



Standard Specification for PVC Hub and Elastomeric Seal (Gasket) Tee Connection for Joining Plastic Pipe to Insitu Pipelines and Manholes¹¹

This standard is issued under the fixed designation F2946; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification covers the minimum performance and material requirements for a three piece tee connector for connection between plastic pipe and insitu pipes, manholes and wastewater structures in sanitary and storm sewer applications.

1.1.1 The three piece seal system consists of a 4 through 30-in. PVC (polyvinyl chloride) hub pipe, an elastomeric seal (gasket) and a mechanical band (Fig. 1). The system is installed in either a bored or cast hole opening in the host pipe or structure to a specific dimension that corresponds to the combined diameter of the PVC pipe outside diameter/tolerance and the elastomeric seal thickness.

1.2 These tee connectors are designed to provide a non-pressure (gravity flow) watertight connection between the incoming pipe and an insitu pipe or manhole/structure to the limits defined in this standard.

NOTE 1—Connections covered by this specification are adequate for laboratory hydrostatic pressures up to 13 psi (30 ft of head) without leakage when tested in accordance with the provisions of this standard. Infiltration or exfiltration quantities for an installed system are dependent upon many factors other than the connections between incoming pipe and the insitu pipe or manhole structure, and allowable quantities may need to be covered by other specifications and suitable testing of the installed pipeline and system. Where connections are made to concrete manhole sections refer to Specification C923.

NOTE 2—These connectors are not resilient connectors, and as such, allow for only a limited amount of lateral movement due to the tight compression seal between the PVC hub and insitu pipe/structure. Since these connectors are not rigid fittings, a significant amount of axial movement can be accommodated, but the degree of intrusion into the host pipe/structure must be regulated to minimize the impact on flow characteristics or hydraulic design conditions.

1.3 *The following precautionary caveat pertains only to the test methods portion, Section 7, of this specification: This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use. For a specific precaution statement, see Section 7.*

¹ This test method is under the jurisdiction of ASTM Committee F17 on Plastic Piping Systems and is the direct responsibility of Subcommittee F17.20 on Joining.

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2. Referenced Documents

2.1 ASTM Standards:²

A493 Specification for Stainless Steel Wire and Wire Rods for Cold Heading and Cold Forging

A666 Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar

C822 Terminology Relating to Concrete Pipe and Related Products

C923 Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals

D1566 Terminology Relating to Rubber

D1785 Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120

D2665 Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings

D3034 Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings

F412 Terminology Relating to Plastic Piping Systems

F477 Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe

F679 Specification for Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings

F1417 Practice for Installation Acceptance of Plastic Non-pressure Sewer Lines Using Low-Pressure Air

F2487 Practice for Infiltration and Exfiltration Acceptance Testing of Installed Corrugated High Density Polyethylene and Polypropylene Pipelines

2.2 AWWA Standard:³

C900 Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 in. Through 12 in. (100 mm Through 300 mm), for Water Transmission and Distribution

3. Terminology

3.1 Definitions:

3.1.1 Terms relating to plastics and rubber shall be as defined in Terminologies F412 and D1566, respectively.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from American Water Works Association (AWWA), 6666 W. Quincy Ave., Denver, CO 80235, <http://www.awwa.org>.

