

*Standard Specification
for*



Corrugated Polyethylene Pipe, 300- to 1200-mm Diameter

AASHTO DESIGNATION: M 294M-98

1. SCOPE

1.1 This specification covers the requirements and methods of tests for corrugated polyethylene (PE) pipe, couplings, and fittings for use in surface and subsurface drainage applications.

1.1.1 Nominal sizes of 300 to 1200 mm are included.

1.1.2 Materials, workmanship, dimensions, pipe stiffness, environmental stress crack resistance, joining systems, brittleness, and form of markings are specified.

1.2 Corrugated polyethylene pipe is intended for surface and subsurface drainage applications where soil provides support to its flexible walls. Its major use is to collect or convey drainage water by open gravity flow, as culverts, storm drains, etc.

NOTE 1—When polyethylene pipe is to be used in locations where the ends may be exposed, consideration should be given to protection of the exposed portions due to combustibility of the polyethylene and the deteriorating effects of prolonged exposure to ultraviolet radiation.

1.3 This specification does not include requirements for bedding, backfill, or earth cover load. Successful performance of this product depends upon proper type of bedding and backfill, and care in installation. The structural design of corrugated polyethylene pipe and the proper installation procedures are given in the AASHTO *Standard Specifications for Highway Bridges*. Upon request of the user or engineer, the manufacturer shall provide profile wall section detail required for a full engineering evaluation.

2. REFERENCED DOCUMENTS

2.1 AASHTO Standard:

2.1.1 *Standard Specifications for Highway Bridges*

2.2 ASTM Standards:

- D 618 Conditioning Plastics and Electrical Insulating Materials for Testing
- D 883 Terms Relating to Plastics
- D 1693 Environmental Stress Cracking of Ethylene Plastics
- D 2122 Determining Dimensions of Thermoplastic Pipe and Fittings
- D 2412 Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading
- D 2444 Test for Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight)
- D 3350 Standard Specification for Polyethylene Plastics Pipe and Fittings Materials
- F 412 Terms Relating to Plastic Piping Systems

NOTE 2—Pipe sizes 1050 mm and 1200 mm diameters were previously specified by the provisional standard AASHTO MP 6-95. For 1050- and 1200-mm pipe, the wall thickness should be designed using the long-term tensile strength provision (900 psi) until new design criteria are established in the AASHTO bridge and structures specifications.

3. TERMINOLOGY

3.1 The terminology used in this standard is in accordance with the defini-

tions given in ASTM D 883 and ASTM F 412 unless otherwise specified.

3.2 *Crack*—Any break or split that extends through the wall.

3.3 *Crease*—An irrecoverable indentation, generally associated with wall buckling.

3.4 *Buckling*—Any reverse curvature or deformation in the pipe wall that reduces the load carrying capability of the pipe.

3.5 *Reworked Material*—as defined for “reworked plastic (thermoplastic)” in ASTM D 883.

4. CLASSIFICATION

4.1 The corrugated Polyethylene Pipe covered by this specification is classified as follows:

4.1.1 Type C—This pipe shall have a full circular cross section, with a corrugated surface both inside and outside. Corrugations may be either annular or helical.

4.1.1.1 Type CP—This pipe shall be Type C with perforations.

4.1.2 Type S—This pipe shall have a full circular cross section, with an outer corrugated pipe wall and a smooth inner liner. Corrugations may be either annular or helical.

4.1.2.1 Type SP—This pipe shall be Type S with perforations.

4.1.3 Type D—This pipe shall consist of an essentially smooth waterway braced circumferentially or spirally with projections or ribs joined to an essentially smooth outer wall. Both walls shall be fused to, or continuous with, the internal supports.

4.2 Two classes of perforations are as described in Sections 7.3.1 and 7.3.2.

5. ORDERING INFORMATION

5.1 Orders using this specification shall include the following information as necessary to adequately describe the desired product.

5.1.1 AASHTO designation and year of issue.

5.1.2 Type of pipe (see Section 4.1),

5.1.3 Diameter and length required, either total length or length of each piece and number of pieces,

5.1.4 Number of couplings,

5.1.5 Class of perforations (Class 2 is furnished if not specified) (see Section 7.3), and

5.1.6 Certification, if desired (see Section 12.1).

6. MATERIALS

6.1 Basic Materials:

6.1.1 Extruded Pipe and Blow Molded Fittings: Pipe and fittings shall be made of virgin PE compounds which conform with the requirements of cell class 335420C as defined and described in ASTM D 3350, except that the carbon black content shall not exceed 5 percent, and the density shall not be less than 0.945 gm/cc nor greater than 0.955 gm/cc. Compounds that have higher cell classifications in one or more properties, with the exception of density, are acceptable provided product requirements are met.

