## Standard Specification for

# Steel-Reinforced Polyethylene (PE) Ribbed Pipe, 1650- to 3000-mm (66- to 120-in.) Diameter

**AASHTO Designation: MP 40-19 (2021)[1]**

**First Published: 2019** **Reviewed but Not Updated: 2021**

**Technical Subcommittee: 4b, Flexible and Metallic Pipe**

AASHTO

**American Association of State Highway and Transportation Officials**
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## 1. SCOPE

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

**Note 1**—This specification is an extension of M 335, but covering larger pipe diameters.

1.1.1. Nominal sizes of 1650 to 3000 mm (66 to 120 in.) are included.

1.1.2. Materials, workmanship, dimensions, perforation, pipe stiffness, impact resistance, tensile strength of seams, shape stability, joining systems, and form of markings are specified.

1.2. Steel-reinforced PE ribbed 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 2**—When steel reinforced PE ribbed 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 PE and the effects of prolonged exposure to ultraviolet radiation as well as corrosion of the steel reinforcement.

1.3. This specification only deals with this pipe's materials requirements. The structural design of steel reinforced thermoplastic culverts and the proper installation procedures are given in the *AASHTO LRFD Bridge Design Specifications*, Section 12, and *AASHTO LRFD Bridge Construction Specifications*, Section 26, respectively. Upon request of the user or engineer, the manufacturer shall provide profile wall section detail required for a full engineering evaluation.

1.4. *Units*—The values stated in SI units are to be regarded as standard. Within the text, the U.S. Customary units are shown in parentheses and may not be exact equivalents.

1.5. The following precautionary caveat pertains only to the test method portion, Section 9, of this specification. *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. *AASHTO Standards*:

- M 288, Geosynthetic Specification for Highway Applications
- M 335, Steel-Reinforced Polyethylene (PE) Ribbed Pipe, 300- to 1500-mm (12- to 60-in) Diameter
- T 341, Determination of Compression Capacity for Profile Wall Plastic Pipe by Stub Compression Loading
- *AASHTO LRFD Bridge Design Specifications*, Section 12
- *AASHTO LRFD Bridge Construction Specifications*, Section 26

2.2. *ASTM Standards*:

- A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
- D618, Standard Practice for Conditioning Plastics for Testing
- D638, Standard Test Method for Tensile Properties of Plastics
- D883, Standard Terminology Relating to Plastics
- D2122, Standard Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings
- D2412, Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading
- D2444, Standard Practices for Determination of the Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight)
- D3212, Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
- D3350, Standard Specification for Polyethylene Plastics Pipe and Fittings Materials
- F412, Standard Terminology Relating to Plastic Piping Systems
- F477, Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
- F2136, Standard Test Method for Notched, Constant Ligament-Stress (NCLS) Test to Determine Slow-Crack-Growth Resistance of HDPE Resins or HDPE Corrugated Pipe

## 3. TERMINOLOGY

3.1. The terminology used in this standard is in accordance with the definitions given in ASTM D883 and ASTM F412 unless otherwise specified.

3.2. *Definitions*:

3.2.1. *crack*—any break or split that extends through the wall.

3.2.2. *crease*—a visible irrecoverable indentation, generally associated with a loss in shape stability.

3.2.3. *delamination*—a gap extending through the weld seam between two adjacent wrap widths.

3.2.4. *encapsulation thicknesses*—the thicknesses of the high-density polyethylene (HDPE) covering on both sides of the steel reinforcement as well as the thickness of the closure at the top (outside) of the rib and the thickness of the profile directly under (inside) the reinforcement (see Figure 2).

3.2.5. *gravity flow*—a condition in which liquid flow through a piping system results from a downward pipeline slope, but flow is less than full, except during conditions when the system may become