SECTION 02620

PVC PIPE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Polyvinyl chloride (PVC) pressure pipe for water distribution in nominal diameters 4 inches through 24 inches.

B. Polyvinyl chloride sewer pipe for gravity sanitary sewers in nominal diameters 4 inches through 60 inches.

C. Polyvinyl chloride pressure pipe for sanitary sewer force mains in nominal diameters 4 inches through 12 inches.

1.02 MEASUREMENT AND PAYMENT

A. Unit Price Contracts: No separate payment will be made for PVC pipe under this section. Include cost in unit price for work included as specified in the following sections:

1. Section 02664 – Water Mains

2. Section 02720 – Storm Sewers

3. Section 02730 – Gravity Sanitary Sewers

4. Section 02731 – Sanitary Sewer Force Mains

B. Stipulated Price (Lump Sum) Contract: If Contract is a Stipulated Price Contract, payment for Work in this Section is included in total Stipulated Price.

1.03 REFERENCES

A. ANSI A 21.16 (AWWA C 116) - Protective Fusion-Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron.

B. ASTM A 240 - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.

C. ASTM C 923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals.

D. ASTM D 618 - Standard Practice for Conditioning Plastics for Testing.

E. ASTM D 1248 - Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable.

F. ASTM D 1784 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.

G. ASTM D 2122 – Standard Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings.

H. ASTM D 2241 - Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).

I. ASTM D 2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.

J. ASTM D 2412 – Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel Plate Loading.

K. ASTM D 2444 - Standard Practice for Determination of the Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight).

L. ASTM D 2680 - Specification for Acrylonitrile-Butadiene-Styrene (ABS) and Poly (Vinyl Chloride) (PVC) Composite Sewer Piping.

M. ASTM D 3034 - Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

N. ASTM D 3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.

O. ASTM D 3212 - Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.

P. ASTM F 477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

Q. ASTM F 679 - Standard Specification for Poly (Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings.

R. ASTM F 794 - Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter.

S. ASTM F 949 - Standard Specification for Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe with Smooth Interior and Fittings.

T. AWWA C 110 (ANSI A 21.10) - American National Standard for Ductile-Iron and Gray-Iron Fittings, 3-inch Through 48-inch, for Water and Other Liquids.

U. AWWA C 111 (ANSI A 21.11) - American National Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

V. AWWA C 153 (ANSI A 21.53) - Ductile-Iron Compact Fittings for Water Service.

W. AWWA C900 - Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 60 In. (100 MM Through 1,500 MM).

X. AWWA C909 - Standard for Molecularly-Oriented Polyvinyl Chloride (PVCO) Pressure Pipe, 4 In. (100mm) and Larger.

Y. AWWA M23 – PVC Pipe – Design and Installation.

Z. PPI TR-3 - Policies and Procedures for Developing Hydrostatic Design Basis (HDB), Pressure Design Basis (PDB), Strength Design Basis (SDB), and Minimum Required Strength (MRS) Ratings for Thermoplastic Piping Materials or Pipe.

AA. UNI-B-13 - Recommended Standard Performance Specification for Joint Restraint Devices for Use with Polyvinyl Chloride Pipe.

1.04 SUBMITTALS

A. Conform to requirements of Section 01300 – Submittals.

B. Submit shop drawings showing the design of new pipe and fittings indicating alignment and grade, laying dimensions, fabrication, fittings, flanges, and special details.

C. Contractor to review and submit PVC pipe manufacturers recommended installation procedures.

D. Calculations and limits of thrust restraint shall be based on AWWA M23, latest edition.

1.05 QUALITY ASSURANCE

A. Submit manufacturer's certifications that PVC pipe meets requirements of this Section and AWWA C900 for pressure pipe applications, or the appropriate ASTM standard specified for PVC pipe.

B. Submit manufacturer's certification that PVC pressure pipe has been hydrostatically tested at the factory in accordance with AWWA C 900 and this Section.

1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Inspect pipe upon arrival at job site.

