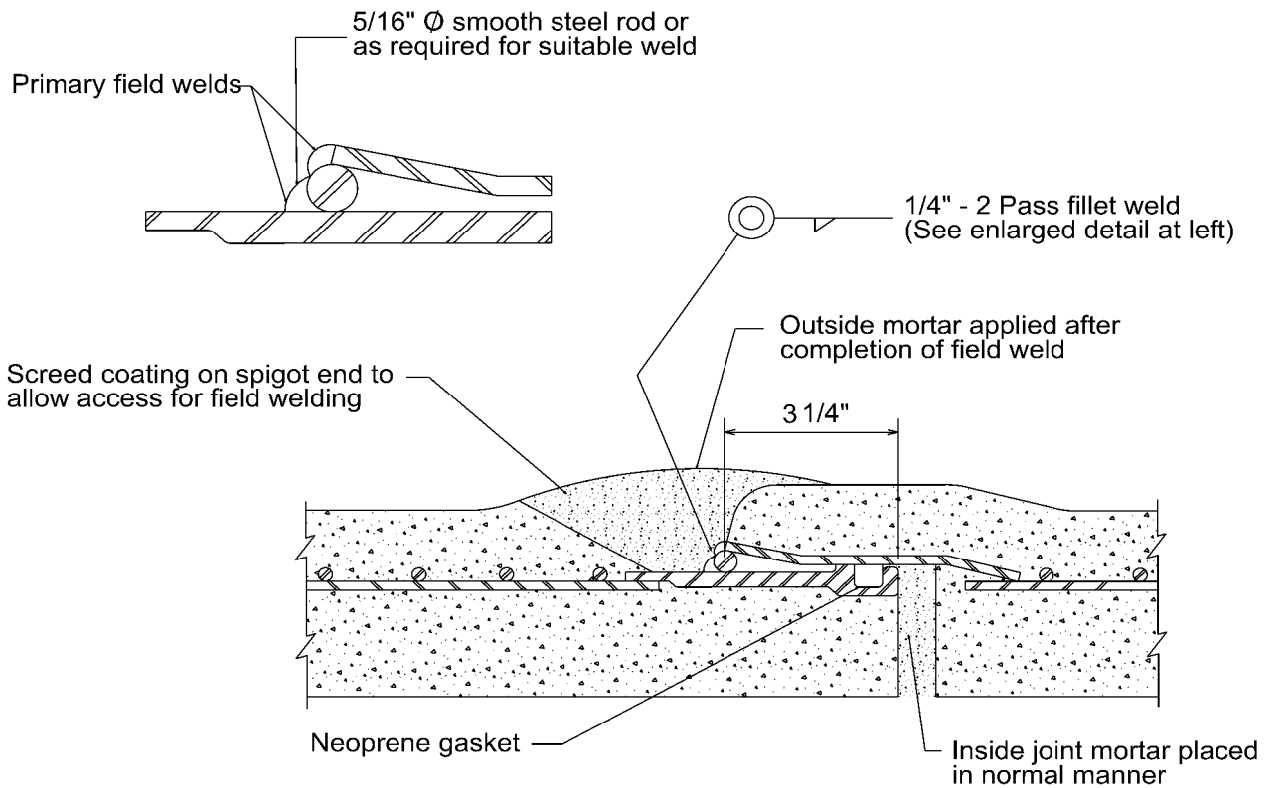
820.7 PAYMENT: Payment for Concrete Steel Cylinder Pipe installed will be made at the unit price bid per linear foot of pipe of the various sizes installed by the open cut method.

1. Such payment shall also include excavation, selected embedment material, backfill, compaction, compaction testing, polyethylene sleeve, hauling and disposition of surplus excavated material, including all existing pipe, fittings, appurtenances to be abandoned or removed, all weather surface, and other required testing as per Specification Item No. 804,

End of Specification



C.S.C. PIPE WITH EXTRA BRUSH COAT



FIELD PROCEDURE - Place a steel rod snugly into the recess between the bell and spigot as shown above and field weld as indicated. The weld should be continuous and need not be watertight. (No Skip Weld)

FIELD WELDED JOINT DETAIL

PROPERTY OF SAN ANTONIO WATER SYSTEM SAN ANTONIO, TEXAS	INSTALLATION OF C.S.C. PIPE IN CONDUIT OR BORE	APPROVED	REVISED
		MARCH 2008	AUG 2019
		DD-820-01	SHEET 1 OF 3