



Designation: F1947 – 21a

Standard Practice for Installation of Folded Poly(Vinyl Chloride) (PVC) Pipe into Existing Sewers and Conduits¹

This standard is issued under the fixed designation F1947; 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 practice describes the procedures for the rehabilitation of sewer lines and conduits with nominal diameters between 4 in. and 30 in. (100 mm and 750 mm) by the insertion of folded PVC pipe, which is heated, pressurized, and expanded against the interior surface of the existing pipe with either a mechanical rounding device or steam pressure. The finished formed PVC pipe will be continuous and conform to the existing pipe. This rehabilitation process can be used in a variety of non-pressure applications, such as: sanitary sewers, storm sewers, and process piping.

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.*

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

D790 Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

¹ This practice is under the jurisdiction of ASTM Committee F17 on Plastic Piping Systems and is the direct responsibility of Subcommittee F17.67 on Trenchless Plastic Pipeline Technology.

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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.

D1600 Terminology for Abbreviated Terms Relating to Plastics

D2122 Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings

F412 Terminology Relating to Plastic Piping Systems

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

F1216 Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube

F1504 Specification for Folded Poly(Vinyl Chloride) (PVC) Pipe for Existing Sewer and Conduit Rehabilitation

2.2 NASSCO Standard:

Recommended Specifications for Sewer Collection System Rehabilitation³

2.3 Uni-Bell Standard:

UNI-B-5-89

3. Terminology

3.1 *Definitions*—Terminology used in this practice is in conformance with Terminology **F412** and abbreviations used in this practice are in accordance with Terminology **D1600**, unless otherwise indicated.

3.2 Definitions of Terms Specific to This Standard:

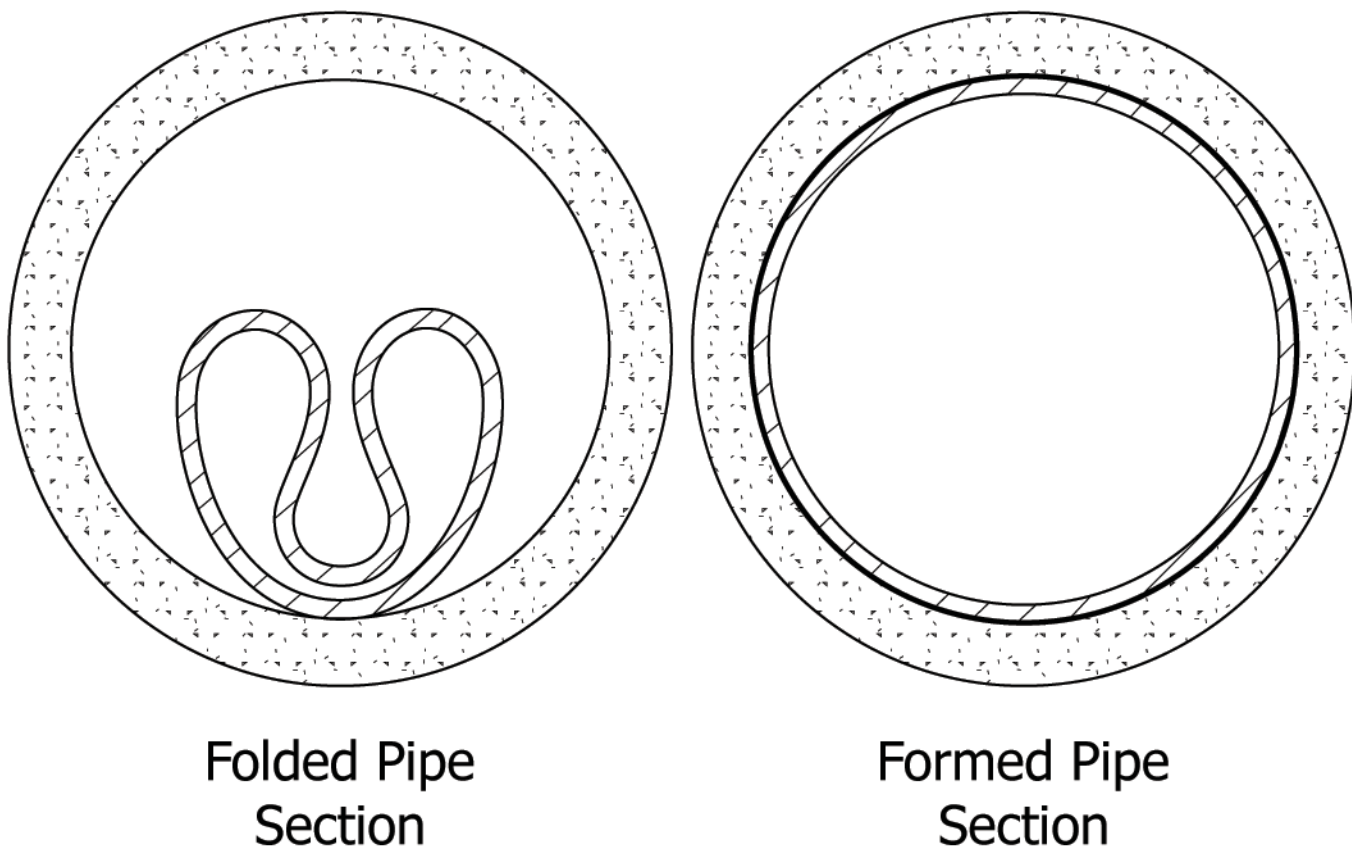
3.2.1 *containment tube, n*—an optional elastomeric material placed between the folded pipe and the existing pipe to protect the folded pipe during insertion, for containment of steam during the installation process, and to provide a waterproof barrier against infiltration, inflow, and standing water. This tube remains within the pipe but provides no structural support.

