



Standard Practice for Infiltration and Exfiltration Acceptance Testing of Installed Corrugated High Density Polyethylene and Polypropylene Pipelines^{1,21}

This standard is issued under the fixed designation F2487; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope*

1.1 This practice covers procedures for testing installed non-perforated, gasketed corrugated high-density polyethylene (HDPE) and corrugated polypropylene (PP) pipelines using either water infiltration or exfiltration acceptance limits to demonstrate the integrity via the level of leakage of the installed materials, construction procedures and installation quality via the level of leakage. Pipe to be tested under this practice shall include corrugated HDPE and PP drainage pipe meeting the requirements of ~~AASHTO M 252, AASHTO M 294 and Specifications~~ F2306/F2306M, F2736, F2762, F2763, F2764/F2764M, F2881/F2881M and F2947/F2947M.

NOTE 1—The performance criteria specified in this standard may be used for other plastic pipe products. The engineer, however, must assess if the testing procedures are adequate for the particular material and installation being considered.

NOTE 2—The user of this practice is advised that test criteria presented in this practice are similar to those in general use. Pipe, ~~600 mm (24 in.)~~ 600 mm (24 in.) diameter or larger, may be accepted by visual inspection when testing for infiltration.

~~1.2 The values stated in SI units are to be regarded as the standard. The values in parentheses are mathematical conversions to inch-pounds, which are provided for informational purposes only and are not considered standard.~~

1.2 This test method shall be performed on lines after all connections and service laterals have been plugged and braced adequately to withstand the test pressures. The time between completion of the backfill operations and testing shall be specified by the approving authority.

1.3 Units—The values stated in SI units are to be regarded as standard. The values given in parentheses after SI units are provided for information only and are not considered standard.

1.4 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

¹ This practice is under the jurisdiction of ASTM Committee F17 on Plastic Piping Systems and is the direct responsibility of Subcommittee F17.20 on Joining. Current edition approved Nov. 1, 2017/Dec. 1, 2021. Published November 2017/February 2022. Originally approved in 2006. Last previous edition approved in 2012/2017 as ~~F2487–06(2012); F2487–13(2017)~~. DOI: ~~10.1520/F2487-13.10.1520/F2487-21~~.

*A Summary of Changes section appears at the end of this standard

2. Referenced Documents

2.1 *ASTM Standards:*²

[D3212 Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals](#)

[F412 Terminology Relating to Plastic Piping Systems](#)

[F2306/F2306M Specification for 300 mm to 1500 mm \[12 in. to 60 in.\] Annular Corrugated Profile-Wall Polyethylene \(PE\) Pipe and Fittings for Non-Pressure Gravity-Flow Storm Sewer and Subsurface Drainage Applications](#)

[F2736 Specification for 6 to 30 in. \(152 To 762 mm\) Polypropylene \(PP\) Corrugated Single Wall Pipe And Double Wall Pipe \(Withdrawn 2018\)⁴](#)

[F2762 Specification for 12 to 30 in. \(300 to 750 mm\) Annular Corrugated Profile-Wall Polyethylene \(PE\) Pipe and Fittings for Sanitary Sewer Applications \(Withdrawn 2016\)⁴](#)

[F2763 Specification for 12 to 60 in. \[300 to 1500 mm\] Dual and Triple Profile-Wall Polyethylene \(PE\) Pipe and Fittings for Sanitary Sewer Applications](#)

[F2764/F2764M Specification for 6 to 60 in. \[150 to 1500 mm\] Polypropylene \(PP\) Corrugated Double and Triple Wall Pipe and Fittings for Non-Pressure Sanitary Sewer Applications](#)

[F2881/F2881M Specification for 12 to 60 in. \[300 to 1500 mm\] Polypropylene \(PP\) Dual Wall Pipe and Fittings for Non-Pressure Storm Sewer Applications](#)

[F2947/F2947M Specification for 150 to 1500 mm \[6 to 60 in.\] Annular Corrugated Profile-Wall Polyethylene \(PE\) Pipe and Fittings for Sanitary Sewer Applications](#)

2.2 *AASHTO Standards*²

[M-252 Standard Specification for Corrugated Polyethylene Drainage Pipe 75 to 250-mm \(3 to 10-inch\) Diameter](#)

[M-294 Standard Specification for Corrugated Polyethylene Drainage Pipe 300 to 1500-mm \(12 to 60-inch\) Diameter](#)

3. Terminology

3.1 *Definitions*—For definitions of terms relating to plastic pipe, see Terminology [F412](#).

