
Standard Specification for Steel-Reinforced Polyethylene (SRPE) Corrugated Pipe

AASHTO Designation: MP 42-22¹

Technically Revised: 2022

Technical Subcommittee: 4b, Flexible and Metallic Pipe



**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 (SRPE) corrugated pipe, couplings, and fittings for use in surface and subsurface drainage applications.
- 1.1.1. Nominal sizes of 300 to 1800 mm (12 to 72 in.) are included.
- 1.1.2. Materials, workmanship, dimensions, pipe stiffness, impact resistance, joining systems, and form of markings are specified.
- 1.2. SRPE corrugated 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 SRPE corrugated pipe is to be used in locations where the ends may be exposed, above ground, consideration should be given to protection of the exposed portions due to combustibility of polyethylene and the effects of prolonged exposure to ultraviolet radiation, as well as corrosion of 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 specifying agency or engineer, the manufacturer shall provide profile wall section detail required for a full engineering evaluation.
- 1.4. 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 STANDARDS

- 2.1. *AASHTO Standards:*
- M 288, Geosynthetic Specification for Highway Applications
 - M 339M/M 339, Thermometers Used in the Testing of Construction Materials

- 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
- A1008/A1008M, Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable
- D618, Standard Practice for Conditioning Plastics for Testing
- 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 Test Method 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
- D4703, Standard Practice for Compression Molding Thermoplastic Materials into Test Specimens, Plaques, or Sheets
- E1, Standard Specification for ASTM Liquid-in-Glass Thermometers
- E230/E230M, Standard Specification for Temperature–Electromotive Force (emf) Tables for Standardized Thermocouples
- E879, Standard Specification for Thermistor Sensors for General Purpose and Laboratory Temperature Measurements
- E1137/E1137M, Standard Specification for Industrial Platinum Resistance Thermometers
- E2877, Standard Guide for Digital Contact Thermometers
- 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

2.3.

International Electrotechnical Commission Standards:

- IEC 60584-1:2013, Thermocouples - Part 1: EMF Specifications and Tolerances
- IEC 60751:2008, Industrial Platinum Resistance Thermometers and Platinum Temperature Sensors

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 pipe wall.

- 3.2.2. *crease*—a visible irrecoverable indentation.
- 3.2.3. *delamination*—a gap extending through the fused PE between two adjacent Corrugated Profiles.
- 3.2.4. *encapsulation thickness*—the thickness of the high density polyethylene (HDPE) bonded to either side of the steel 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 temporarily surcharged, in which case the system is subject to temporary internal hydrostatic pressure that is limited to 74 kPa [10.8 psi].
- 3.2.6. *polyethylene (PE) plastics*—plastics based on polymers made with ethylene as essentially the sole monomer (ASTM D883).
- 3.2.7. *reworked plastic*—a plastic from a processor's own production that has been reground, pelletized, or solvated after having been previously processed by molding, extrusion, etc. (ASTM D883).

