

**Standard Practice for
Installation of Annular Corrugated Profile Wall
Polyethylene Pipe for
Agricultural Drainage or Water Table Control**

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105 Decker Ct, Suite 825, Irving, TX 75062 · www.plasticpipe.org

Foreword

This report was developed and published with the technical help and financial support of the members of the PPI (Plastics Pipe Institute, Inc.). The members have shown their interest in quality products by assisting independent standards-making and user organizations in the development of standards, and also by developing reports on an industry-wide basis to help engineers, code officials, specifying groups, and users.

The purpose of this technical note is to provide general information on resistance of solid wall polyethylene pipe to a sanitary sewage environment.

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SCOPE

This practice is recommended for agricultural subsurface drainage or water table control installations using Annular Corrugated Profile Wall Polyethylene Pipe (Double Wall Pipe). It is not recommended for sanitary or storm sewer applications. Procedures are outlined to minimize pipe deflection or structural damage during and after the installation process. These installation procedures are in accordance with “flexible conduit” principles.

MATERIAL

Pipe and Fittings installed under this specification shall comply with the requirements for materials, test methods, dimensions, and marking in accordance with the current issue of AASHTO M252 type S and SP for 4” through 10” diameters, or ASTM F 2306 for 12” through 60” diameters except there shall be no requirement for the NCLS test for ASTM F2306 pipe and fittings.

GENERAL REQUIREMENTS

The maximum and minimum burial depth are affected by the following factors: groove support angle of the trench bottom, bedding, blinding backfill, soil density, envelope density, envelope placement, pipe stiffness, the live load expected, desired water table depth, and width of trench.

Minimum Cover: The minimum recommended cover needed to protect the pipe is 2 ft. Granular bedding or special construction techniques may be used to reduce the recommended minimum cover.

Maximum Cover: The maximum burial depth is influenced by such factors as degree of compaction, type of bedding, support from the trench bottom, trench width, size of pipe, pipe stiffness, weight of backfill, and live loads imposed. In general, when pipes are to be installed without the benefit of an Engineered design, the maximum depth of cover should be limited to 6 feet. For installation at depths greater than 6 feet, an Engineer should be retained to review the design and to develop site specific recommendations to ensure a successful installation.

Trench Width: Increasing the trench width increases the soil load on the pipe. Side clearances of more than 6 in. on each side should only be used with an engineering design and special construction. Trench width must be at least 3 in. wider than the pipe on each side for open trench installation to allow sufficient bedding to support the pipe.

- Minimum Pipe Cover – 2 feet
- Maximum Pipe Cover – 6 feet
- Minimum Trench Width – Pipe OD plus 6 inches
- Maximum Trench Width – Pipe OD plus 12 inches

Trench Design:

Bottom Shape: The bottom shall have a semi-circular or trapezoidal groove (see Fig. 1). The groove must conform as closely as possible to the outside diameter of the pipe and envelope 180 degrees of the pipe or there will be insufficient support and pipe deflection will be increased. For flat-bottom trench, bedding must be used for support as shown in Fig. 2.

Circular Groove Diameter	
Nominal Inside Diameter (Inches)	*Typical Outside Diameter of HDPE Dual Wall Pipe (Inches)
4	4.9
6	6.9
8	9.7
10	12.0
12	14.5
15	18.2
18	21.5
21	24.6
24	28
30	36.4
36	42.5
42	48
48	55
54	61
60	67.3

* Per PPI Design Manual Chapter 5

Bedding: If the trench is of the Flat Bottom type then bedding must be provided for adequate support. Bedding in the form of a Class I or II fill must be placed in the bottom of the trench up to the spring line (Fig. 2) of the pipe. (See Fig. 3 for Class I and II descriptions)

Blinding: Material used for this process shall be Class I, II, or III fill material (Fig. 3) and shall not contain any hard object larger than 1 ½ inch (38mm) in diameter and must cover the pipe to a depth of 6 inches (150 mm). Blinding is placed as pipe is being laid.

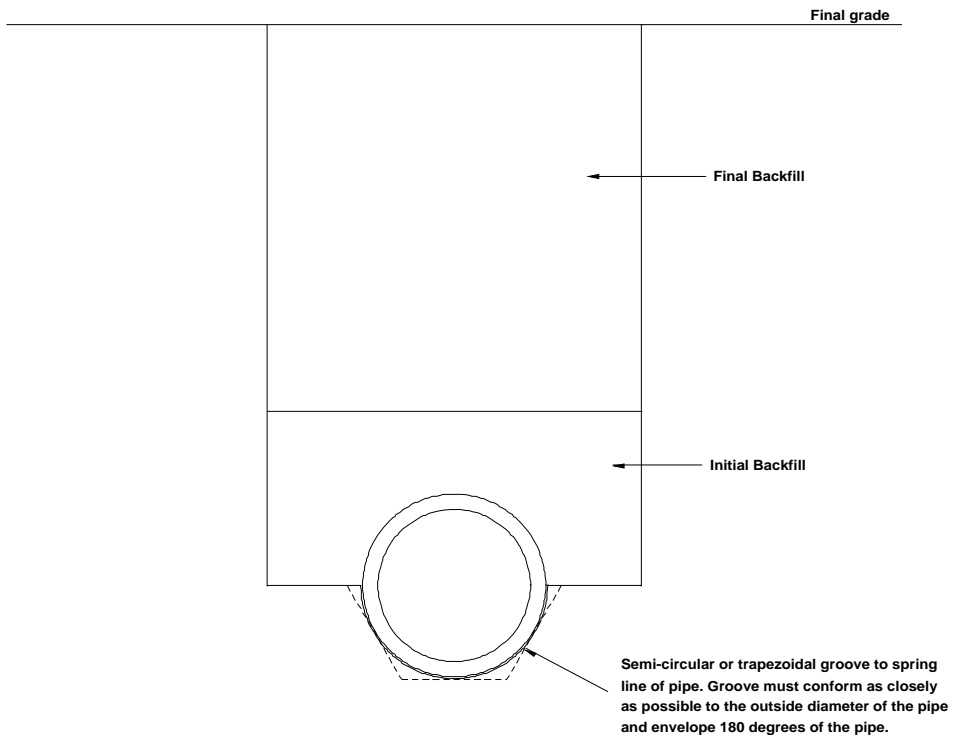
Backfilling: Place the backfill material so that displacement or deflection of the pipe will not occur. Backfill should be placed so that it does not drop directly on the pipe. Large stones, frozen material, and dry clods shall not be placed directly over the pipe. The trench shall be backfilled directly after blinding operations are completed.