3.2.2 *dimples (dimpling), n*—where a side connection meets the existing pipe, there is not existing pipe support for the folded PVC pipe during expansion causing a point of thermoplastic pipe expansion slightly beyond the existing pipe wall. This formation of an external departure from the formed pipe wall is termed dimpling.

3.2.3 *folded pipe, n*—pipe that has been manufactured in a folded shape or that is subsequently folded for use in existing sewer and conduit rehabilitation (see **Fig. 1**).

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



**Folded Pipe
Section**

**Formed Pipe
Section**

NOTE 1—This figure is intended only for clarification of terms specific to this practice and shows a representative folded and formed pipe shapes. Other folded pipe shapes can meet the requirements of this practice.

FIG. 1 Folded Pipe and Formed Pipe, Clarification of Terms

3.2.4 *formed pipe, n*—folded pipe that has been inserted into an existing sewer or conduit and expanded with heat, pressure, and, if applicable, a rounding device to conform to and take the shape of the existing pipe (see Fig. 1).

3.2.5 *insertion point, n*—an existing manhole, existing access shaft, or an excavated pit that serves as the point of entrance for the folded pipe into the existing pipe.

3.2.6 *rounded pipe sample, n*—a folded pipe that has been inserted into a pipe mold and expanded with heat and pressure to conform to the mold, intended for testing purposes.

3.2.7 *rounding device, n*—a flexible, bullet-shaped device, which may be used to unfold and expand the folded pipe tightly against the wall of the existing pipe.

3.2.8 *termination point, n*—an existing manhole, existing access shaft, or an excavated pit that serves as the point of exit of the folded pipe from the existing pipe.

4. Significance and Use

4.1 This practice is for use by designers and specifiers, regulatory agencies, owners, and inspection organizations who are involved in the rehabilitation of non-pressure sewers and conduits.

5. Materials

5.1 The folded poly(vinyl chloride) (PVC) pipe shall be in accordance with Specification F1504.

5.2 The folded pipe shall be spooled in a continuous length for storage and shipping to the job site. Handling and storing shall be in accordance with the manufacturer's published recommendations.

5.3 The optional containment tube should be an elastomeric material capable of containing the steam required to process the folded pipe and serve as a protective waterproofing barrier. The containment tube shall be compatible with the PVC compound, the folded pipe installation process, and the existing pipe so as not to effect the properties of the finished pipe.

6. Installation Recommendations

6.1 Cleaning and Inspection:

6.1.1 *Prep Work*—Prior to entering access areas such as manholes, and performing inspection or cleaning operations, an evaluation of the atmosphere to determine the presence of toxic or flammable vapors or lack of oxygen must be undertaken in accordance with local, state, or federal safety regulations.

6.1.2 *Cleaning of Pipeline*—Internal debris shall be removed from the existing pipeline. The pipeline should be cleaned with hydraulically-powered equipment, high-velocity jet cleaners, or mechanically-powered equipment in accordance with NASSCO Recommended Specifications for Sewer Collection System Rehabilitation.