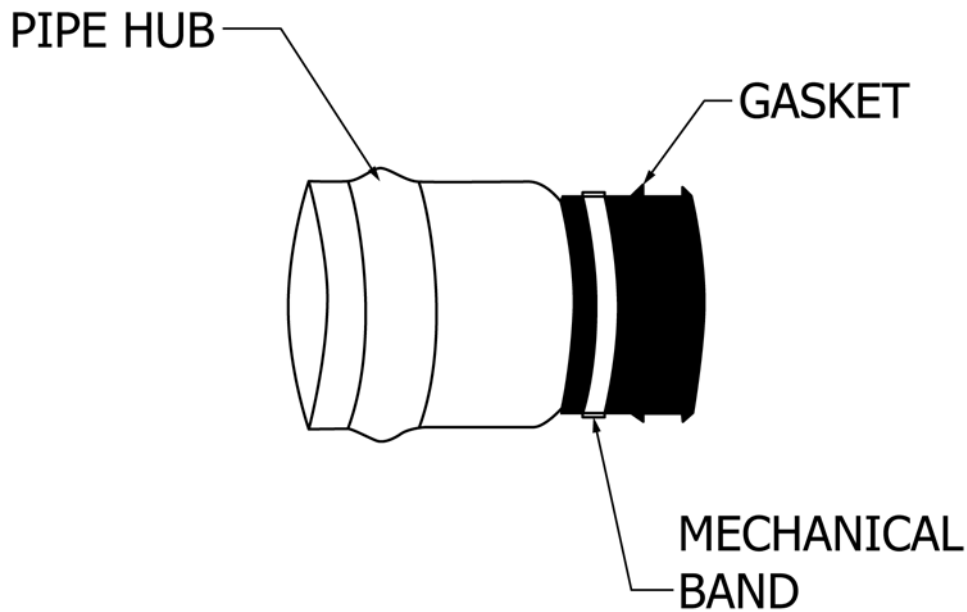


FIG. 1 Three-Piece Sealing System (Connector)

3.1.2 Terms relating to precast concrete pipe, manholes, and related products shall be as defined in Terminology C822.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 connector, *n*—the entire assembly including pipe hub, elastomeric seal and mechanical band.

3.2.2 *insitu*, *adj*—reflects the condition of the pipe, manhole or waste water structure that serves as the host to the connector. These facilities are existing structures that has been excavated for the purposes of tapping or connecting into the line.

3.2.3 mechanical band, *n*—metallic or nonmetallic mechanical device used for compressing an elastomeric seal against a pipe’s outside diameter wall, typically a stainless steel worm screw clamp.

3.2.4 pipe hub, *n*—a short section of pipe used to made a watertight connection to the incoming pipeline. This pipe hub is typically made from the same pipe material and meeting the same ASTM standard as the incoming pipeline.

4. Materials and Manufacture

4.1 All materials shall conform to the following requirements:

4.1.1 Elastomeric Seals—Gasket materials for connectors shall meet the requirements of F477.

4.2 Mechanical Device or Band—Take-up devices used for mechanically compressing the resilient portion of the connector against the pipe, manhole or wastewater structure shall be made from a material or materials in combination that will ensure durability, strength, resistance to corrosion, and have properties that will ensure continued resistance to leakage. All metallic mechanical devices, including castings and bolt assemblies used to mechanically deform elastomeric seals shall be constructed of corrosion resistant materials meeting the physical properties and chemical composition requirements of Specifications A493 and A666, Type 302 through Type 316.

The minimum torque requirement for securing the band around the PVC hub shall be 60 in-lbs.

4.3 PVC Hubs—PVC pipe and joint sections that constitute the hub component of this system shall be fabricated from pipe and joint that meet the requirements of either Specification D1785, D2665, D3034, F679 or AWWA C900.

NOTE 3—Experience has shown that successful performance of this product depends on the type of bedding and backfill and the care in the field installation of the manhole or wastewater structure and connecting pipes. The owner is cautioned that field inspection at the construction site may be necessary.

5. Principles of Design

5.1 The design of the connector shall be such that positive seal is accomplished at two locations: (1) between the elastomeric seal and the wall of the insitu pipe, manhole or wastewater structure and (2) between the elastomeric seal and the pipe hub. The watertight seal between the insitu pipe, manhole or waste water structure is made by the compression of the gasket between the insitu structure and the pipe hub.

5.1.1 The seal between the connector and the wall of the insitu pipe, manhole or wastewater structure shall be made by mechanical means, compression of the elastomeric seal between the outside surface of the pipe hub and the opening in the wall of the insitu pipe, manhole or wastewater structure.

5.1.2 The seal between the connector and the pipe hub shall be made by mechanical means by compression of the elastomeric material against the outside of the pipe hub with a mechanical devise or band. Devices used to effect mechanical seals shall conform to the requirements specified in Section 4.

5.2 All pipe stubs installed shall allow for future connection to the insitu pipe, manhole or wastewater structure, and be mechanically restrained from movement by means of the elastomeric connectors. If an internal and external lip or seal is made with the insitu pipe, manhole or waste water structure