Installation: Pipe shall be bedded and backfilled in accordance with the installation detail (Figures 1 & 2) and in accordance with the general bedding and backfill requirements specified above. When unstable soil conditions are encountered or the trench width exceeds (O.D. plus 12-inches), pipe shall be bedded and backfilled in accordance with ASTM D 2321 or the PPI Installation Manual

References

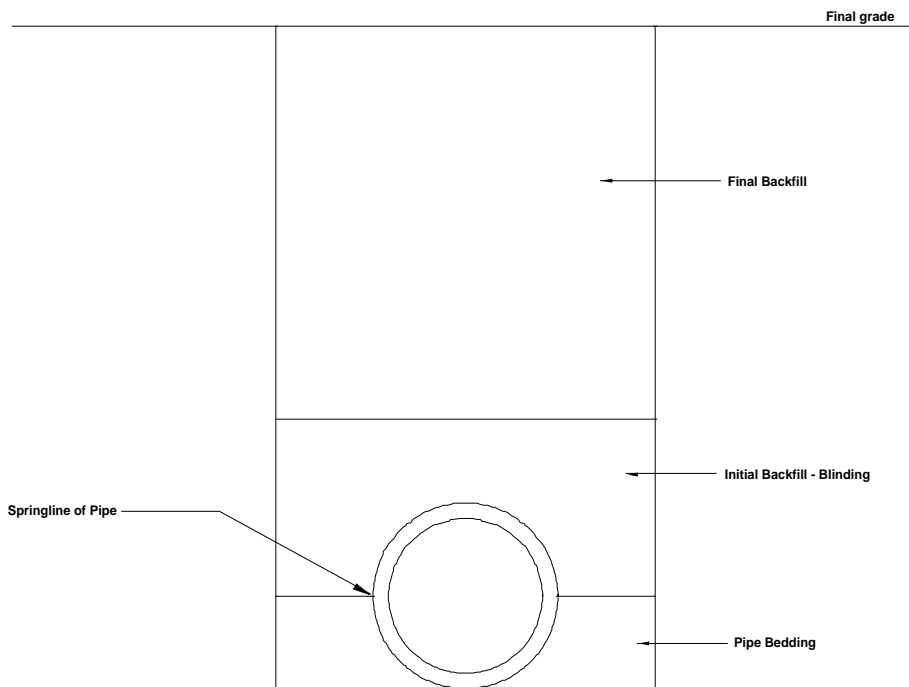
1. ASTM F 449, “Standard Practice for Subsurface Installation of Corrugated Polyethylene Pipe for Agricultural Drainage of Water Table Control,” American Society of Testing and Materials.

2. ASTM F 2306, "Standard Specification for 12 to 60-inch (300 to 1500-mm) Annular Corrugated Profile Wall Polyethylene (PE) Pipe and Fittings for Gravity Flow Storm Sewer and Subsurface Drainage Applications," American Society for Testing and Materials.
3. ASTM D 2321, "Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications," American Society for Testing and Materials.
4. PPI Design Manual "The Complete Corrugated Polyethylene Pipe Design Manual and Installation Guide"



Trench with Grooved Bottom

Fig. 1



Trench with Flat Bottom

Fig. 2

Pipe Embedment Material			
ASTM D 2321*		ASTM D 2487	
Class	Description	Notation	Description
IA	Manufactured Aggregates: open-graded, clean.	None	Angular, crushed stone or rock, crushed gravel, broken coral, crushed slag, cinders or shells; large void content, contain little or no fines.
IB	Manufactured, Processed Aggregates; dense-graded, clean.	None	Angular, crushed stone (or other Class 1A materials) and stone/sand mixtures contains little or no fines.
II	Coarse-Grained Soils, clean	GW	Well-graded gravels and gravel-sand mixtures; little or no fines.
		GP	Poorly-graded gravels and gravel-sand mixtures; little or no fines.
		SW	Well-graded sands and gravelly sands; little or no fines.
		SP	Poorly-graded sands and gravelly sands; little or no fines.
III	Coarse-Grained Soils With Fines	GM	Silty gravels, gravel-sand-silt mixtures.
		GC	Clayey gravels, gravel-sand-clay mixtures.
		SM	Silty sands, sand-silt mixtures.
		SC	Clayey sands, sand-clay mixtures.
IVA ^A	Inorganic Fine-Grained Soils	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, silts with slight plasticity.
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
IVB	Inorganic Fine-Grained Soils	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
		CH	Inorganic clays of high plasticity, fat clays.
V	Organic or Highly Organic Soils	OL	Organic silts and organic silty clays of low plasticity.
		OH	Organic clays of medium to high plasticity, organic silts.
		PT	Peat and other high organic soils.

Fig. 3