

San Antonio Water System Standard Specifications for Construction

**ITEM NO. 848
SANITARY SEWERS**

848.1 DESCRIPTION: This item shall govern the furnishing, installation and jointing of sanitary sewer pipe of the size and type specified by the project's plans and specifications.

All plans, materials and specifications shall be in accordance with the Texas Administrative Code (TAC) rules to include: 30 TAC § 213, and Design Criteria for Sewerage Systems 30 TAC § 217, or any revisions thereto as applicable.

848.2 MATERIALS: Materials for sanitary sewer pipe and fittings shall be either rigid or flexible. All pipe not listed shall be subject to approval by the SAWS Standards Committee.

1. Rigid Pipe: Reinforced concrete, ductile iron, cast iron and concrete steel cylinder pipe shall for the purpose of this specification be known as rigid pipe.
2. Flexible Pipe: Pipe consisting of materials other than those listed above.
 - a. Any flexible conduit having a deflection of the inside diameter greater than 5% after installation will not be accepted.

A "GO, NO-GO" Deflection Testing Mandrel built in accordance with the detail drawing, as shown on the Drawings DD-848, and 30 TAC § 217, shall be furnished at the Contractor's expense and shall be used in testing pipe deflection for acceptance, unless directed otherwise by the Engineer. Refer to SAWS Specification Item No. 849 for more information about Mandrel Deflection testing.

- b. Working room: The working room for flexible pipe shall be a minimum of 6 inches.
- c. Pipe Stiffness:

All mains are to be SDR 26 PVC (ASTM D-3034) with a minimum stiffness of 115 PSI.

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- d. At waterline crossings and where water and sewer mains are parallel and separation distance can not be achieved as per 30 TAC § 217.13, use pressure rated pipe SDR 26 PVC (ASTM D-2241) with a minimum pressure rating of 150 PSI.
3. Concrete Pipe:
 - a. Concrete pipe and fittings less than 18" in diameter shall conform to ASTM Designation C-14.
 - b. Concrete pipe and fittings 18" and larger in diameter shall conform to ASTM Designation C-76, Class III, or C-655.
 - c. When the depth of cover over the top of the pipe is over 14 feet, concrete pipe less than 18" in diameter shall be extra strength and shall conform to ASTM Designation C-14, Class III, as a minimum.
 - d. When the depth of cover over the top of the pipe is over 14 feet, concrete pipe 18" and larger in diameter shall conform to ASTM Designation C-76, Class IV, or C-655, as a minimum.
 - e. All joints and joint material for concrete pipe and fittings shall conform to ASTM Designation C-443.
4. Asbestos-Cement (AC) Pipe: AC pipe shall not be used. Refer to the SAWS website for AC pipe and material handling.
5. Fiberglass Reinforced Sewer Pipe, Non-Pressure Type: Fiberglass reinforced sewer pipe, non-pressure type, shall be a factory-formed conduit of polyester resin, continuous roving glass fibers and silica sand built up in laminates and shall conform to the requirements of ASTM D-3262 including the appendix and subsequent specifications, and in accordance with SAWS material specifications.

Coupling Joints: Joints for pipe and fittings shall be confined compression rubber gasket bell and spigot type joints conforming to the material and performance requirements of ASTM D-4161.

Fittings: Flanges, elbows, reducers, tees, wyes, laterals, and other fittings shall be capable of withstanding all operating conditions when installed. They may be contact molded or manufactured from mitered sections of

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pipe joined by glass-fiber reinforced overlays. For pipes 15" or larger in diameter, lateral openings 6 inch or greater in size shall be made using PVC sewer saddles conforming to ASTM D-2661 or insert a Tee connections conforming to ASTM D-3034 or approved equal.

Minimum pipe stiffness shall not be less than 115 psi for direct bury applications.

