

## SECTION 02500 – POLYVINYL CHLORIDE (PVC) PRESSURE PIPE

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

- A. This section includes materials and installation procedures for polyvinyl chloride (PVC) pressure pipe and appurtenances for potable and recycled water systems.

#### 1.2 REFERENCE SPECIFICATIONS

- A. The publications listed below form part of this specification to the extent referenced and are referred to in the text by the basic designation only. Reference shall be made to the latest edition of said standards unless otherwise called for.

AWWA	C900	Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In. for Water Transmission and Distribution
AWWA	C905	Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 In. Through 48 In. for Water Transmission and Distribution
AWWA	C909	Molecularly Oriented Polyvinyl Chloride Pressure Pipe
AWWA	M23	PVC Pipe - Design and Installation
Uni-Bell		Handbook of PVC Design and Construction

#### 1.3 SERVICE APPLICATION

- A. PVC pipe will be used to transport and distribute potable water or recycled water as indicated on the Approved Plans.
- B. In accordance with their AWWA designations PVC pipe shall be used for pipe sizes as follows:
  - 1. C900 & C909 PVC pipe shall be used for mains and related appurtenances sized 4” through 12”
  - 2. C905 PVC pipe shall be used for mains sized 14” through 48”

#### 1.4 DESIGN REQUIREMENTS

- A. PVC pipe shall be provided in standard 20 foot lengths, unless otherwise specified, detailed or required on the approved plans. The use of 10’ and 15’ lengths shall be allowed. Random lengths are not allowed. Field cut lengths of pipe for tie-ins and stub-outs may not be shorter than 4 feet in length and must be approved by the DISTRICT.
- B. All PVC pipe entering or exiting a fitting shall be a minimum length of 10 feet unless approved otherwise by DISTRICT.
- C. Horizontal Radius: In areas where it is required to lay the pipe along a curve, the use of deflection couplings will be used to form the arc. The pipe shall not be bent to form the arc, nor shall the pipe be deflected within integral bells or ductile-iron fittings. Unless otherwise approved by the DISTRICT Engineer, PVC pipe shall be installed using 5°

deflection couplings (2 ½° at each bell) to form arcs with radii no less than the minimum noted below.

<u>Pipe Length Used</u>	<u>Minimum Radius</u>
20'	229'
10'	115'
Combination (refer to Section 3)	76'

## 1.5 FITTINGS

Ductile-iron fittings shall be used for the installation of pipe appurtenances 4" and larger in accordance with Section 02300.

## 1.6 SERVICE SADDLES FOR PVC PIPE

A. Service saddles shall be used for installation of pipe appurtenances 2" and smaller in accordance with Section 02200.

## 1.7 TAPPING SLEEVES

A. Tapping sleeves shall be compatible with the size and type of pipe receiving the sleeve in accordance with the manufacturer's recommendations and shall be selected from the Approved Materials List.

B. Tapping sleeves shall be installed a minimum of 3 feet from the edge of the sleeve to any pipe joint or other sleeve. Multiple taps of 6 inches or larger shall not be made in the same joint of pipe without the approval of the DISTRICT.

## 1.8 QUALITY ASSURANCE

A. The manufacturer of each shipment of pipe shall be required to supply a statement certifying that each lot or load of pipe has been subjected to the tests specified for PVC pipe, and has been found to meet all the requirements of AWWA C900/C909 & C905 as applicable.

B. PVC pipe shall carry a current certification of the National Sanitation Foundation (NSF) as acceptable to use in the transport of potable water.

C. PVC pipe and couplings shall bear indelible identification markings as required by AWWA C900/C909 and C905. In addition, all pipe shall bear a "home mark on the spigot end to indicate proper penetration when the joint is made. The pipe markings for PVC pipe for recycled water systems shall include the designated "RECYCLED WATER" in addition to the identification markings required by AWWA.

D. A fabricated two-part carbon steel sleeve shall be used for wet tap connections. The carbon steel used in the sleeve shall have minimum yield strength of 30,000 psi. The bolts and nuts shall be stainless steel, Type 316. The entire sleeve shall be shop coated with a minimum of 8 mils of fusion bonded powder epoxy in accordance with AWWA C213.

