Designation: D2774 – 21a

An American National Standard

Standard Practice for Underground Installation of Thermoplastic Pressure Piping[1]

This standard is issued under the fixed designation D2774; 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.

INTRODUCTION

In general, thermoplastics pressure piping materials behave as ductile materials under load, meaning that they can undergo considerable deformation without damage. Piping made from such materials has the ability to bend under a load without breaking and to deform in other ways, while offering continued resistance. This flexibility allows ductile thermoplastic pipe to activate through pipe deformation lateral soil forces which create a pipe/soil system capable of safely supporting–even in pipes subject to little or no internal pressure–the earth and superimposed loads which are encountered in most pipe installations. However, proper installation techniques are required to ensure that the necessary support at the bottom and passive soil pressures at the sides of the pipe are developed and maintained.

Soils in which trenches are dug shall be examined and identified and the trenches prepared and backfilled in accordance with sound bedding procedures and this practice.

1. Scope*

1.1 This practice governs procedures and references ASTM specifications for underground installation of thermoplastic pressure piping, 63 in. (1372 mm) nominal size and smaller. It is beyond the scope of this practice to describe these procedures in detail since it is recognized that significant differences exist in their implementation depending on kind and type of pipe material, pipe size and wall thickness, soil conditions, and the specific end use.

1.1.1 This practice assumes that over the range of anticipated operating conditions, including maximum external loading and minimum internal pressure, the soil/pipe system will offer sufficient structural stability to resist possible excessive diametrical deformation, or even collapse. In cases, particularly with large diameter thinner-walled pipe, for which the validity of this assumption may be in question, the selection of pipe and recommended installation conditions shall be determined by a qualified engineer.

1.1.2 Specific pipe characteristics and end-use requirements shall dictate addition to, or modification of the procedures stated or referenced herein.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.3 *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.* Specific precautionary statements are given in Sections 10 and 11.

1.4 *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.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D1600 Terminology for Abbreviated Terms Relating to Plastics

D2487 Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)

D2488 Practice for Description and Identification of Soils (Visual-Manual Procedures)

E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves

F412 Terminology Relating to Plastic Piping Systems

F1668 Guide for Construction Procedures for Buried Plastic Pipe

[1] This practice 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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[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.

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

F1674 Test Method for Joint Restraint Products for Use with PVC Pipe

2.2 *AWWA Standard:*

C 651 Standard for Disinfecting Water Mains[3]

3. Terminology

3.1 *Definitions:*

3.1.1 Definitions are in accordance with Terminology F412, unless otherwise specified. Abbreviated terms are in accordance with Terminology D1600. Installation terminology used in this practice is illustrated in Fig. 1.

3.1.2 The term pipe refers to both pipe and tubing, unless specifically stated otherwise.

3.1.3 *protective sleeve, n*—a short section of pipe installed over system piping where there is a transition from relatively rigid piping or structure to relatively flexible piping or structure to protect the transition region from excessive bending or shear stresses. For example, protective sleeves are installed at connections between plastic or non-plastic mains and plastic lateral branch or service lines (such as service or branch connections to tapping tees or saddles), where plastic pipe enters or exits a casing, or where plastic pipe penetrates a building or vault wall.

4. Significance and Use

4.1 This practice may not apply to products which shall be subject to failure at relatively low strains. For low ductility materials, the installed pipe/soil system shall be sufficiently rigid to prevent pipe deformations which could strain the piping material beyond its safe strain limit.

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

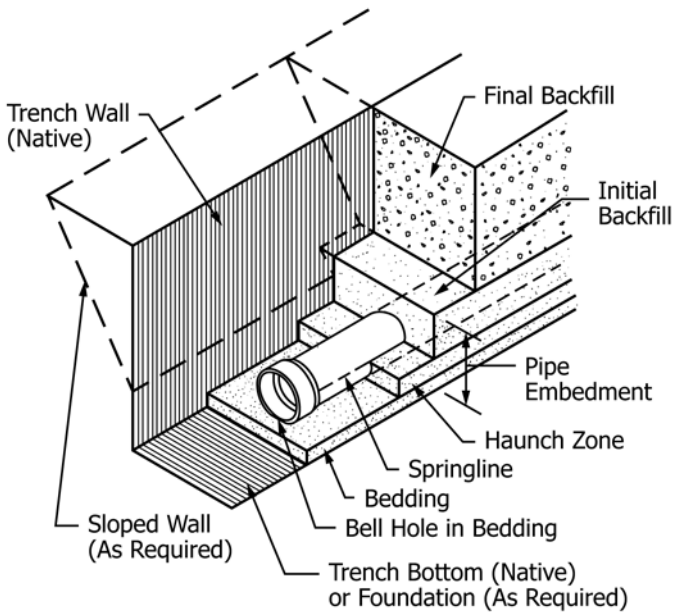

FIG. 1 Installation Terminology

5. Joining

5.1 Plastic pipe shall be joined together or to other pipes of dissimilar material using a number of different techniques. Commonly used procedures, joining materials, and fittings are defined by various standards. (See Appendix X1.) The technique used shall be suitable for the particular pipes being joined to one another. Manufacturers shall be consulted for specific instructions not covered by existing specifications. When requesting information, the intended service application shall be made known.

5.2 Skill and knowledge on the part of the installer are required using recommended techniques to obtain quality joints. Training of new installers shall be made under the guidance of skilled individuals. Detailed written procedures and visual aids used to train personnel are available from piping and joining equipment manufacturers.

5.3 The use of fittings and joining procedures which are not covered by a recognized standard is subject to the judgment and discretion of the purchaser. Each fitting and joining procedure used shall be qualified by investigation, testing, and experience to establish its suitability and safety for the intended service. Fittings and joints shall have long-term pressure capabilities equal to or greater than the system's maximum anticipated sustained operating pressure.

5.3.1 Thrust transmitting joints such as heat fused or solvent cemented, shall be capable of restraining maximum anticipated pipe pull-out forces generated by any unbalanced forces from internal pressure or pipe expansion/contraction, or both.

5.3.2 Gasketed and other non-thrust transmitting joints shall be restrained by means of properly engineered external restraints (thrust blocks) or joint restraint devices (see 7.3).

NOTE 1—Where there are unbalanced momentum forces and thrust is transmitted through the joints, consideration shall be given to the design capacity of each joint in the system to safely resist maximum anticipated axial thrust (see 7.3). Where a piping section having thrust transmitting joints is connected to a piping section having non-thrust transmitting joints, measures shall be taken to anchor or restrain the end of the thrust transmitting joint section against longitudinal movement so that contractive forces shall not be transmitted and cause disjoining of non-thrust transmitting joints.

6. Trenching-Recommended Installation Procedure

6.1 *Trench Stability*—During trench excavation, ensure that the trench sides shall be stable under all working conditions. The trench walls shall be sloped or appropriate supports provided to comply with all applicable local, state, and federal requirements for safety.

6.2 *Trench Width*—The width of the trench at any point below the top of the pipe shall be sufficient to provide adequate room for each of the following requirements: (*1*) joining the pipe in the trench if this is required; (*2*) snaking of small-diameter, heat fused or solvent cemented pipe from side-to-side along the bottom of the trench, when the effects of contraction are not otherwise accommodated; (*3*) filling and compacting the side fills; and (*4*) checking the elastomeric seal joints. Minimum trench widths shall be permitted to be utilized with most solvent-cemented and heat-fused pressure pipe materials by joining the pipe outside the trench and lowering the pipe