
Standard Specification for Porous Concrete Pipe

AASHTO Designation: M 176M/M 176-23¹

Technically Revised: 2023

Technical Subcommittee: 4a, Concrete Drainage Structures

ASTM Designation: C654M-19 and C654-19



American Association of State Highway and Transportation Officials
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1. SCOPE

- 1.1. This specification covers porous nonreinforced concrete pipe for use in underdrains.
- 1.2. This specification is applicable for orders in either SI units (M 176M) or in inch-pound units (M 176). SI units and inch-pound units are not necessarily equivalent. Inch-pound units are shown in brackets in the text for clarity, but they are the applicable values when the material is ordered to M 176.
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2. REFERENCED DOCUMENTS

- 2.1. *AASHTO Standards:*
- < M 6, Fine Aggregate for Hydraulic Cement Concrete
 - < M 80, Coarse Aggregate for Hydraulic Cement Concrete
 - < M 85, Portland Cement
 - < M 154M/M 154, Air-Entraining Admixtures for Concrete
 - < M 157, Ready-Mixed Concrete
 - < M 240M/M 240, Blended Hydraulic Cement
 - < M 262, Concrete Pipe and Related Products
 - < M 295, Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
 - < M 302, Slag Cement for Use in Concrete and Mortars
 - < T 280, Concrete Pipe, Manhole Sections, or Tile
- 2.2. *ASTM Standard:*
- < C1116/C1116M, Standard Specification for Fiber-Reinforced Concrete
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3. TERMINOLOGY

- 3.1. *Definitions*—For definitions of terms relating to concrete pipe, see M 262.
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4. CLASSIFICATION

- 4.1. Pipe manufactured according to this specification shall be of two classes identified as Standard-Strength Porous Nonreinforced Concrete Pipe and Extra-Strength Porous Nonreinforced Concrete Pipe.

5. BASIS OF ACCEPTANCE

- 5.1. The acceptability of the pipe shall be determined by the results of the strength and porosity or rate of infiltration tests, and by inspection to determine whether the pipe conforms to this specification as to design and freedom from defects.
- 5.2. The pipes shall be acceptable under the strength tests when they have met the requirements as prescribed in Section 10.
- 5.3. *Acceptance as to Infiltration Properties*—Pipe shall be acceptable under the infiltration test when all test pipes conform to the test requirements as prescribed in Section 10.

6. MATERIALS

- 6.1. *Concrete*—The concrete shall consist of cementitious materials, aggregates, admixtures, if used, and water.
- 6.2. *Cementitious Materials:*
- 6.2.1. *Cement*—Cement shall conform to the requirements of M 85 or shall be portland blast-furnace slag cement, portland-limestone cement, or portland-pozzolan cement conforming to the requirements of M 240M/M 240, except that the pozzolan constituent in the Type IP portland-pozzolan cement shall be fly ash.
- 6.2.2. *Fly Ash*—Fly ash shall conform to the requirements of M 295, Class F or Class C.
- 6.2.3. *Slag Cement*—Slag cement shall conform to the requirements of grade 100 or 120 of AASHTO M 302.
- 6.2.4. *Allowable Combinations of Cementitious Materials*—The combination of cementitious materials used in the concrete shall be one of the following:
- 6.2.4.1. Portland cement only,
- 6.2.4.2. Portland blast-furnace slag cement only,
- 6.2.4.3. Portland-pozzolan cement only,
- 6.2.4.4. Portland-limestone cement only,
- 6.2.4.5. A combination of portland cement or portland-limestone cement and fly ash,
- 6.2.4.6. A combination of portland cement or portland-limestone cement and slag cement,
- 6.2.4.7. A combination of portland cement or portland-limestone cement, fly ash, and slag cement, or
- 6.2.4.8. A combination of portland-pozzolan cement and fly ash.

Note 1—The user of this specification is advised that porous pipe may experience leaching detrimental to durability when subjected to drainage of soft or acid waters (less than 50 ppm hardness or less than 6.0 pH). Type V portland cement should be specified where high sulfate resistance is required, and Type II or IIA portland cement should be specified where the pipe will