SECTION 15064

pvc pressure pipe

# GENERAL

## DESCRIPTION

### This section includes materials, installation, and testing of polyvinyl chloride (PVC) pressure pipe conforming to AWWA C900.

## REFERENCE STANDARDS

### 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.

#### ASTM D1784 – Standard Specification for Rigid Polyvinyl Chloride (PVC) Compounds and Chlorinated Polyvinyl Chloride (CPVC) Compounds

#### ASTM A307 – Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength

#### ASTM A563 – Standard Specification for Carbon and Allow Steel Nuts

#### ASTM B62 – Standard Specification for Composition Bronze or Ounce Metal Castings

#### ASTM D1248 – Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable

#### AWWA C110 – Ductile-Iron and Gray-Iron Fittings, 3-inch through 48-inch, for Water and other Liquids

#### AWWA C111 – Rubber-Gasket Joints for Ductile-Iron Pressure Pipe & Fittings

#### AWWA C153 – Ductile-Iron Compact Fittings, 3-inch through 16-inch, for Water And other Liquids

#### AWWA C900 – Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4-inch through 60-inch

## RELATED WORK SPECIFIED ELSEWHERE

### EVMWD Standard Drawings.

### Section 02223 – Trenching, Backfilling, and Compacting

### Section 03310 – Cast in Place Sitework Concrete

### Section 09800 – Painting and Coating

### Section 15000 – General Piping Systems and Appurtenances

### Section 15044 – Hydrostatic Testing and Flushing of Pressure Pipelines

## SUBMITTALS

### Submit shop drawings in accordance with the standard specifications.

### Provide affidavit of compliance with AWWA C900.

### Submit fully dimensioned cross section of the bell and barrel of the pipe. Show the bell maximum outside diameter in the pressurized area and its minimum wall thickness at the same location.

### Submit copies of the following manufacturer required tests conducted on the project pipe:

#### Quick-burst strength of pipe and couplings.

#### Flattening resistance of pipe.

#### Impact resistance of pipe

#### Acetone-immersion test of pipe material

#### Internal pressure and vacuum tests of joints per ASTM D 3139

#### Laboratory tests of gaskets per ASTM F 477

#### Record of additional tests after test sample failure.

### Submit manufacturer's literature on ductile iron fittings including dimensions, thickness, weight, coating, lining, and a statement of inspection and compliance with the acceptance tests of AWWA C110 or C153. Submit copy of report of pressure tests for qualifying the designs of all sizes and types of AWWA C153 fittings that are being used in the project. The pressure test shall demonstrate a minimum safety factor of three times the rated working pressure as described in AWWA C153, Section 5.5.

### Submit manufacturer's catalog data and descriptive literature for high deflection couplings, repair couplings, service saddles, restrained joints, tracer wire, marking tape, and miscellaneous piping materials.

## INSPECTION AND FIELD VERIFICATION

### The DISTRICT's Representative may inspect materials, productions, and testing at manufacturer's plant.

### Where new pipelines are to be connected to existing waterlines of the DISTRICT, the Contractor shall verify in the field the location, elevation, pipe material, pipe outside diameter, and any other characteristics of the existing waterline before proceeding with the pipe installation. This field verification shall be performed in the presence of the DISTRICT's Representative.

# MATERIALS

## PVC PIPE

### PVC pipe shall be provided in accordance with the Design Standards and these specifications.

### Pipe shall be made from unplasticized PVC compounds having a minimum cell classification of 12454 as defined in ASTM D1784. The compound shall qualify for Hydrostatic Design Basis (HDB) of 4000 psi for water at 73.4-degrees Fahrenheit, in accordance with the requirements of ASTM D2837

### Provide pipe in standard 20-foot laying lengths, unless noted otherwise. Random lengths will not be permitted.

### Pipe shall incorporate an integral bell joint system using Rubber Gasket System technology and a single rubber gasket conforming to ASTM F477. Joints shall be designed to meet the zero leakage test requirements of ASTM D3139.

### Pipe shall meet the requirements of ANSI/NSF 61 Drinking Water System Components—Health Effects.

### PVC pipe shall have a minimum pressure class of 235 psi (DR 18).

[\*Note to the Engineer: update 2.01F with pressure class as necessary, adhering to minimum pressure class as stated above.\*]

## HIGH DEFLECTION COUPLINGS

### Provide polyvinyl chloride (PVC) or ductile iron (DQ couplings with twin elastomeric gaskets which allow 2 degrees of deflection at each gasket for a total of 4 degrees per coupling.) Provide couplings for cast iron equivalent outside diameter. Couplings shall be selected from the Approved Materials List.