4. Summary of Practice

4.1 Determine the groundwater conditions surrounding the section of pipeline to be tested and select the type of test to be conducted.

4.2 For the infiltration test, the amount of water leaking into the pipeline is measured, and the rate of infiltration is determined. If the rate is less than or equal to the allowable limit, the section of pipe tested is acceptable.

4.3 For the exfiltration test, the pipeline is filled with water to the specified test head and the rate of water loss is determined. If the rate is less than or equal to the allowable limit, the section of pipe tested is acceptable.

5. Significance and Use

5.1 This is not a routine test. The values recorded are applicable only to the pipe being tested and at the time of testing.

6. Preparation of the Pipeline

6.1 The pipe shall be free of debris prior to testing.

6.2 The manholes, the ends of the branches, laterals, wyes and stubs to be included in the test shall be plugged. All plugs shall be secured to prevent leakage blowout due to testing pressure. **Warning**—The test places extremely high forces on plugs used for sealing the pipeline for pressure testing. Plugs must be properly blocked and braced against movement before the test begins. All confined space procedures shall be observed during preparation and conducting of this test. Under no circumstances shall any persons be permitted inside the manhole during pressure testing.

7. Procedure

7.1 *Infiltration Testing:*

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.

- 7.1.1 Conduct testing from manhole to manhole. The length of pipeline tested shall not exceed 213 m (700 ft).
- 7.1.2 Stop all dewatering operations and allow the groundwater to return to its normal level. Infiltration testing shall not be used unless the groundwater level is at least 0.6 m (2 ft) above the crown of the pipe for the entire length of the test section.
- 7.1.3 Plug all pipe outlets discharging into the upstream manhole.
- 7.1.4 Measure the groundwater elevation and determine the average head over the test section.
- 7.1.5 Measure infiltration leakage at the outlet of the test section. Because leakage allowances are small, measurements are best made by either timing the filling of a small container of known volume, or by directing flow into a container for a specified time and measuring the content, or by using small weirs.
- 7.1.6 If the measured rate of leakage is less than or equal to the allowable leakage in accordance with 8.1, the section of pipeline tested is acceptable.
- 7.1.7 If the test section fails, the line shall be repaired and retested in accordance with this practice.

7.2 Exfiltration Testing:

- 7.2.1 Conduct testing from manhole to manhole. The length of pipeline tested shall not exceed 213 m (700 ft).
- 7.2.2 Determine the groundwater elevation at both ends of the test section. If the groundwater level is less than 0.6 m (2 ft) above the crown of the pipe measured from the highest elevation of the pipeline, the exfiltration test shall be used.
- 7.2.3 Plug all pipe outlets discharging into the upstream manhole and the test section outlet. Fill the pipeline with water.
- 7.2.4 At the upstream manhole the test head shall be established as minimum of 0.6 m (2 ft) above the crown of the pipe, or at least 0.6 m (2 ft) above existing groundwater, whichever is higher.
- 7.2.5 Measure the leakage loss over a timed test period. The minimum test period shall be 15 min and the maximum shall not exceed 24 h.
- 7.2.6 If the measured rate of leakage is less than or equal to the allowable leakage, in accordance with 8.1, the section of pipeline tested is acceptable.
- 7.2.7 If the test section fails, the line shall be repaired and retested in accordance with this practice. The groundwater elevation shall be redetermined prior to a second test and the test head adjusted, if necessary, in accordance with 7.2.4.

8. Leakage Criteria

8.1 Leakage criteria for infiltration and exfiltration testing shall be determined by the owner based on their application and design requirements.

NOTE 3—If the hydrostatic head is expected to exceed the maximum pressure capacity of the joint, as specified in Specification D3212, the design engineer should review field conditions to determine if a special joint design is required to maintain the long-term integrity of the system.

NOTE 4—The current Environmental Protection Agency's (EPA) maximum leakage allowance specified for infiltration and exfiltration acceptance for sanitary pipelines is 18.5 L/(mm of internal diameter) (km of pipeline) (24 h) [200 gal/in/mi/day].

9. Keywords

9.1 corrugated HDPE pipe; exfiltration; infiltration; leakage testing