6. PSM Polyvinylchloride (PVC) Sewer Pipe: Pipe shall be made from class 12454-B materials as prescribed in ASTM-D 1784. For pipes 4" to 15" in diameter, PSM pipe, fittings and joints shall conform to ASTM D-3034 and D-3212, with the exception that solvent cement joints shall not be used. All pipes that are 18" to 27" in diameter shall meet the requirements of ASTM F-679.
7. Pressure Pipe/Force Mains: Pipe shall be made from Class 1254-A or 1254-B, as defined in ASTM D-1784. All pipe, fittings, and joints shall meet or exceed the requirements of ASTM Designation 2241, with the exception that solvent cement joints shall not be used. The pressure rating, size, and pressure class shall be as shown on the plans. Pipe shall have an integral bell and gasket seal with the locked-in type gasket reinforced with a steel band or other rigid material conforming to ASTM F-477. The joint shall comply with the requirements of ASTM D-3139. Pressure pipe/Force mains are required to have modified grade 5 material used as bedding. Pipes also shall be hydrostatically tested at minimum of 100 psi after their construction to ensure proper construction.
8. Mechanical or compression joints, concrete jointing collars, or non-reinforced rubber adaptors shall be used only as approved by the Owner.
9. Ductile Iron Pipe and Fittings: Ductile iron pipe shall be centrifugally cast of 60-42-10 iron and shall conform to the requirements of the latest revision of ANSI Standard A21.51/American Water Works Association (AWWA) C151. Thickness or class shall be that required for laying condition type 4 or 5, in accordance with actual conditions at the site. Ductile iron pipe may be "thickness designed" in accordance with requirements of the latest revision of ANSI Standard A21.50/AWWA C150. Thickness design shall be based on standard laying conditions 4 or 5 in accordance with conditions at the site. Fittings for ductile iron pipe shall have not less than the thickness, class, or pressure rating specified for ductile iron pipe. Fittings shall be furnished with all necessary glands, gaskets, bolts, etc. as may be required to complete the joints.

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Rubber gasket joints for mechanical joints or push on type joints shall conform to the requirements of ANSI Standard A21/AWWA C111.

All ductile iron pipe and fittings shall be cement mortar lined or polyethylene lined. The cement mortar lining shall be in accordance with ANSI A21.4/AWWA C104.

The polyethylene lining material for pipe and fitting shall be virgin polyethylene complying with ANSI/ASTM D-1248, compounded with inert filler and with sufficient carbon black to resist ultraviolet rays during storage of the pipe and fittings. The polyethylene shall be bonded to the interior of the pipe or fitting by heat. Polyethylene lining in pipe and in fittings shall be 40 mils nominal thickness. Minimum lining thickness shall be 30 mils.

10. Concrete Steel Cylinder Pipe: Prestressed concrete pipe and fittings shall conform to AWWA Specification C-301, as outlined in SAWS Material Specification Item No. 05-20, or AWWA Specification C-303, as outlined in SAWS Material Specification Item No. 05-40.
11. All sanitary sewer pipe and fittings produced within the jurisdiction of the SAWS shall be tested by a SAWS-approved laboratory method at the source of supply. All shipments of pipe not so tested shall be accompanied by a certificate of compliance to these specifications prepared by an independent testing laboratory and signed by a registered professional engineer.

848.3

CONSTRUCTION: All sanitary sewer mains shall be constructed in accordance with the specifications herein outlined and in conformity with the required lines, grades, and details shown on the plans and as directed by the Engineer. Successful passage of the air test, as described under TCEQ Criteria, shall be required for the acceptance of the mains.

