

**SECTION 02616 - REINFORCED CONCRETE PIPE, RUBBER GASKET JOINT
(WITH OR WITHOUT PVC LINING)**

City of San Diego, CWP Guidelines

NTS: The reinforced concrete pipe covered by this Section 02616, which conforms to ASTM C-76's D-Load Design Method and to ASTM C-361 for joint design, is primarily intended for gravity storm drain and sanitary sewer applications where limited amounts of infiltration/exfiltration and leakage are acceptable. This pipe is normally furnished with Carnegie bell and spigot steel joint or a raised or flush bell concrete joint with a single rubber gasket. For special applications only, such as subaqueous installations or pipelines installed below the water table, these joints shall be furnished with double rubber gaskets. These applications should be clearly shown or defined in paragraph 2.3 below. There is a 10 to 15 psi shop test for the joint. Field leakage testing shall be in accordance with Section 02730. This reinforced concrete pipe can be furnished with PVC lining for sanitary sewer applications as required.

This Section is coordinated with Section 02600 such that it requires inclusion of that Section in the Contract Document.

PART 1 - GENERAL

1.1 WORK OF THIS SECTION

- A. The WORK of this Section includes providing rubber gasketed reinforced concrete pipe with or without PVC lining intended to be used for the construction of gravity storm drains and sanitary sewers.

1.2 RELATED SECTIONS

- A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.
 - 1. Section 02140 Dewatering
 - 2. Section 02200 - Earthwork
 - 3. Section 02600 - Pipeline Construction
 - 4. Section 02730 - Sanitary Sewerage System Testing
 - 5. Section 03300 - Cast-in-Place Structural Concrete

1.3 STANDARD SPECIFICATIONS

- A. Except as otherwise indicated in this Section of the Specifications, the CONTRACTOR shall comply with the Standard Specifications for Public Works Construction (SSPWC), as specified in Section 01090 - REFERENCE STANDARDS.

1.4 SPECIFICATIONS AND STANDARDS

- A. Except as otherwise indicated, the current editions of the following apply to the WORK of this Section:
 - 1. ASTM C 76 Specification for Reinforced Concrete Culvert, Storm Drain, Sewer Pipe
 - 2. ASTM C 150 Specification for Portland Cement
 - 3. ASTM C 361 Specification for Reinforced Concrete Low-Head Pressure Pipe
 - 4. ASTM D 412 Test Methods for Rubber Properties in Tension
 - 5. ASTM D 2240 Test Method for Rubber Property - Durometer Hardness

1.5 SHOP DRAWINGS AND SAMPLES

- A. The following shall be submitted in compliance with Section 01300:
 - 1. Manufacturer's design drawings indicating, at relative scale, concrete covers, reinforcement placements and joint assembly design. Submittals shall also include the design pipe size, D-load, cement type, concrete strength and steel areas, and types and placement of reinforcement.
 - 2. A certified affidavit of compliance for all pipe and other products or materials furnished under this Section, as specified in the reference standards and the following supplemental requirements:
 - a. Hydrostatic test reports of rubber gasket joints.
 - b. Three-edge-bearing strength (D-load) test reports.
 - c. PVC-Liner test reports.

1.6 FACTORY INSPECTION AND TESTING

- A. The CONTRACTOR shall be responsible for all costs associated with inspection and testing of materials, products, or equipment at the place of manufacture. This shall include costs for travel, meals, lodging, and car rental for [two] OWNER-designated inspectors for [] days required to complete such inspections or observations exclusive of travel days, if the place of manufacture, fabrication and factory testing is more than fifty (50) miles outside the geographical limit of the City. The CONTRACTOR shall not be responsible for salary or salary-related costs of the inspectors. The CONTRACTOR shall comply with the requirements of Section 01400.