E. No wet taps will be allowed where the outlet is the same size as the main.

## 1.9 DELIVERY, STORAGE, AND HANDLING

- A. PVC pipe shall be stored in supplier's yards and on the job site in accordance with AWWA M23 and the manufacturer's recommendations. Store PVC pipe in the field by supporting the pipe uniformly in accordance with AWWA M23. Pipe shall not be stacked higher than 4' or with weight on the bell ends.
- B. Cover stored PVC pipe with an opaque material to protect it from the sun's ultraviolet radiation. PVC pipe that has been subjected to excess ultraviolet radiation as identified by color fading or chalking shall not be used. The determination as to the acceptability of PVC pipe shall rest solely with the DISTRICT Engineer.
- C. PVC pipe that has been contaminated in any way with petroleum products (on the inside or outside of the pipe) shall not be used.
- D. For pipe older than 24 months, the DISTRICT will require information on the pipe storage during the period. The DISTRICT reserves the right to reject pipe older than 24 months or to require retesting and recertification by the pipe manufacturer.

## PART 2 - PRODUCTS

### 2.1 POLYVINYL CHLORIDE PIPE

- A. PVC pressure pipe and appurtenant components and materials shall be selected from the Approved Materials List. Provide pipe with cast-iron equivalent outside diameter, and integral wall-thickened bell and spigot ends.
- B. PVC pipe in sizes 4" through 12" shall comply with the requirements of AWWA C900 or C909, Class 305 (DR14).
- C. PVC pipe in sizes 14" through 48" shall comply with the requirements of AWWA C905, Class 235 (DR18) or as shown on the Approved Plans.

### 2.2 DEFLECTION COUPLINGS

PVC deflection coupling that allow for 2 ½° deflection at each bell for a maximum of 5° total deflection shall be selected from the Approved Materials List.

### 2.3 FITTINGS

Ductile-iron fittings shall be in accordance with Section 02300 and selected from the Approved Materials List. The fittings shall have mechanical joint type or push-on type joints manufactured specifically for PVC pipe.

### 2.4 CONCRETE

Concrete used for thrust, anchor, and support blocks shall be in accordance with Section 03000.

## 2.5 JOINT RESTRAINT

Joint restraint systems may be used when shown on the Approved Plans or with prior approval of the DISTRICT Engineer. CONTRACTOR shall submit shop drawing and catalog data for restraint system in accordance with Section 01300. Joint restraint systems shall be selected from the Approved Materials List.

## 2.6 IMPORTED GRANULAR MATERIAL FOR PIPE AND TRENCH ZONES

Imported granular material for use in pipe and trench zones shall be in accordance with Section 02000.

## 2.7 TRACER WIRE

Tracer wire shall be installed with all water mains and services in accordance with Section 02100 and selected from the Approved Materials List. Wire shall be placed on the top centerline of the pipeline and shall run continuously along the entire length of pipe prior to placement of trench backfill. Wire shall be mechanically and electrically continuous throughout the pipeline, including within pipe casings. Tracer wire shall be secured to the pipe at 5' intervals with plastic adhesive 10 mil tape. Splices shall be installed only when necessary and shall be made using wire connectors selected from the Approved Materials List.

## 2.8 WARNING/IDENTIFICATION TAPE

Warning/Identification tape shall be installed for PVC water mains and services, in accordance with Section 02100 and selected from the Approved Materials List.