1. Water Main Crossings: Where gravity or force main sewers are constructed in the vicinity of water mains, the requirements of the 30 TAC § 217.5 shall be met.
2. For excavation, trenching and backfill requirements see Item No. 804.
3. Pipe Laying: The Owner will inspect all pipe before it is placed in the trench and will reject any sections found to be damaged or defective to a degree that would affect the friction of the pipe. Rejected pipe shall be

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immediately removed from the site of the work. The Contractor shall be required to commence construction and laying of pipe at the downstream end of the sanitary sewer outfall line and proceed non-stop in a forward upstream direction. No pipe shall be laid within 10 feet of any point where excavation is in progress. Pipe laying shall proceed upgrade with the tongue or spigot pointing in the direction of flow. Pipe shall be lowered into the trench without disturbing the prepared foundation or the trench sides. The drilling of lifting holes in the field will not be permitted. Pipe shall be installed by means of a concentric pressure being applied to the pipe with a mechanical pipe puller. Pulling or pushing a joint of pipe in place by using a crane, bulldozer, or backhoe will not be permitted. Pipe shall be pulled home in a straight line with all parts of the pipe on line and grade at all times. No side movement or up and down movement of the pipe will be permitted during or after the pulling operation. Should coupled joints of pipe be out of line or off grade, they shall be removed one joint at a time and brought to the proper line and grade. The lifting or moving of several joints of coupled pipe at one time to close a partially open joint or to fine grade under laid joints of pipe will not be permitted.

4. Laser Beams: The use of laser beams for vertical control shall be required provided the Contractor makes available to the Inspector, when requested, a level and rod of sufficient sensitivity to accurately determine differences in elevation between points 300 feet apart with one instrument set-up.

No pipe shall be installed in tunnels except as provided on the plans, or with the permission of the Engineer. If the Contractor finds it necessary to install pipe in tunnels not provided on the plans, he shall submit to the Engineer, prior to commencement of work, a detailed outline of procedures, methods, and use of materials depending on existing soil conditions.

No horizontal or vertical curves shall be permitted in conformance with appropriate regulatory agency requirements.

Before leaving the work unattended, the upper ends of all pipelines shall be securely closed with a tight fitting plug or closure. The interior of laid pipe shall be kept free from dirt, silt, gravel, or foreign material at all times. All pipes in place must be approved before backfilling.

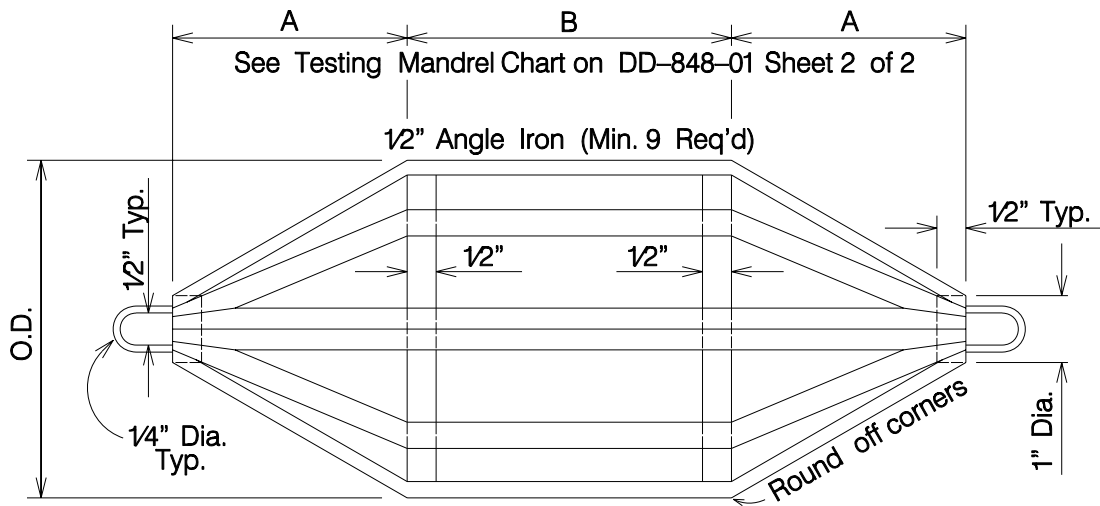
When replacing an existing system in place, Contractor shall maintain screens to prevent the entrance of construction debris into the sewer system.