## CLOSURE/REPAIR COUPLINGS

### Provide polyvinyl chloride (PVC) couplings with twin elastomeric gaskets which are designed to connect plain ends of straight pipe. Provide couplings for cast iron equivalent outside diameter with working pressure rating to match adjoining pipe. Do not deflect pipe in these couplings. Closure/Repair Couplings shall be selected from the Approved Materials List.

## FITTINGS

### Ductile iron fittings for use with C900 PVC pressure pipe shall be in accordance with SECTION 15056 – Ductile Iron Pipe and Fittings. Fittings for use with the Pump to Waste Line shall be lined and coated per AWWA C116 (Fusion Bonded Epoxy Lining and Coating).

## FLANGES

### Flanges on ductile iron fittings shall conform to AWWA C110 or ANSI B16.42 Class 150. Refer to SECTION 15056.

## BOLTS, NUTS AND GASKETS FOR FLANGES

### Bolts, nuts and gaskets shall be in accordance with SECTION 15000.

## OUTLETS

### For outlets 2 inches and smaller with working pressures 150 psi or less, attach a service saddle and corporation stop to the pipe. Provide service saddles with full width, cast bronze bodies conforming to ASTM B 62, 0-ring gaskets, and iron pipe threads. Provide Type 304 stainless steel double band straps with four bolts All stainless steel shall be fully passivated for enhanced corrosion resistance. All saddles shall be pre-sized at the factory for installation on cast iron equivalent outside diameter PVC pipe conforming to AWWA C900. Service saddles shall be selected from the Approved Materials List.

### For outlets 2 1/2 inches and larger, use a ductile iron tee with a flanged outlet. Sizes below 3 inches will require a reducing fitting.

## COUPLINGS

### Flexible pipe couplings and flange coupling adapters shall be in accordance with SECTION 15000 and shall be selected from the Approved Materials List.

## TRACER WIRE

### Tracer wire shall be in accordance with SECTION 15000.

## WARNING/IDENTIFICATION TAPE

### Warning/Identification tape shall be in accordance with SECTION 15000.

## MARKER POSTS

### Marker posts shall be furnished in accordance with SECTION 15000 and the DISTRICT Standard Drawings.

## POLYETHYLENE (PE) ENCASEMENT AND WAX TAPE COATING

### PE encasement and wax tape coating shall be in accordance with DISTRICT Design Standard Drawings.

# EXECUTION

## PRODUCT MARKING

### Legibly mark pipe in blue at 5-foot intervals and each coupling to identify the nominal pipe size, OD base, PVC, dimension ratio number and pressure class, AWWA C900, and the seal of the testing agency that verified the suitability of the material for potable water service.

## DELIVERY AND TEMPORARY STORAGE OF PIPE

### Ship, store, and place pipe at the storage yard or installation site by supporting the pipe uniformly. Avoid scratching the pipe surface. Do not stack higher than 4-feet nor stack with weight on bells. Cover to protect from sunlight.

### Do not install pipe that is gouged or scratched forming a clear depression.

### Do not install pipe contaminated with a petroleum product (inside or outside).

### Do not install any pipe that shows evidence of exposure to sunlight, age, surface deterioration, or other physical damage. The decision of the DISTRICT's Representative shall be final as to the acceptability of the pipe to be installed.

## HANDLING OF PIPE

### Lift pipes with mechanical equipment using wide belt slings or a continuous fiber rope which avoids scratching the pipe. Do not use cable slings or chains. Pipes up to 12 inches in diameter may be lowered by rolling on two ropes controlled by snubbing. Pipes up to 8 inches in diameter can be lifted by hand.

## SANITATION OF PIPE INTERIOR

### During laying operations, do not place tools, clothing, or other materials in the pipe.

### When pipelaying is not in progress, including lunch breaks, close the ends of the installed pipe with a plug to deter contamination of pipe.

## PIPE LAYOUT FOR STRAIGHT AND CURVED ALIGNMENTS

### Use integral bell end pipe for straight alignments and for radii greater than 1,150 feet.

### Use plain end pipe lengths with high deflection (HD) couplings and integral bell end pipe for curved alignments in horizontal direction when the deflection is higher than the manufacturers maximum tolerance. HD couplings shall be used for all vertical deflections. Do not bend pipe between couplings. Saw cut integral bell end of standard pipe and bevel end for use with deflection couplings. Use an integral bell end pipe length joined together with a 19-foot plain end pipe length to form a chord. Use deflection couplings on each end of the chord and continue this combination through the curved alignment for all radii Pipe lengths shorter than 9 feet will not be used unless specifically authorized by the DISTRICT's Representative.