B. Handle and store pipe materials to protect them from damage due to impact, shock, shear or free fall. Do not drag pipe along ground. Do not roll pipe unrestrained from delivery trucks.

C. Use mechanical means to move or handle large pipe. Employ acceptable clamps, rope or slings around outside barrel of pipe and fittings.

PART 2 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 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.

Table 2.01: Gasket Requirements

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 30-inch: AWWA C 900, Class 235, DR 14; nominal 20-foot lengths; cast iron equivalent outside diameters.

B. 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.

C. 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 Owner Representative.

D. Hydrostatic Test: AWWA C 900, 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 02610 - Ductile-Iron Pipe and Fittings.

C. Restraints for large diameter PVC pipe at the bell shall be consist of the following:

1. The restraint shall be manufactured of ductile iron conforming to ASTM A536.

2. A backup ring shall be utilized behind the PVC bell.

3. A restraint ring, incorporating a plurality or individually actuating gripping surfaces, shall be used to connect the bell ring and gripping ring.

4. The restraint shall be the Series 2800 as manufactured by EBAA Iron, Inc., or approved equal.

2.04 GRAVITY SANITARY SEWER PIPE

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

Table 2.04: PVC Pipe Requirements

Manufacturer	Product Application	Standard	SDR (Max)/Stiffness	Size Range
Diamond Plastics Corporation	Gravity Sewer	ASTM D3034	SDR 26	4” to 15”
IPEX USA LLC				
Jet Stream by PipeLife				
JM Eagle				
National Pipe & Plastics, Inc.				
Sanderson Pipe Corporation				
Westlake Pipe and Fittings				
Diamond Plastics Corporation	Gravity Sewer	ASTM F679	PS 115	18” to 60”
IPEX USA LLC				
Jet Stream by PipeLife				
JM Eagle				
National Pipe & Plastics, Inc.				
Sanderson Pipe Corporation				
Westlake Pipe and Fittings				
Diamond Plastics Corporation	Force Main or where pressure rated pipe required	AWWA C900	DR 14*	4” to 12”
IPEX USA LLC				
Jet Stream by PipeLife				
JM Eagle				
National Pipe & Plastics, Inc.				
Sanderson Pipe Corporation				
Westlake Pipe and Fittings				
*Higher DR wall thicknesses may be acceptable if design calculations support their use. All calculations shall be signed and sealed by a licensed Texas PE and submitted for approval prior to acceptance.				

B. When solid wall PVC pipe 18 inches to 60 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 stiffness 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. Alternatively, PVC pipe in accordance with ASTM D3034 SDR 26 or ASTM F679 PS 115 can be utilized of certification can be provided that the pipe is capable of withstanding 150 psi.

D. Joints: Spigot and integral wall section bell with solid cross section elastometric or rubber ring gasket conforming to requirements of ASTM D 3212 and ASTM F 477, or ASTM D 3139 and ASTM F 477, shall be provided. Gaskets shall be factoryassembled and securely bonded in place to prevent displacement. The manufacturer shall test a sample from each batch conforming to requirements ASTM D2444.

E. 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 02731 - 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-B13, for PVC pipe 12-inch diameter and less.

C. Fittings: Provide ductile iron fittings as per Paragraph 2.03, 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 02630 - Polyethylene Wrap.

E. Hydrostatic Tests: Hydrostatically test pressure rated pipe in accordance with Paragraph 2.02 E.

PART 3 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.

B. B. Contractor is responsible for proper storage and protection of stored pipe.

3.02 INSTALLATION

A. Conform to requirements of Section 02664 - Water Mains, Section 02730 - Gravity Sanitary Sewers, Section 02731 - Sanitary Sewage Force Mains, and Section 02763 - Point Repairs to Sanitary Sewers, as applicable.

B. Install PVC pipe in accordance with Section 02227 - 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 finished grade above the pipe, unless otherwise required by Drawings.

D. Avoid imposing strains that will overstress or buckle the pipe when lowering pipe into trench.

E. 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