

Section 02534**PVC PIPE****1.0 GENERAL****1.01 SECTION INCLUDES**

- A. Polyvinyl chloride pressure pipe for water distribution in nominal diameters 4 inches through 16 inches.
- B. Polyvinyl chloride sewer pipe for gravity sanitary sewers in nominal diameters 4 inches through 48 inches.
- C. Polyvinyl chloride pressure pipe for gravity sanitary sewers and force mains in nominal diameters 4 inches through 36 inches.
- D. References to Technical Specifications:
 - 1. Section 01350 – Submittals
 - 2. Section 02634 – Ductile Iron Pipe and Fittings
 - 3. Section 02533 – Sanitary Sewage Force Mains
 - 4. Section 02512 – Polyethylene Wrap
 - 5. Section 02510 – Water Mains
 - 6. Section 02530 – Gravity Sanitary Sewers
 - 7. Section 02731 – Sanitary Sewage Force Mains
 - 8. Section 02630 – Storm Sewers
 - 9. Section 02318 – Excavation and Backfill for Utilities
- E. Referenced Standards:
 - 1. American Water Works Association (AWWA)
 - a. AWWA C900 Polyvinyl Chloride (PVC) Pressure Pipe, 4” – 12” for Water Distribution.
 - b. AWWA C905 Polyvinyl Chloride (PVC) Water Transmission Pipe, Nominal Diameters, 14in. Through 36 in.
 - c. AWWA C110 Ductile-Iron and Gray Iron Fittings for Water.
 - 2. American Society for Testing and Materials (ASTM)
 - a. ASTM D 1784, “Standard Specification for Rigid Poly Vinyl Chloride (PVC) Compounds and Chlorinated Poly Vinyl Chloride (CPVC) Compounds”
 - b. ASTM F 477, “Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe”

- c. ASTM D 3139, “Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals”
 - d. ASTM D 3034, “Standard Specification for Type PSM Poly Vinyl Chloride (PVC) Sewer Pipe and Fittings”
 - e. ASTM F 949, “Standard Specification for Poly Vinyl Chloride (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings”
 - f. ASTM D 794, “Standard Specification for Poly Vinyl Chloride (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter”
 - g. ASTM F 679, “Standard Specification for Poly Vinyl Chloride (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings”
 - h. ASTM D 2241, “Standard Specification for Poly Vinyl Chloride (PVC) Pressure-Rated Pipe (SDR Series)”
 - i. ASTM D 3212, “Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals”
 - j. ASTM D 2444, “Standard Test Method for Determination for the Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight)”
 - k. ASTM D 1248, “Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable”
 - l. ASTM D 2321, “Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications”
3. American National Standards Institute (ANSI)
 - a. ANSI A21.10 Cast Iron and Ductile Iron Fittings, 2 thru 48 in./Water.
 - b. ANSI A21.11 Rubber Gasket Joints Cast and Ductile Iron Press Pipe.

1.02 MEASUREMENT AND PAYMENT

- A. Unless indicated as a Bid Item, no separate payment will be made for PVC pipe under this Section. Include cost in Bid Items for Water Mains, Gravity Sanitary Sewer, and Sanitary Sewage Force Mains.

1.03 SUBMITTALS

- A. Make Submittals required by this Section under the provisions of Section 01350 – Submittals.
- B. Submit Shop Drawings showing design of new pipe and fittings indicating alignment and grade, laying dimensions, fabrication, fittings, flanges, and special details.

1.04 QUALITY CONTROL

- A. Submit manufacturer's certifications that PVC pipe and fittings meet requirements of this Section and AWWA C900 or AWWA C905 for pressure pipe applications, or the appropriate ASTM standard specified for gravity sewer pipe.
- B. Submit manufacturer's certification that PVC pressure pipe has been hydrostatically tested at the factory in accordance with AWWA C900 or AWWA C905 and this Section.
- C. When foreign manufactured material is proposed for use, have material tested for conformance to applicable ASTM requirements by certified independent testing laboratory located in United States. Certification from any other source is not acceptable. Furnish copies of test reports to the Engineer for review. Cost of testing shall be borne by Contractor or Supplier.