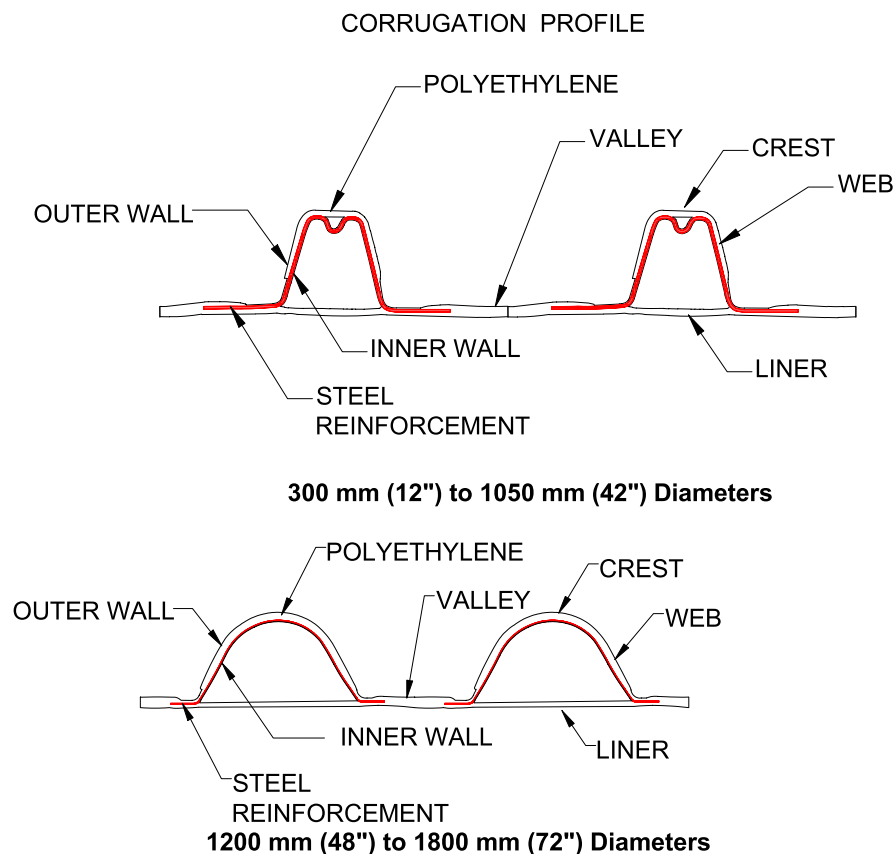


Figure 1—Cross Section of Corrugated Profile

- 3.2.8. *steel-reinforced polyethylene corrugated pipe*—Polyethylene pipe with a corrugated profile containing reinforcing steel (see Figure 1).

- 3.2.9. *slow crack growth*—A phenomenon by which a stress crack may form. A stress crack is an external or internal crack in plastic caused by tensile stresses less than its short-term mechanical strength.
- 3.2.10. *virgin polyethylene material*—PE plastic material in the form of pellets, granules, powder, floc, or liquid that has not been subject to use or processing other than required for initial manufacture.

4. CLASSIFICATION

- 4.1. *The SRPE corrugated pipe covered by this specification is classified as follows:*
- 4.1.1. *Type S*—This pipe shall have a full circular cross section with an essentially smooth inner wall.
- 4.1.2. *Type SP*—This pipe shall be Type S with perforations.
- 4.2. Perforations are described in Section 7.5.

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 MP zzz;
- 5.1.2. Perforation, if applicable (Section 7.5);
- 5.1.3. Diameter and length required, either total length or length of each piece and number of pieces;
- 5.1.4. Certification, if desired (Section 12.1); and
- 5.1.5. Type of pipe joint (Section 7.11.1).

6. MATERIALS

- 6.1. *Polyethylene Materials:*
- 6.1.1. *Pipe and Fittings*—Pipe and fittings shall be made of virgin PE, conforming to the requirements of ASTM D3350 and having a cell classification of 334452C or E. Resins that have higher cell classifications in one or more properties are acceptable provided the product requirements are met.
- 6.1.2. *Rotational Molded Fittings and Couplings*—Fittings and couplings shall be made of virgin PE, conforming to the requirements of ASTM D3350 and having a cell classification of 213320C or E. Resins that have higher cell classifications in one or more properties are acceptable provided product requirements are met. For slow crack resistance, acceptance of resins shall be determined by using notched, constant ligament-stress (NCLS) test according to the procedure described in Section 9.4. The average failure time of the five test specimens must exceed 24 h with no single specimen's failure time less than 17 h.
- 6.1.3. *Injection Molding Fittings and Couplings*—Fittings and couplings shall be made of virgin PE, conforming to the requirements of ASTM D3350 and having a cell classification of 324452C or E. Resins that have higher cell classifications in one or more properties are acceptable provided product requirements are met.