



Designation: F 1867 – 98 (Reapproved 2004)

An American National Standard

Standard Practice for Installation of Folded/Formed Poly (Vinyl Chloride) (PVC) Pipe Type A for Existing Sewer and Conduit Rehabilitation¹

This standard is issued under the fixed designation F 1867; 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 covers the procedures for the rehabilitation of sewer lines and conduits 4 in. (102 mm) to 18 in. (457 mm) in diameter by the insertion of a folded/formed PVC pipe that is heated, pressurized, and expanded to conform to the wall of the original conduit forming a new structural pipe-within-a-pipe. This rehabilitation process can be used in a variety of gravity applications such as sanitary sewers, storm sewers, and process piping.

1.2 This practice is to be used with the material specified in Section 6 of Specification F 1871.

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

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

1.5 There is no similar or equivalent ISO Standard.

2. Referenced Documents

2.1 ASTM Standards:²

- D 638 Test Method for Tensile Properties of Plastics
- D 648 Test Method for Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position
- D 790 Test Method for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
- D 1600 Terminology for Abbreviated Terms Relating to Plastics
- D 1784 Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds And Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds

¹ This standard is under the jurisdiction of 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.

D 2122 Test Method of Determining Dimensions of Thermoplastic Pipe and Fittings

F 412 Terminology Relating To Plastic Piping Systems

F 1417 Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low Pressure Air

F 1871 Specification for Folded/Formed Poly (Vinyl Chloride) Pipe Type A for Existing Sewer and Conduit Rehabilitation

2.2 Uni-Bell Standard:

UNI-B-5-89 Recommended Practice for the Installation of Polyvinyl Chloride (PVC) Sewer Pipe³

3. Terminology

3.1 *Definitions*—Definitions are in accordance with Terminology F 412, and abbreviations are in accordance with Terminology D 1600, unless otherwise indicated. The abbreviation for poly(vinyl chloride) plastics is PVC.

3.1.1 The term TYPE A is not an abbreviation but rather an arbitrary designation for PVC compounds with a minimum value for modulus in tension as listed in 6.1 and a maximum value as defined by cell limit 1 of Specification D 1784.

3.2 Definitions of Terms Specific to This Standard:

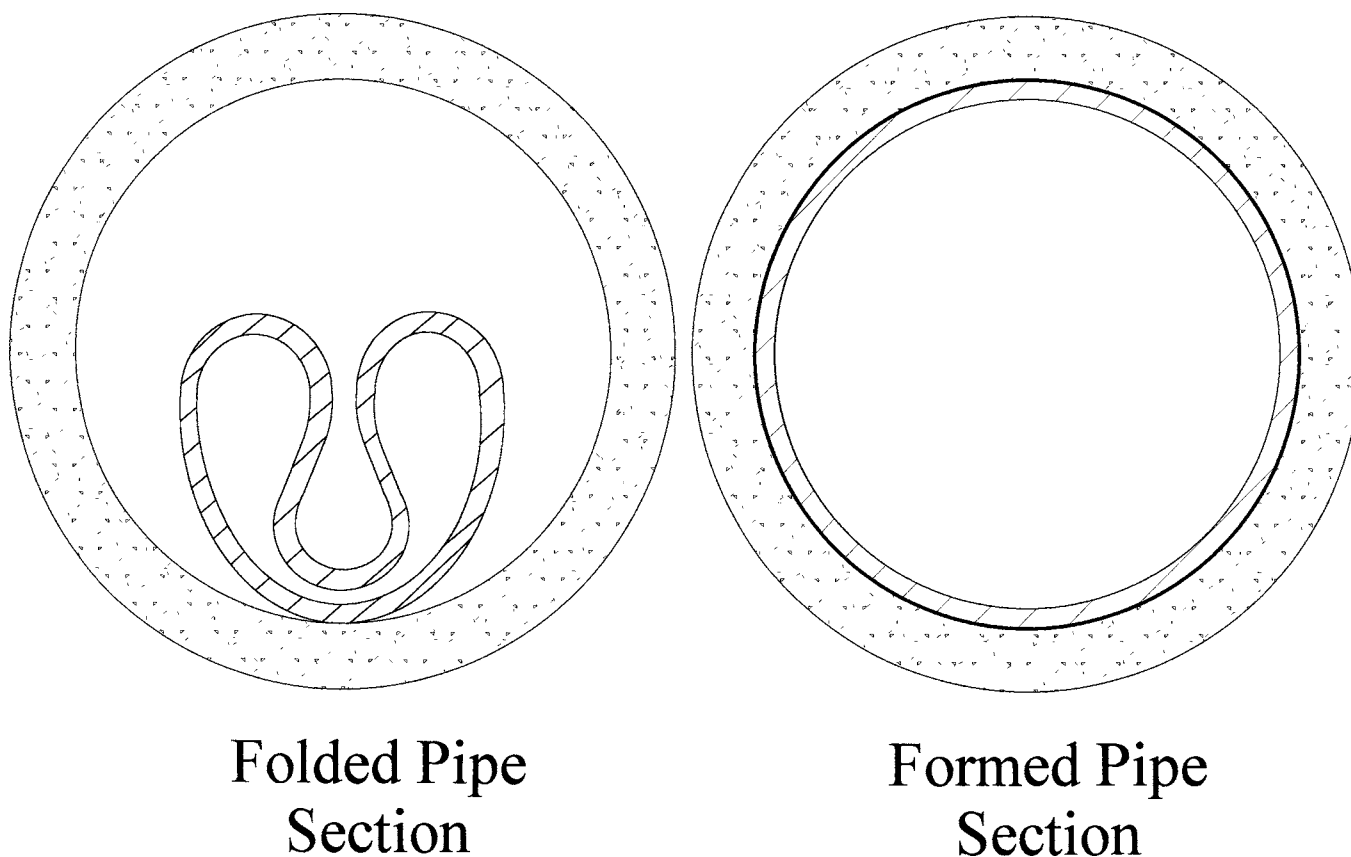
3.2.1 *dimples (dimpling), n*—Where a side connection meets the existing conduit, there is no support for the PVC pipe during forming, causing a point of thermoplastic pipe expansion slightly beyond the existing pipe wall. This formation of an external departure from the formed pipe wall is termed dimpling.