2.0 PRODUCTS**2.01 MATERIAL**

- A. Use PVC compounds in the manufacture of pipe that contain no ingredient in an amount that has been demonstrated to migrate into water in quantities considered to be toxic.
- B. Furnish PVC pressure pipe manufactured from Class 12454-A or Class 12454-B virgin PVC compounds as defined in ASTM D 1784. Use compounds qualifying for a rating of 4000 psi for water at 73.4 degrees F per requirements of PPI TR3. Provide pipe which is homogeneous throughout, free of voids, cracks, inclusions, and other defects, uniform as commercially practical in color, density, and other physical properties. Deliver pipe with surfaces free from nicks and scratches with joining surfaces of spigots and joints free from gouges and imperfections which could cause leakage.
- C. For PVC pressure pipe used for water mains, provide self-extinguishing PVC pipe that bears Underwriters' Laboratories mark of approval and is acceptable without penalty to Texas State Fire Insurance Committee for use in fire protection lines.
- D. Gaskets:
 - 1. Gaskets shall meet the requirements of ASTM F 477. Use elastomeric factory-installed gaskets to make joints flexible and watertight.
 - 2. Pipes to be installed in potentially contaminated areas, especially where free product is found near the elevation of the proposed sewer, shall have the following gasket materials for the noted contaminants.

CONTAMINANT	GASKET MATERIAL REQUIRED
Petroleum (diesel, gasoline)	Nitrile Rubber
Other contaminants	As recommended by the pipe manufacturer

- E. Lubricant for rubber-gasketed joints: Water soluble, non-toxic, non-objectionable in taste and odor imparted to fluid, non-supporting of bacteria growth, having no deteriorating effect on PVC or rubber gaskets.

2.02 WATER SERVICE PIPE

- A. Pipe 4-inch through 12-inch: AWWAC900, Class 150, DR 18; nominal 20-foot lengths; cast iron equivalent outside diameters.
- B. Pipe 16-inch: AWWA C905; Class 235; DR 18; nominal 20 foot lengths; cast iron equivalent outside diameter.
- C. Joints: ASTM D 3139; push-on type joints in integral bell or separate sleeve couplings. Do not use socket type or solvent weld type joints.
- D. Make curves and bends by deflecting the joints. Do not exceed maximum deflection recommended by the pipe manufacturer. Submit details of other methods of providing curves and bends for review by the Engineer.
- E. Hydrostatic Test: AWWA C900, AWWA C905, ANSI A21.10 (AWWA C110); at point of manufacture; submit manufacturer's written certification.

2.03 BENDS AND FITTINGS FOR PVC PRESSURE PIPE

- A. Bends and Fittings: ANSI A21.10, ductile iron; ANSI A21.11 single rubber gasket push-on type joint; minimum 150 psi pressure rating.
- B. Coatings and Linings: Conform to requirements of Section 02634 – Ductile Iron Pipe and Fittings.

2.04 GRAVITY SANITARY SEWER PIPE

- A. PVC gravity sanitary sewer pipe shall be in accordance with the provisions in the following table:

WALL TYPE	MANUFACTURER	PRODUCT OPTIONS	ASTM DESIGNATION	SDR (MAX.) / STIFFNESS (MIN.)	DIAMETER SIZE RANGE
Solid	J-M Pipe CertainTeed	Approved	D3034	SDR 26 / PS 115	6" to 15"
		Approved	F679	SDR 26 / PS 115	18" to 48"
	Can-Tex Carlton Diamond	Approved	AWWA C900	DR 18 / N/A***	4" to 12"
		Approved	AWWA C905	DR 18 / N/A***	14" to 36"
Profile*	Contech A-2000**	Only when included in the Bid Schedule	F949	N/A / 50 psi	12" to 36"
	ETI Ultra-Rib		F794	N/A / 46 psi	12" to 48"
	Lamson Vylon		F794	N/A / 46 psi	21" to 48"

* Allowed to be used where there are no service taps.