## INSTALLING PIPE IN TRENCH

### See Standard Specification SECTION 02223 for earthwork requirements.

### Inspect each pipe and fitting before lowering into the trench. Clean ends of pipe thoroughly. Remove foreign matter and dirt from inside of pipe and keep clean during and after laying.

### Handle pipe in a manner to avoid any damage to the pipe. Do not drag pipe over the ground, drop it onto the ground, or drop objects on it. Do not drop or allow pipe to fall into trenches.

### Laying tolerances for the installed pipe shall not vary greater than 0.3-foot horizontally, or greater than 0.1-foot vertically from the alignment and elevations shown on the Drawings.

### Grade the bottom of the trench to the line and grade to which the pipe is to be laid, with allowance for pipe thickness. Remove hard spots that would prevent a uniform thickness of pipe base material (imported sand). Before laying each section of the pipe, check the grade with a straightedge and correct any irregularities found. The trench bottom shall form a continuous and uniform bearing and support for the pipe at every point between bell holes, except that the grade may be disturbed for the removal of pipe handling slings.

### At the location of each joint, dig bell holes in the bottom of the trench and at the sides to permit visual inspection of the entire joint and to prevent the pipe from being supported by the bell end or fitting.

### Keep the trench in a dewatered condition during pipelaying. Removal of water shall be in conformance with Standard Specification SECTION 02223.

### At all times when pipe laying is not in progress, the open end of the pipe shall be closed with a tight-fitting cap or plug to prevent the entrance of foreign matter into the pipe. These provisions shall apply during the break periods as well as overnight. In no event shall the pipeline be used as a drain for removing water which has infiltrated into the trench. The Contractor shall maintain the inside of the pipe free from foreign materials and in a clean and sanitary condition until its acceptance by the Owner.

## ASSEMBLING PIPE JOINTS

### The spigot and integral bell or coupling shall be dirt free and slide together without displacing the rubber ring gasket. Lay the pipe section with the integral bell facing the direction of laying.

### Clean the groove of the bell or coupling of all foreign materials. If the gasket groove is dirty or contains debris, carefully remove the gasket and clean the groove. Insert the gasket back into the groove of the bell or coupling prior to installation. Observe the correct direction of the shaped gasket. Feel that the gasket is completely and evenly seated in the groove.

### Mark the full insertion depth on the spigot end of the pipe. This mark indicates when the pipe is fully inserted into toe bell or coupling. Lubricate the exposed gasket surface and the beveled spigot up to the full insertion mark with the lubricant supplied by the pipe manufacturer. For repair couplings, lubricate pipe for the entire distance the coupling will travel on the pipe. If the lubricated pipe end touches dirt, clean the pipe end and reapply lubricant.

### Insert the spigot into the bell or coupling and force it slowly into position.

### Check that the rubber ring gasket has not left the groove during assembly by passing a feeler gage around the completed joint.

## INSTALLING BURIED FITTINGS

### Buried ductile iron fittings shall be installed in accordance with SECTION 15056.

## INSTALLING FLANGED JOINTS

### Flanged ductile iron joints shall be installed in accordance with SECTION 15056.

## INSTALLING SERVICE SADDLES

### Place the service saddle on the pipe and hand tighten the nuts while positioning the saddle in its final location. Uniformly tighten the nuts in a progressive diametrically opposite sequence and torque with a calibrated torque wrench to the saddle manufacturer's recommended values.

### Connect a corporation stop to the saddle per Standard Specification SECTION 15100. Apply Teflon joint compound or tape to the male threads before installing the corporation stop. Make joints watertight.

### Mount a tapping machine on the corporation stop to cut a hole in the pipe with a shell type cutter made specifically for PVC pipe. Do not use other devices or hand equipment to bore through the pipe wall.

## INSTALLING TRACER WIRE

### Tracer wire shall be installed in accordance with SECTION 15000.

## INSTALLING WARNING/IDENTIFICATION TAPE

### Warning/Identification tape shall be installed in accordance with SECTION 15000 and the DISTRICT Standard Drawings.

## SETTING MARKER POSTS

### Marker posts shall be installed in accordance with SECTION 15000.

## PRESSURE TESTING and disinfection

### See Standard Specification SECTION 15044 for pressure testing, flushing, and disinfection requirements.

END OF SECTION