

UNDERSTANDING ASTM D2321

STANDARD PRACTICE FOR UNDERGROUND INSTALLATION OF THERMOPLASTIC PIPE FOR SEWERS AND OTHER GRAVITY-FLOW APPLICATIONS

ASTM D2321 Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications is the long recognized standard for the installation of flexible plastic pipe.

ASTM D2321 is also the recommended installation standard by all manufacturers of thermoplastic pipe. Along with the thermoplastic pipe manufacturers, it is the recommended installation for US Army Corps of Engineers, Uni-Bell PVC Pipe Association, Corrugated Polyethylene Pipe Association and numerous State DOT's.

While this standard is a very good installation procedure it must be understood that all sections must be followed for the flexible pipe to perform as designed.

It is most important the Engineer be aware of and understand the key sections of this document prior to specifying a flexible pipe installation.

These key sections include:

Section 5 Materials

This section classifies and describes the various types of soils that are acceptable or unacceptable for use with thermoplastic pipe. The Engineer should be aware that this section recommends that the bedding be leveled by hand and the haunch material be placed by hand (Table 2) and that for non-free draining soils, moisture content should be held to +/- 3% of optimum otherwise excessive deflection may result due to failure to achieve the required density.

Section 6.3 Minimum Trench Width

This section requires that actual trench width in unstable and unsupported soils be based on the size and stiffness of the pipe, stiffness of the embedment and in-situ soil (E') and depth of cover. It is not prudent to assume that minimum trench widths can be used for all flexible installations.

6.4 Support of Trench Walls

It is critical that the embedment material not be disturbed once placed and compacted in the trench. This section addresses concerns with the use of movable trench wall supports and removal of trench wall supports. It specifically states that the embedment material and foundation should not be disturbed when using this type of trench support.

7.6 Minimum Cover

Even though certain thermoplastic pipe manufactures recommend minimum cover requirements as low as 1', it should be noted that even when the best embedment material available (Type IA), ASTM D2321 requires a minimum cover of 24" or one pipe diameter (whichever is larger) and that for poorer grades of embedment material, 36" or one pipe diameter (whichever is larger) of cover is required before allowing vehicles or construction traffic over the pipe.

X1.3 Load/Deflection Performance

It is important to recognize that embedment materials must be selected and placed so that the pipe and soil act together to carry the applied loads without excessive strains, deflections, or wall distortions.

X1.4.1 Construction Deflections

While pipe systems are designed for certain earth and live loads, the effect of construction loads induced during installation must also be addressed. ASTM D2321 recognizes this and recommends that the Engineer consider this during design.

X1.6.1 Embedment at Pipe Haunches

The Engineer is cautioned that for a flexible pipe system to perform, it is critical that the haunch material be properly placed and compacted to reduce the possibility of excessive deflections.

X1.10 Embedment Width for Adequate Support

It is further emphasized that the Engineer is responsible to see that the proper trench width is specified and that it is necessary to consider all aspects of the pipe and installation, pipe stiffness, embedment stiffness, in-situ soil, and the magnitude of both construction and service loads.

ASTM D2321 is a widely accepted method for installation of thermoplastic pipe. It is critical the Engineer require that all sections of the specification be adhered to and realize the Engineer is ultimately responsible for all aspects of the soil/pipe system performance.