6.1.2 Rotational Molded Pipe and Fittings: Pipe and fittings shall be made of virgin PE compounds which conform with the requirements of cell class 213320C as defined and described in ASTM D 3350, except that the carbon black content shall not exceed 5 percent. Compounds that have higher cell classifications in one or more properties are acceptable provided product requirements are met.

6.2 Reworked Material: In lieu of virgin PE, clean reworked material may be used by the manufacturer, provided that it meets the cell class requirements as described in Section 6.1.

7. REQUIREMENTS

7.1 Workmanship: The pipe and fittings shall be free of foreign inclusions

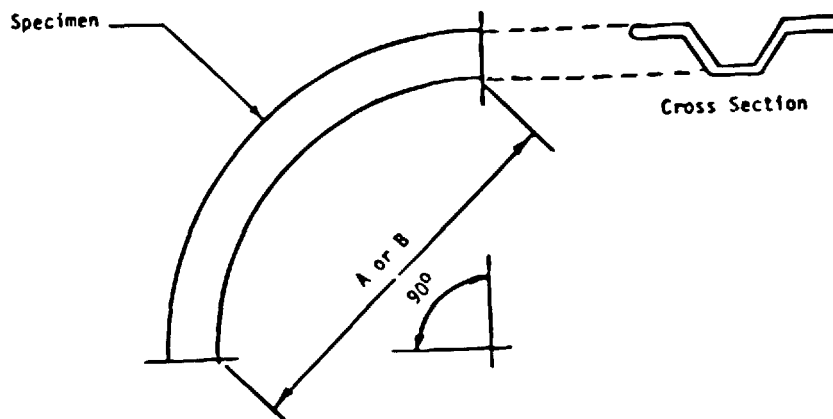


FIGURE 1 Specimen Configuration for Environmental Stress Cracking (Section 9.4.2)

and visible defects as defined herein. The ends of the pipe shall be cut squarely and cleanly so as not to adversely affect joining or connecting.

7.1.1 Visible Defects: Cracks, creases, unpigmented or nonuniformly pigmented pipe are not permissible in the pipe as furnished.

7.1.2 For Type S pipe, the inner liner shall be fused to the outer corrugated shell at all internal corrugation crests. For Type D pipe, both walls shall be fused to or continuous with the internal supports.

7.2 Pipe Dimensions:

7.2.1 Nominal Size: The nominal size for the pipe and fittings is based on the nominal inside diameter of the pipe. Nominal diameters shall be 300, 375, 450, 525, 600, 675, 750, 900, 1050, and 1200 mm.

7.2.2 Wall Thickness: The inner wall of Type S pipe, and both inner and outer walls of Type D pipe, shall have the following minimum thicknesses, when measured in accordance with Section 9.6.4.

Diameter (mm)	Wall Thickness (mm)
300	0.9
375	1.0
450	1.3
525	1.5
600	1.5
675	1.5
750	1.5
900	1.7
1050	1.8
1200	1.8

7.2.3 Inside Diameter Tolerances: The tolerance on the specified inside diameter shall be 4.5 percent oversize and

1.5 percent undersize, but not more than 30 mm oversize when measured in accordance with Section 9.6.1.

7.2.4 Length: Corrugated PE pipe may be sold in any length agreeable to the user. Lengths shall not be less than 99 percent of the stated quantity when measured in accordance with Section 9.6.2.

7.3 Perforations: When perforated pipe is specified, the perforations shall conform to the requirements of Class 2, unless otherwise specified in the order. Class 1 perforations are for pipe intended to be used for subsurface drainage or combination storm and underdrain. Class 2 perforations are for pipe intended to be used for subsurface drainage only. The perforations shall be cleanly cut so as not to restrict the inflow of water. Pipe connected by couplings or bands may be unperforated within 100 mm of each end of each length of pipe.

7.3.1 Class 1 Perforations: The perforations shall be approximately circular and shall have nominal diameters of not less than 5 mm nor greater than 10 mm and shall be arranged in rows parallel to the axis of the pipe. The perforations shall be located in the external valleys with perforations in each row for each corrugation. The rows of perforations shall be arranged in two equal groups placed symmetrically on either side of the lower unperforated segment corresponding to the flow line of the pipe. The spacing of the rows shall be uniform. The distance between the center lines of the rows shall not be less than 25 mm. The minimum number of longitudinal rows of perforations, the maximum height of the center