- B. **Inspection:** All pipe shall be subject to inspection at the place of manufacture in accordance with the provisions of the applicable referenced standards as supplemented by the requirements herein. The CONTRACTOR shall notify the CONSTRUCTION MANAGER in writing of the manufacturing starting date not less than 14 calendar days prior to the start of any phase of pipe manufacture.
- C. **Tests:** Unless otherwise indicated, all materials used in the manufacture of the pipe shall be tested in accordance with the requirements of the applicable referenced standards. The CONTRACTOR shall perform said material tests at no additional cost to the OWNER. The CONSTRUCTION MANAGER will witness all testing conducted by the CONTRACTOR; provided, that the CONTRACTOR's schedule is not delayed for the convenience of the CONSTRUCTION MANAGER. In addition to those tests specifically required, the CONSTRUCTION MANAGER may request additional samples of any material for testing by the OWNER. The additional samples shall be furnished at no additional cost to the OWNER.
- D. **Product Testing:** In addition, pipe shall be tested at the factory for D-load bearing strength in compliance with SSPWC Subsection 207-2.9.2.
- E. **Hydrostatic Tests:** Pipe shall be subjected to hydrostatic test of the rubber gasket joints in accordance with ASTM C 361 except that test pressure shall be a minimum of 5 psi.
- F. **PVC Liner Tests:** PVC liner shall be tested in accordance with Subsection 210-2.3 of SSPWC.

PART 2 -- PRODUCTS

2.1 GENERAL

- A. Reinforced concrete pipe shall conform to the requirements of ASTM C 76 as modified below:
 - 1. In no case shall pipe be less than that specified under ASTM C 76 provisions for Class III, Walls "B", or "C." Wall "A" shall not be accepted.
 - 2. Minimum protective cover of concrete over the inner reinforcement cage shall be 1¼ inches.
 - 3. Pipe shall be fabricated by the vertically cast process which shall be wet cast, vibrated, and steam- or water-cured. Pipe manufactured by the dry cast method is unacceptable. For steam curing, the forms shall not be removed for a minimum of 6 hours. For water curing, the minimum period for removal of forms is 24 hours. Fabrication of vertically-cast pipe shall be in accordance with ASTM C 361 and further, form oils or release agents shall not contain any material or substances as would penetrate or otherwise retard concrete set at the formed surface.

2.2 MATERIALS

- A. **General:** Materials shall comply with Section 6 of ASTM C 76 modified below.

- B. **Cement:** Cement used in the manufacture of reinforced concrete pipe shall be Type II in conformance with ASTM C 150.
- C. **Admixtures:** No admixture shall be used unless otherwise specified or accepted by the CONSTRUCTION MANAGER.
- D. **Rubber Gaskets:** Rubber gaskets shall be neoprene and shall comply with the requirements of ASTM C 361.
- E. **PVC-Liner:** PVC-liner shall conform to SSPWC Subsection 207.3 and shall be **Amerplace T-Lock as manufactured by Ameron Protective Coatings Division, Brea, Calif., or equal.** The liner shall cover 330 degrees of the pipe interior surface, leaving an open arc of 30 degrees at the bottom of the pipe for observation of cracks that may occur during D-Load tests.

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NTS: The Specifier shall add special considerations and criteria for joint design, for information of the pipe manufacturer, to withstand any anticipated: future settlement in soft ground; liquefaction induced by seismic activity; joint rotation which may be necessary to accommodate changes in line and grade; and other special project-specific features.

In areas where differential settlement or liquefaction may occur, specify only raised bell joints and limit pipe length. Consider including or modifying Standard Detail C-195.

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2.3 JOINTS

- A. Joint assembly design shall be Carnegie bell and spigot steel joint or reinforced concrete raised or flush bell concrete joint incorporating a fully retained single rubber gasket in accordance with ASTM C 361 and as shown. [For special applications only, such as subaqueous installations or pipelines installed below the water table, the CONTRACTOR shall provide double rubber gaskets and as shown].

PART 3 -- EXECUTION

3.1 GENERAL

- A. Reinforced concrete pipe shall be installed in accordance with the requirements of SSPWC Subsection 306-1.2 and Section 02600.

3.2 PVC-LINER INSTALLATION

- A. PVC-liner installation shall conform to SSPWC Subsection 311-1.

**** END OF SECTION ****