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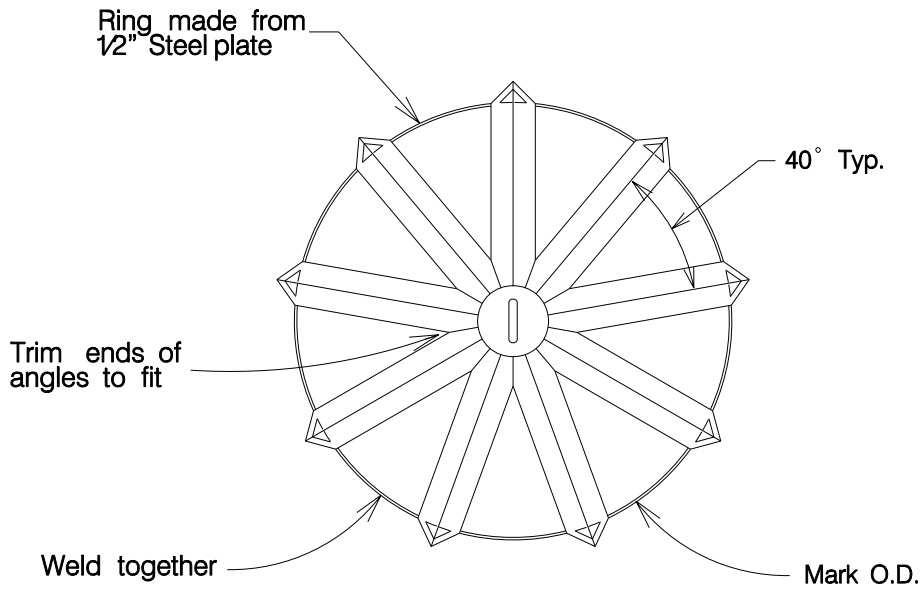
848.4 **MEASUREMENT:** All sewer pipes will be measured from center of manhole to center of manhole or end of main. Measurement will be continuous through any fittings in the main, even though the fittings are pay items of the contract.

848.5 **PAYMENT:**

1. Sewer pipe will be paid for at the contract bid price per linear foot complete in place for the types, size and depth constructed. Said price shall be full compensation for furnishing all materials, including pipe, trenching, pumping, concrete, plugs, laying and jointing, backfilling, select bedding and initial backfill material, tamping, water, labor, tools, equipment, and other incidentals necessary to complete the work.
2. Sewer pipe fittings, as part of the main line such as wyes and tees, is inclusive in the cost of Item No.854 Sanitary Sewer Laterals.
3. Pay cuts will be measured from the top of ground prior to the Contractor's operation and along the centerline of the pipe to the invert of the pipe.



SIDE OR TOP VIEW



END VIEW

Note:
All mandrels must be approved by SAWS Construction Inspections and stamped before use.

PROPERTY OF
SAN ANTONIO WATER SYSTEM
SAN ANTONIO, TEXAS

GO, NO GO DEFLECTION
TESTING MANDREL

APPROVED
March 2008

REVISED

DD-848-01

SHEET
1 OF 2

SIZE	A	B *	MANDREL O.D.	RING O.D.
			PVC (SDR-26)	PVC (SDR-26)
6"	4.0"	4.5"	5.50	4.79
8"	5.5"	6"	7.37	6.66
10"	7.0"	7.5"	9.21	8.50
12"	8.0"	9"	10.96	10.25
15"	10.0"	11"	13.42	12.71
18"	12.0"	13.5"	—	—
21"	14.0"	16"	—	—
24"	16.0"	18"	—	—
27"	18.0"	20"	—	—

* Minimum Length

CHART

Notes:

PVC pipes and fittings 6" to 15" in diameter shall conform to ASTM D-3034.

PVC pipes and fittings 18" to 27" in diameter shall conform to ASTM F-679.

This information is provided as a reference. All deflection testing shall be done in accordance with TCEQ Chapter 317.