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AnAmerican National Standard

Standard Practice for Rehabilitation of Existing Sewers and Conduits with Deformed Polyethylene (PE) Liner[1]

This standard is issued under the fixed designation F1606; 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 requirements for the installation of deformed polyethylene (PE) liner for pipeline rehabilitation.

1.2 This practice describes a method by which the PE liner may be installed with little or no excavation.

1.3 This practice applies to the rehabilitation of 3 to 18- in. (76 to 457-mm) diameter pipe in terms of installation. The specifier determines what DR is used based on conditions of the specific application.

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.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D638 Test Method for Tensile Properties of Plastics

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

D1600 Terminology for Abbreviated Terms Relating to Plastics

D2122 Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings

D3350 Specification for Polyethylene Plastics Pipe and Fittings Materials

F412 Terminology Relating to Plastic Piping Systems

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

F1533 Specification for Deformed Polyethylene (PE) Liner

2.2 *NASSCO Standard:*

Recommended Specifications for Sewer Collection System Rehabilitation[3]

3. Terminology

3.1 *General*—Abbreviations used in this practice are in accordance with Terminology D1600, and definitions are in accordance with Terminology F412, unless otherwise indicated.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *deformed pipe*—HDPE or MDPE pipe manufactured in deformed shape with a reduced cross-sectional area that includes the most common u-geometric form for use in existing sewer and conduit rehabilitation. (See Fig. 1.)

3.2.2 *dimpling*—a localized deformation resulting from expansion, during rounding of a thermoplastic deformed PE pipe, into space where a side connector meets an existing conduit and where there is no support for the deformed PE pipe.

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

3.2.4 *liner*—PE reformed pipe fully functional as pipe within a rehabilitated pipe.

3.2.5 *manifolds*—set of the equipment required for heat and pressure processing of the deformed pipe.

3.2.6 *pipeline*— existing sewer to be rehabilitated.

3.2.7 *reformed pipe*—PE deformed pipe processed by heat and pressure after insertion into the pipeline and reformed to a fit conforming to the existing pipe (See Fig. 1.)

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

4. Significance and Use

4.1 This practice is to provide guidance for designers and specifiers, regulatory agencies, owners, and inspection organizations who are involved in the rehabilitation of conduits.

[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.

[3] Available from NASSCO, 2798 Harbor Drive San Diego, CA 92113.

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Modifications may be required depending on specific job

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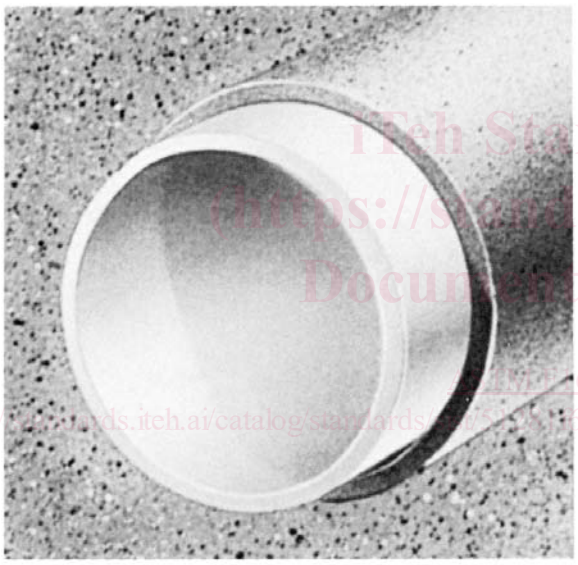
(*a*) Deformed Pipe



(*b*) *Reformed Pipe*

NOTE 1—This figure is intended only for clarification of terms specific to this practice and shows representative deformed and reformed pipe shapes. Other deformed pipe shapes may meet the general requirements of this practice.

FIG. 1 Deformed Pipe and Reformed Pipe—Clarification of Terms

conditions to establish a project specification. The manufacturer of the product should be consulted for design and installation information.

5. Materials

5.1 The deformed PE liner should be in accordance with Specification F1533.

5.2 The following are minimum cell classification numbers for HDPE polyethylene pipe based on Specification D3350. Specification D3350 should be consulted for property value limits based on these cells.

Type	PE 2406	PE 3408
Density	2	3
Melt	3	4
Flexural Modulus	4	5
Tensile Strength	3	4
ESCR	3	3
HDB	3	4
Color and UV Stabilizer	C, D, or E	C, D, or E

5.3 The deformed pipe should be spooled in a continuous length for storage and shipping to the job site. Handling and storage should be in accordance with the manufacturer's published recommendations.

5.4 There should be no evidence of splits, cracks, crazing or breaks in the deformed pipe on the spool. If any of these conditions are evident, the damaged material should be replaced.

6. Installation Recommendations

6.1 *Cleaning and Inspection:*

6.1.1 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 shall be undertaken in accordance with local, state, or federal safety regulations.

6.1.2 *Cleaning of Pipeline*—Internal debris should be removed from the existing pipeline. Gravity pipes 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.

6.1.3 *Inspection of Pipelines*—Inspection of pipelines should be performed by experienced personnel trained in locating breaks, obstacles, and service connections by closed circuit television. The interior of the pipeline should be carefully inspected to determine the location of any conditions that may prevent proper insertion of the deformed pipe, such as protruding service taps, collapsed or crushed pipe, out-of-roundness, significant line sags, and deflected joints. All such conditions should be noted in the plans so that they can be corrected prior to liner installation. If a user desires to ignore any of the obstacles with PE liner pipe, the contractor should inform the user about expected results.

6.1.4 *Line Obstructions*—The inside of the existing pipeline should be clear of obstructions that will prevent the proper insertion and full expansion of the deformed pipe. Obstructions could include dropped or offset joints of more than 12.5 % of inside pipe diameter; service connections that protrude into the pipe more than 12.5 % of the inside diameter or 1-in. (25 mm), whichever is less; and other obstructions in cross-sectional area of more than 14 % based on the inside diameter of the existing pipe. If inspection reveals an obstruction that cannot be removed by cleaning or rodding, then a point repair excavation should be made to uncover and remove or repair the obstruction. Typically, bends along the pipe length in excess of 30° and changes in pipe size cannot be accommodated. Such conditions require access at these points for termination and start of a new insertion.

6.2 *Bypassing*—If flow cannot be interrupted for the necessary duration, bypassing of flow is required around the sections

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