



Standard Guide for Construction Procedures for Buried Plastic Pipe¹

This standard is issued under the fixed designation F1668; 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 guide describes installation techniques and considerations for open-cut construction of buried pipe. Although this guide was developed for plastic pipe, the concepts of providing the appropriate soil support, care in handling, correct joining techniques, proper soil compaction methods, and prevention of installation damage may apply to any pipe.

1.1.1 Plastic pipe refers to thermoplastic and fiberglass pipe.

1.1.2 Thermoplastic pipe refers to pipe fabricated from polyvinyl chloride (PVC), polyethylene (PE), acrylonitrile-butadiene styrene (ABS), cross-linked polyethylene (PEX), chlorinated polyvinyl chloride (CPVC), or polypropylene (PP). A list of specifications for these products is given in [Appendix X2](#).

1.1.3 Fiberglass pipe refers to a glass-fiber-reinforced thermosetting-resin pipe. A list of ASTM specifications for these products is given in [Appendix X2](#).

NOTE 1—[Appendix X2](#) cannot be considered inclusive because there may be unlisted, recently adopted ASTM specifications for new products that may be installed using this guide.

NOTE 2—Only a few of the ASTM specifications listed in [Appendix X2](#) include the associated fittings. While this guide applies to the installation of pipe, couplings, and fittings, no attempt was made to list all the possible fitting specifications that may be used in conjunction with the pipe specifications. Consult each specification or manufacturer for appropriate fitting standards.

1.1.4 For simplification, the term pipe will be used in this document to mean pipe sections, fittings, and couplings.

1.2 This guide contains general construction information applicable for plastic pipe and supplements the installation standards for the various types of pipe as described in Practices [D2321](#), [D2774](#), [D3839](#), [F690](#), and Guide [F645](#).

NOTE 3—This guide is not applicable for gas pipe applications as additional requirements may apply.

1.3 Flexible pipe, such as thermoplastic and fiberglass, are typically designed to rely on the stiffness of the soil surrounding the pipe for support. The contract documents should describe the requirements of an appropriate soil support

system. The construction practices described in this guide can be instrumental in attaining the required soil stiffness.

1.3.1 A discussion of the interaction between a buried pipe and the surrounding soil and the importance of attaining proper soil support is in [Appendix X1](#).

1.3.2 Following these guidelines will be helpful in preventing local deformations in the pipe.

1.4 This guide does not cover underwater installation, pipe that needs to be supported on piling, perforated pipe used for drainage, or gas pipelines.

1.5 Pipelines through areas described as “expansive soils,” “collapsing soils,” landfills or water-logged land (such as swamps) should be constructed using site-specific installation procedures and are not discussed in this guide.

1.6 This guide is not intended to cover all situations. Specific pipe characteristics, fluid transported, local site conditions, environmental concerns, or manufacturer’s recommendations may require different guidelines.

1.7 The construction practices presented in this guide may be affected by the installation requirements of owners, specifying organizations, or regulatory agencies for pipelines crossing roads and highways, other pipelines or cables, or waterways such as streams, drainage channels, or floodways.

1.8 Culverts or pipe that are used as passages through water retaining embankments (for example, earth dams) may be constructed using the principles of this guide, if appropriate provisions are made to prevent water movement along the outside of the pipe (using impervious soils, cutoff collars, head walls, etc.).

1.9 The values stated in SI units are to be regarded as the standard. The inch-pound units in parentheses are given for information only.

NOTE 4—There is no similar or equivalent ISO standard covering the primary subject matter of this guide.

1.10 *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.*

1.11 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the*

¹ This guide is under the jurisdiction of ASTM Committee [F17](#) on Plastic Piping Systems and is the direct responsibility of Subcommittee [F17.61](#) on Water.

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Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

2. Referenced Documents

2.1 ASTM Standards:²

- D8** Terminology Relating to Materials for Roads and Pavements
- D653** Terminology Relating to Soil, Rock, and Contained Fluids
- D883** Terminology Relating to Plastics
- D1600** Terminology for Abbreviated Terms Relating to Plastics
- D4914/D4914M** Test Methods for Density of Soil and Rock in Place by the Sand Replacement Method in a Test Pit
- D5030/D5030M** Test Methods for Density of In-Place Soil and Rock Materials by the Water Replacement Method in a Test Pit
- F412** Terminology Relating to Plastic Piping Systems
- Pipe Installation:*
 - D2321** Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
 - D2774** Practice for Underground Installation of Thermoplastic Pressure Piping
 - D3839** Guide for Underground Installation of “Fiberglass” (Glass-Fiber Reinforced Thermosetting-Resin) Pipe
 - F645** Guide for Selection, Design, and Installation of Thermoplastic Water- Pressure Piping Systems
 - F690** Practice for Underground Installation of Thermoplastic Pressure Piping Irrigation Systems (Withdrawn 2012)³
- Soil Testing:*
 - D698** Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³))
 - D1556/D1556M** Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method
 - D1557** Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³))
 - D2167** Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method
 - D2216** Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
 - D2487** Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
 - D2488** Practice for Description and Identification of Soils (Visual-Manual Procedures)
 - D4253** Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table
 - D4254** Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density
 - D4564** Test Method for Density and Unit Weight of Soil in

- Place by the Sleeve Method (Withdrawn 2013)³
- D4653** Test Method for Total Chlorides in Leather
- D4944** Test Method for Field Determination of Water (Moisture) Content of Soil by the Calcium Carbide Gas Pressure Tester
- D4959** Test Method for Determination of Water Content of Soil By Direct Heating
- D5080** Test Method for Rapid Determination of Percent Compaction

Joining Practices:

- D2657** Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings
- D2855** Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets
- D6938** Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
- F402** Practice for Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings
- F477** Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
- F913** Specification for Thermoplastic Elastomeric Seals (Gaskets) for Joining Plastic Pipe
- F2164** Practice for Field Leak Testing of Polyethylene (PE) and Crosslinked Polyethylene (PEX) Pressure Piping Systems Using Hydrostatic Pressure
- F2620** Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings

Other ASTM Standards:

- C94/C94M** Specification for Ready-Mixed Concrete
- F1417** Practice for Installation Acceptance of Plastic Non-pressure Sewer Lines Using Low-Pressure Air

2.2 American Water Works Association (AWWA) Standards:⁴

- C651** Disinfecting Water Mains
- C904** Practice for Field Leak Testing of Polyethylene (PE) Pressure Piping system Using Hydrostatic Pressure

2.3 American Association of State Highway and Transportation Officials (AASHTO) Standard:

- Standard Specification for Highway Bridges⁵

2.4 Uni-Bell PVC Pipe Association Standard:

- UNI-B-13** Recommended Performance Specification for Joint Restraint Devices for Use with Polyvinyl Chloride (PVC) Pipe⁶

3. Terminology

3.1 *Definitions*—Definitions are in accordance with Terminologies **D8**, **D653**, **D883**, **D1600**, and **F412** unless otherwise

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 The last approved version of this historical standard is referenced on www.astm.org.

⁴ Available from American Water Works Association (AWWA), 6666 W. Quincy Ave., Denver, CO 80235, <http://www.awwa.org>.

⁵ Available from American Association of State Highway and Transportation Officials (AASHTO), 444 N. Capitol St., NW, Suite 249, Washington, DC 20001, <http://www.transportation.org>.

⁶ Available from the Uni-Bell PVC Pipe Assoc., 2655 Villa Creek Dr., Suite 155, Dallas, TX 75234.