CITY OF FORT WAYNE MASTER UPDATED: 12/12/16

SECTION 33 05 37.16

PVC Pressure Utility Piping

NTS: This section covers pressurized PVC pipe. PVC pipe covered in this section includes buried PVC pressure pipe for waterlines and force mains. This section is only applicable to PVC pressure pipe using bell and spigot joints. See Section33 05 37.24 for Certa-Lok Polyvinylchloride Pressure Utility Piping and Section 33 05 37.34 for Fusible Polyvinylchloride Utility Piping. Do not use this section for projects utilizing trenchless installation methods.

Not covered in this section is non-pressure PVC utility piping. Other types of non-metallic piping, such as HDPE, are in other specification sections.

D.I. fittings, for use with PVC pressure pipe, are not included in this specification. When D.I. fittings are used for PVC pressure pipe Section 33 05 33, Ductile Iron Pressure Utility Piping, should be referenced in this section and included in the Project Manual.

Edit this section to suit project requirements. Coordinate this section with applicable requirements of Division 33 installation. Installation and jointing methods are included in the applicable piping installation section. Trenching and backfill information is in 33 00 05 Trenching and Earthwork.

1. GENERAL
   1. DESCRIPTION
      1. Scope:
         1. Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install PVC pipe and fittings as shown and specified.
      2. Coordination:
         1. Review installation procedures under this and other Sections and coordinate installation of items that must be installed with, or before, PVC piping Work.
      3. Related Sections:

NTS: List below only sections covering products, construction, and equipment specifically identified in this section and specified in another section and directly referenced in this specification. Do not list administrative and procedural Division 01 sections. Insert at (--1--) the number and name of the Division 33 installation section or any other referenced sections.

* + - 1. Section 31 00 05, Trenching and Earthwork.
      2. Section 33 05 33, Ductile Iron Pressure Utility Piping.
      3. Section (--1--).

NTS: Section “1.2” is to be included if project is bid on unit price basis. Section to be deleted or revised if project is to be bid on lump sum basis.

NTS: Insert at (--1--), (--2--) and (--3--) below the various PVC pressure pipe types and diameters to be used for project. Adjust Section “1.2” below for additional work item numbers as needed. In extreme cases consider separating the work items by diameter and depth.

Review Paragraph “A.4” below and modify to suit the project. Add “disinfection” to the description if designing a water line.

* 1. MEASUREMENT AND PAYMENT
     1. PVC Pressure Utility Piping
        1. Work Item Number and Title

**33 05 37.16-A (--1--) PVC Pressure Utility Piping**

**33 05 37.16-B (--2--) PVC Pressure Utility Piping**

**33 05 37.16-C (--3--) PVC Pressure Utility Piping**

NTS: Edit paragraph 2 below to suit the Project. for watermain projects consider editing the specific structures to measure from.

* + - 1. The quantity of pipe installed shall be the number of linear feet as measured horizontally along the centerline of the successfully installed, backfilled and tested from outside wall of structure to outside wall of structure as shown and specified. Measurement shall include length of fittings and valves.
      2. The payment of pipe shall be based on the unit price per linear foot as listed on the submitted Bid schedule for each size pipe successfully installed. Payment for restraining fittings and appurtenances shall be included in their respective Work items. Payment for any associated restoration shall be paid for under its respective Work item.

NTS: Review paragraph 4 below and edit to suit project. For non-water projects remove work item “disinfection” if not required for project.

* + - 1. These Work items shall include all costs to furnish all labor, materials, tools, and equipment, both permanent and temporary, to install the PVC pressure pipe as shown and specified. The Work includes, but is not limited to, trench excavation, dewatering, furnishing and placement of bedding, pipe, placement of required backfill, disposing of excess excavated material, required couplings and specials, testing of materials, compaction of bedding and backfill, utility verification, pavement removal and disposal if necessary, temporary sheeting, shoring and bracing, tracing wire, pressure testing, disinfection, restoration/replacement of all disturbed items not included under other Work items, protection of existing utilities and structures, and incidentals for performing all Work as specified unless otherwise provided for as a separate Work item. Specified restraint of mains not associated with fittings shall also be included in the unit price for the main.

NTS: Leave section “B” below for water projects. Insert at (--1--), through (--5--) below the various ductile iron pipe fittings diameters to be used for project. Add additional work item numbers as needed. Delete if not required for project. Include Ductile Iron Pipe Section in Project Manual.

* + 1. Fittings
       1. Work Item Number and Title:

All fittings are Ductile Iron Fittings unless otherwise stated.