3.2.2 *folded pipe, n*—pipe that has been manufactured and calibrated round, then subsequently cooled and deformed into a folded shape for use in existing sewer and conduit rehabilitation (see Fig. 1).

3.2.3 *formed field sample, n*—A formed field sample is formed when the folded pipe has been inserted into a mold pipe and expanded with steam heat and pressure, and, if required by the manufacturer, with a squeegee or similar device to provide a close fit to the mold pipe.

3.2.4 *formed pipe, n*—a folded pipe that has been inserted into an existing sewer or conduit and expanded with steam heat

³ Available from Uni-Bell PVC Pipe Association, 2655 Villa Creek Drive, Suite 155, Dallas, TX 75234.



**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 pipe shape. Other folded pipe shapes may meet the requirements of this practice.

FIG. 1 Folder Pipe and Formed Pipe—Clarification of Terms

and pressure, and, if required by the manufacturer, with a squeegee device or similar device to provide a close fit to the existing pipe (see Fig. 1).

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

3.2.6 *liner, n*—PVC formed pipe fully functional as a pipe within a rehabilitated pipe.

3.2.7 *squeegee or similar device, n*—a device to sequentially heat and expand the folded pipe to provide a close fit to 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 specifies regulatory agencies, owners, and inspection organizations involved in the rehabilitation of non-pressure sewers and conduits. Modifications may be required, depending on specific job conditions, to establish a project specification. The manufacturer of the product should be consulted for design and installation information. Industrial waste disposal lines should be installed only with the specific approval of the cognizant code authority, since chemicals not commonly found in drains and sewers and temperatures in excess of 140 °F (60 °C) may be encountered.

5. Materials

5.1 The folded/formed PVC liner pipe should be made from PVC compound, meeting all the requirements for cell classification 12111-C as defined in Specification D 1784 and with minimum physical properties as listed below:

Tensile Strength	Test Method D 638	3600 PSI	(25 MPa)
Tensile Modulus	Test Method D 638	155 000 PSI	(1069 MPa)
Flexural Strength	Test Method D 790	4100 PSI	(28 MPa)
Flexural Modulus	Test Method D 790	145 000 PSI	(1000 MPa)
Heat Deflection	Test Method D 648	115 °F	(46 °C)
Temperature Tested at 264 psi	(2 MPa)		

5.1.1 Compounds meeting the above minimum properties that have different cell classifications because one or more properties are greater to those of the specified compounds are also acceptable, except modulus in tension shall not exceed 280 000 psi.

5.2 *Rework Material*—Clean rework material from this type of pipe, generated from the manufacturer's own pipe production may be used by the same manufacturer provided that the rework material meets all the requirements of 5.1.

6. Installation Recommendations

6.1 *Cleaning and Inspection:*



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