# PART 3 - EXECUTION

## 3.1 GENERAL

- A. At all times when the work of installing pipe is not in progress, including worker break times, the ends of the pipe shall be closed with tight-fitting, vermin-proof and childproof caps or plugs. Do not permit trench water to enter the pipe. Do not place tools, clothing, or other materials in the pipe. The CONTRACTOR shall maintain the interior of the pipe in a sanitary condition free from foreign materials at all times.
- B. Proper care shall be used to prevent damage in handling, moving and placing the pipe. All pipe, fittings, valves, and other pipeline materials shall be lowered into the trench in a manner that prevents damage. The pipe shall not be dropped, dragged or handled in a manner that will cause bruises, cracks, or other damage. PVC pipe that has been gouged, scratched, or otherwise damaged shall be subject to rejection at the discretion of the DISTRICT Engineer.
- C. Where pipe lengths less than the standard 20' are required, the pipe sections shall be installed in accordance with the manufacturer's installation guide (with the exception of deflection at the bell and spigot, which is not allowed) and shall only be used as specified herein or with the approval of the DISTRICT Engineer. The minimum pipe length permitted is 5', except at tie-ins, where the minimum pipe length permitted is 4', when approved by the DISTRICT Engineer.

### 3.2 TRENCHING, BACKFILLING AND COMPACTION

Trenching, bedding, backfilling and compaction operations shall be performed in accordance with Section 02000.

### 3.3 DEWATERING

Dewatering of trench excavations shall be performed in accordance with Section 02100. If flooding of the trench does occur, the CONTRACTOR shall immediately dewater and restore the trench. Damaged or altered pipelines, appurtenances, or trench materials shall be repaired or replaced as directed by the DISTRICT Engineer.

### 3.4. PIPE INSTALLATION

When the work requires and the size of the pipe allows entry of personnel into the pipe, the CONTRACTOR shall comply with Federal and State regulations for confined space entry. Work inside pipelines shall not be undertaken until all tests and safety provisions for confined space entry have been performed and the area is verified as safe to enter.

The CONTRACTOR shall furnish and install all pipe, specials, fittings, closure pieces, valves, supports, bolts, nuts, gaskets, jointing materials, and all other appurtenances as shown on the Approved Plans and as required to provide a complete and workable installation.

Install pipe in the trench as follows:

- A. Inspect each section of pipe prior to lowering the pipe into the trench. Thoroughly clean the ends of the pipe. Remove foreign matter and dirt from the inside of the pipe and keep clean during and after installation.
- B. Install pipe according to the manufacturer's approved order of installation to the proper lines and grades in accordance with the Approved Plans and as follows:
  - 1. Install pipe uphill if the grade exceeds ten percent (10%).
  - 2. Installation tolerance for the pipe shall not vary more than 2" horizontally or 1" vertically from the alignment and elevations shown on the Approved Plans.
  - 3. Install the pipe such that the identification markings on each pipe section are continuously aligned for the total length of the pipeline alignment. Orient the strip marking upward to the 12 o'clock position (top) of the trench opening.
- C. The pipe shall have a firm bearing along its full length, and bell holes shall be provided at each joint to permit visual inspection of the joint and prevent the pipe from being supported by the bell end or coupling.
- D. The beveled end of the pipe shall be removed prior to insertion into a mechanical joint fitting.
- E. Field cutting and milling shall be performed in accordance with the manufacturer's written instructions to equal the quality of shop- fabricated ends.

F. Pipe Assembly

1. Push-On Type: Assemble the pipe joint using a lubricant selected from the Approved Materials List. Insert the spigot end into the bell or coupling to the proper insertion mark. Check that the elastomeric ring has not left the groove during assembly by passing a feeler gauge around the completed joint. Drive spigot ends of the pipe into bell ends in accordance with the manufacturer's recommendations. Stabbing shall not be permitted.
2. Mechanical – Joint Type: Assembly of mechanical joint fittings shall be in accordance with the manufacturer's recommendations regarding installation.

G. PVC pipe shall not be bent, nor shall PVC pipe be deflected at pipe connections other than deflection couplings. Install deflection couplings selected from the Approved Materials List for horizontal and vertical changes in direction not greater than 5°, and for installation of pipe through curves. Pipe sections of differing lengths may be used as follows to facilitate the installation of pipelines through curves.

1. Allowable lengths of pipe sections through curves are 20' or 10' only.
2. No more than two 5' pipe sections may be used in succession without being separated by a 20' or 10' section. Pipe layout through curves is subject to approval by the DISTRICT Engineer. In no case shall the minimum radius be less than 76'.

END OF SECTION