**33 05 37.16-D (--1--) 11.25, 22.5, 45 or 90 Degree Bend Ductile Iron Fittings for Pressure PVC Pipe**

**33 05 37.16- E (--2--) x (--3--) x (--4--) Tee Ductile Iron Fittings for Pressure PVC Pipe**

**33 05 37.16- F (--5--) Cross Ductile Iron Fittings for Pressure PVC Pipe**

* + - 1. The number of fittings to be measured for payment shall be the actual number installed of each size and type as shown and specified along a water main that is successfully installed, pressure tested and disinfected.
      2. The payment for these items shall be based on the contract unit price. Payment for special backfill will be under its respective bid item. Payment for excavation, placement of native backfill disposal of excavated materials, bedding, restoration, and pressure testing and disinfection shall be included under the bid items for the water main unless otherwise broken down by the Engineer as a separate bid items.
      3. These items shall include all costs to furnish all labor, materials, tools and equipment, both permanent and temporary, to install and maintain complete the ductile iron fittings as shown and specified unless otherwise directed by the Engineer. Work shall include, but is not limited to, any necessary joint restraining required to overcome the thrust imposed by the respective items.
  1. REFERENCES

NTS: Retain applicable standards and add/delete as required. Delete paragraph “A.4.” if not using for potable water.

* + 1. Standards referenced in this Section are listed below:
       1. American Association of State Highway and Transportation Officials.
          1. AASHTO Standard Specifications.
       2. ASTM International.
          1. ASTM D1784, Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
          2. ASTM D3139, Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
          3. ASTM F477, Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
       3. American Water Works Association.
          1. AWWA C900, Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In.-60 In. (100 mm-300 mm), for Water Transmission and Distribution
          2. AWWA C907, Injection-Molded Polyvinyl Chloride (PVC) Pressure Fittings, 4 In. Through 12 In. (100 mm Through 300 mm).
       4. NSF International.
          1. NSF/ANSI Standard 61, **Drinking Water System Components - Health Effects.**
  1. QUALITY ASSURANCE

NTS: Edit or delete Paragraph “A” below if project requirements prohibit an experience clause.

* + 1. Manufacturer’s Qualifications:
       1. Manufacturer: Shall have a minimum of 5 years experience producing PVC pressure pipe and fittings and shall be able to submit documentation of satisfactory service in at least 5 completed installations in operation for at least five years each.
    2. Component Supply and Compatibility:
       1. All pipe of each material type shall be furnished by the same manufacturer.
       2. PVC pipe Supplier shall prepare and review all Shop Drawings and other submittals for all materials furnished under this section.
       3. Materials shall be suitable for specified service conditions and shall be integrated into overall assembly by PVC pipe Supplier.

NTS: Remove paragraph “C” below if not for potable water use.

* + 1. Regulatory Requirements
       1. Pipe and fittings, including linings and coatings, that will convey potable water or water that will be treated to become potable, shall be certified by an accredited organization in accordance with NSF 61 as being suitable for contact with potable water, and shall comply with requirements of authorities having jurisdiction at Site.
  1. SUBMITTALS

NTS: Review Paragraph “A” and “B” below and modify or eliminate to suit the project. Piping layout should only be requested for special circumstances such as areas where pipe restraint is required.

* + 1. Action Submittals: Submit the following:
       1. Product Data:
          1. Submit product data on pipe, fittings, gaskets, hardware, pipe gasket lubricant and appurtenances sufficient to demonstrate compliance with the Contract Documents.

NTS: Remove paragraph “b” below if not a potable water project.

* + 1. Informational Submittals: Submit the following:
       1. Certificates:
          1. Submit manufacturer’s certificate of compliance with standards referenced in this Section.
          2. Submit manufacturer’s certificate of NSF 61 compliance for all components coming into contact with potable water.
       2. Source Quality Control Submittals:
          1. When requested by Engineer, submit results of source quality control tests. Ensure the quality control tests were completed on the same material installed.

NTS: Edit or delete Paragraph “3” below if project requirements prohibit an experience clause.

* + - 1. Qualifications Statements:
         1. Submit qualifications of manufacturer when requested by Engineer.
         2. Submit qualifications of installer when requested by Engineer.
  1. DELIVERY, STORAGE, AND HANDLING
     1. Ship and store in accordance with manufacture’s recommendations.
     2. Inspect all materials during unloading process.
     3. Notify Owner of any cracked, flawed or otherwise defective material.
     4. Remove all materials from the Site that are found to be unsatisfactory.
     5. Comply with Section 01 65 00 Product Delivery Requirements and Section 01 66 00 Product Storage and Handling Requirements.

1. PRODUCTS
   1. MATERIALS

NTS: Edit Paragraph “A” to suit the project.

* + 1. General:
       1. Pipe materials shall be suitable for services intended.
       2. Pipe shall be homogeneous throughout and free of visible cracks, holes, foreign inclusions, and other defects. Unless otherwise shown or indicated, pipe shall be uniform in color, opacity, density, and other physical properties.
       3. Buried pipe shall be capable of withstanding external live load, including impact, equal to AASHTO H-20 loading, with cover shown or indicated in the Contract Documents.
       4. Pipe, fittings, and appurtenances in contact with potable water or water that will be treated to become potable shall be listed in ANSI/NSF 61 as being suitable for contact with potable water.
    2. POLYVINYL CHLORIDE (PVC) PIPING

NTS: Paragraph “A” and “B” covers PVC pipe typically used in buried pressurized applications, such as sanitary force mains. Delete if not required. Not covered in Paragraph “A” is PVC piping with integral restrained joints as used in trenchless applications such as pipe bursting or directional drilling. Contact manufacturers such as IPEX and Certainteed for information on such systems.