** Allowed to be used to maximum depth of 10' only.

*** For water-seer separation requirements unless specifically noted in Bid Schedule.

- B. When solid wall PVC pipe 18 inches to 27 inches in diameter is required in SDR 26, provide pipe conforming to ASTM F679, except provide wall thickness as required for SDR 26 and pipe strength of 115 psi.
- C. For sewers up to 12-inch-diameter crossing over waterlines, or crossing under waterlines with less than 2 feet separation, provide minimum 150 psi pressure-rated pipe conforming to ASTM D 2241 with suitable PVC adapter couplings.
- D. Joints: Spigot and integral wall section bell with solid cross section elastomeric or rubber ring gasket conforming to requirements of ASTM D 3212 and ASTM F 477.
- E. ASTM D 3139 and ASTM F 477 shall be provided. Gaskets shall be factory-assembled and securely bonded in place to prevent displacement. The manufacturer shall test a sample from each batch conforming to requirements ASTM D 2444.
- F. Fittings: Provide PVC gravity sewer sanitary bends, tee, or wye fittings for new sanitary sewer construction. PVC pipe fittings shall be full-bodied, either injection molded or factory fabricated. Saddle-type tee or wye fittings are not acceptable.

2.05 SANITARY SEWER FORCE MAIN PIPE

- A. Provide PVC pressure pipe conforming to the requirements for water service pipe, and conforming to the minimum working pressure rating specified in Section 02533 – Sanitary Sewage Force Mains.
- B. Acceptable pipe joints are integral bell-and-spigot, containing a bonded-in elastomeric sealing ring meeting the requirements of ASTM F 477. In designated areas requiring restrained joint pipe and fittings, use EBAA Iron Series 2000PV, Uniflange Series 1350 restrainer, or equal joint restraint device conforming to UNI-B-13, for PVC pipe 12-inch diameter and less.

- C. Fittings: Provide ductile iron fittings as per this Section, 2.03 “Bends and Fittings for PVC Pressure Pipe”, except furnish all fittings with one of the following internal linings:
1. Nominal 40 mils (35 mils minimum) virgin polyethylene complying with ASTM D 1248, heat fused to the interior surface of the fitting, as manufactured by American Cast Iron Pipe "Polybond", or U.S. Pipe "Polyline".
 2. Nominal 40 mils (35 mils minimum) polyurethane, Corro-pipe II by Madison Chemicals, Inc.
 3. Nominal 40 mils (35 mils minimum) ceramic epoxy, Protecto 401 by Enduron Protective Coatings.
- D. Exterior Protection: Provide polyethylene wrapping of ductile iron fittings as required by Section 02512 – Polyethylene Wrap.
- E. Hydrostatic Tests: Hydrostatically test pressure rated pipe in accordance with this Section, 2.02E.
- F. Manufacturers: Approved manufacturers of pressure rated, solid wall PVC pipe for sanitary sewer force mains are:
1. J & M Manufacturing Company, Inc.
 2. CertainTeed Corporation
 3. Diamond Plastics Corporation
 4. Carlon Company
 5. North American Pipe Corporation (NAPCO)

3.0 EXECUTION

3.01 PROTECTION

- A. Store pipe under cover out of direct sunlight and protect from excessive heat or harmful chemicals in accordance with the manufacturer's recommendations.

3.02 INSTALLATION

- A. Conform to requirements of Section 02510 – Water Mains, Section 02530 – Gravity Sanitary Sewers, Section 02731 – Sanitary Sewage Force Mains, and Section 02630 – Storm Sewers.
- B. Install PVC pipe in accordance with Section 02318 – Excavation and Backfill for Utilities, ASTM D 2321, and manufacturer's recommendations.

- C. Water service pipe 12 inches in diameter and smaller: Installed to clear utility lines and have minimum 4 feet of cover below lowest property line grade of street, unless otherwise required by Plans.
- D. For water service, exclude use of PVC within 200 feet (along the public right-of-way) of underground storage tanks or in undeveloped commercial acreage. Underground storage tanks are primarily located on service stations but can exist at other commercial establishments.
- E. Avoid imposing strains that will overstress or buckle the pipe when lowering pipe into trench.
- F. Hand shovel pipe bedding under the pipe haunches and along the sides of the pipe barrel and compact to eliminate voids and ensure side support.

END OF SECTION