* + - 1. Buried PVC Sanitary Pressure Pipe:
         1. Material:

Pipe shall comply with AWWA C900

Material shall comply with ASTM D1784.

NTS: Insert at (--1--) the wall thickness (i.e., SDR “18”, SDR “21”, etc.). AWWA C900 covers PVC pipe four-inch through 60-inch diameter in SDR 14 (e.g., 200 psi working pressure rating), 18 (150 psi), and 25 (100 psi).

Wall Thickness: SDR (--1--).

Fabricate pipe with cast-iron pipe equivalent outside diameter.

* + - * 1. Fittings:

Comply with AWWA C900, or AWWA C907, as applicable.

* + - * 1. Joints:

Provide bell and spigot joints. Bell shall consist of an integral wall section to hold securely in place (and prevent displacement during assembly of joint) elastomeric O-ring gasket.

Jointing lubricant shall be as recommended by pipe manufacturer.

NTS: Specify nitrile gaskets when pipe is installed in oil-contaminated soils.

Provide elastomeric gaskets complying with ASTM F477 and ASTM D3139.

Restrained Joints: Provide restrained joints where shown or indicated.

* + - 1. Buried PVC Water Pressure Pipe (Diameter ≤ 16 inch):
         1. Material:

Pipe shall comply with AWWA C900.

Material shall comply with ASTM D1784, Class 12454-B (DOC 1170).

NTS: Insert at (--1--) the wall thickness (e.g. DR “18”, etc.). AWWA C900 covers PVC pipe four-inch through 60-inch diameter in SDR 14 (e.g., 200 psi working pressure rating), 18 (150 psi), and 25 (100 psi). 16 inch is the largest allowed for PVC in the water distribution system. DR 18 shall be used for PVC in any distribution system application.

Wall Thickness: DR (--1--).

Fabricate pipe with cast-iron pipe equivalent outside diameter.

* + - * 1. Fittings:

Refer to Section 33 05 33, Ductile Iron Pressure Utility Piping.

* + - * 1. Joints:

Provide bell and spigot joints. Bell shall consist of an integral wall section to hold securely in place (and prevent displacement during assembly of joint) elastomeric O-ring gasket.

Jointing lubricant shall be as recommended by pipe manufacturer.

NTS: Specify nitrile gaskets when pipe is installed in oil-contaminated soils.

Provide elastomeric gaskets complying with ASTM F477 and ASTM D3139.

Restrained Joints: Provide restrained joints where shown or indicated.

Comply with Section 33 11 00, Water Piping Installation.

* 1. MARKING FOR IDENTIFICATION
     1. Pipe Markings:

NTS: Delete Paragraph “1” if there is no laying schedule on the project.

* + - 1. Factory-mark each length of pipe and each fitting with designation conforming to those on approved laying schedules.
      2. Manufacturer shall cast or paint on each length of pipe and each fitting pipe material, diameter, and pressure or thickness class.
  1. SOURCE QUALITY CONTROL
     1. Shop Tests:
        1. Pipe manufacturer shall maintain continuous quality control program.
        2. Where applicable and when requested by Engineer, submit results of source quality control tests specified in reference standards.
  2. BURIED PIPING IDENTIFICATION

NTS: Coordinate project specific tracing wire requirements with Section 33 11 00, Water Piping Installation or 33 31 00, Sanitary Sewer Piping Installation. Insert at (--1--) the appropriate piping installation spec section. Delete if not required.

* + 1. Provide piping tracing wire; refer to Section (--1--).

1. execution
   1. INSPECTION
      1. Inspect pipe materials for defects in material and workmanship. Verify compatibility of pipe and fittings.
   2. INSTALLATION
      1. Buried Piping Installation
         1. Refer to the applicable Division 33 piping installation section.
      2. Bedding and Backfill
         1. Refer to Section 31 00 05 Trenching and Earthwork.

NTS: Specifier to consider known construction sequencing and procedures when determining pipe design. Heavy construction loading should be avoided for installed pipes with shallow cover.

* + 1. Contractor shall be responsible for verification of pipe loading during construction. Pipe design is based on final installation depth and required cover.
  1. BURIED PIPING IDENTIFICATION INSTALLATION

NTS: Coordinate project specific tracing wire requirements with Section 33 11 00, Water Piping Installation or 33 31 00 Sanitary Sewer Piping Installation. Insert at (--1--) below the appropriate Section. Delete if not required.

* + 1. Install piping tracing wire; refer to Section (--1--).

NTS: Coordinate article “3.4” below with project specific testing requirements listed within Section 33 11 00, Water Piping Installation. Edit the installation specification reference if a different installation (sanitary, storm) section is used. Ensure that the installation section has the applicable requirements.

* 1. FIELD QUALITY CONTROL

NTS: Insert at (--1--) the applicable piping installation specification section.

* + 1. Leakage Testing
       1. Complete pipe leakage testing; refer to Section (--1--).

NTS: Delete Paragraph “B.” below if this is a sanitary sewer forcemain.

* + 1. Disinfection
       1. Complete pipe disinfection; refer to Section 33 11 00, Water Piping Installation.

+ + END OF SECTION + +