
Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe

AASHTO Designation: M 86M/M 86-23

Technically Revised: 2023

Editorially Revised: 2023

Technical Subcommittee: 4a, Concrete Drainage Structures

ASTM Designation: C14M-20 and C14-20



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1. SCOPE

- 1.1. This specification covers nonreinforced concrete pipe intended to be used for the conveyance of sewage, industrial wastes, storm water, and for the construction of culverts.
- 1.2. This specification is applicable for orders in either SI units (M 86M) or in inch-pound units (M 86). 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 86.

Note 1—This specification is a manufacturing and purchasing specification only and does not include requirements for bedding, backfill, or the relationship between field load conditions and the strength classification of pipe. However, experience has shown that the successful performance of this product depends on the proper selection of the class of pipe, type of bedding and backfill, and care that the installation conforms to the construction specifications. Owners are cautioned that they must correlate the field requirements with the class of pipe specified and provide for or require inspection at the construction site.

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 157, Ready-Mixed Concrete
 - M 194M/M 194, Chemical Admixtures for 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 339M/M 339, Thermometers Used in the Testing of Construction Materials
 - T 280, Concrete Pipe, Manhole Sections, or Tile

- 2.2. *ASTM Standards:*
- < C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
 - < C989/C989M, Standard Specification for Slag Cement for Use in Concrete and Mortars
 - < C990, Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
 - < C1116/C1116M, Standard Specification for Fiber-Reinforced Concrete
 - < E1, Standard Specification for ASTM Liquid-in-Glass Thermometers
 - < E230/E230M, Standard Specification for Temperature-Electromotive Force (emf) Tables for Standardized Thermocouples
 - < E2877, Standard Guide for Digital Contact Thermometers
- 2.3. *International Electrotechnical Commission Standard:*
- < IEC 60584-1:2013, Thermocouples - Part 1: EMF Specifications and Tolerances

3. TERMINOLOGY

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

4. CLASSIFICATION

- 4.1. Pipe manufactured according to this specification shall be of three classes identified as “Class 1 Nonreinforced Concrete Pipe,” “Class 2 Nonreinforced Concrete Pipe,” and “Class 3 Nonreinforced Concrete Pipe.” The corresponding strength requirements are prescribed in Table 1.

Table 1—Physical and Dimensional Requirements for Nonreinforced Concrete Pipe^a

Internal Designated Diameter		Class 1				Class 2				Class 3			
		Minimum Thickness of Wall		Minimum Strength, Three-Edge Bearing		Minimum Thickness of Wall		Minimum Strength, Three-Edge Bearing		Minimum Thickness of Wall		Minimum Strength, Three-Edge Bearing	
		mm	[in.]	kN/linear m	[lb/linear ft]	mm	[in.]	kN/linear m	[lb/linear ft]	mm	[in.]	kN/linear m	[lb/linear ft]
100	4	16	⁵ / ₈	22.0	1500	19	³ / ₄	29.0	2000	19	³ / ₄	35.0	2400
150	6	16	⁵ / ₈	22.0	1500	19	³ / ₄	29.0	2000	22	⁷ / ₈	35.0	2400
200	8	19	³ / ₄	22.0	1500	22	⁷ / ₈	29.0	2000	29	1 ¹ / ₈	35.0	2400
250	10	22	⁷ / ₈	23.5	1600	25	1	29.0	2000	32	1 ¹ / ₄	35.0	2400
300	12	25	1	26.5	1800	35	1 ³ / ₈	33.0	2250	44	1 ³ / ₄	38.0	2600
375	15	32	1 ¹ / ₄	29.0	2000	41	1 ⁵ / ₈	38.0	2600	47	1 ⁷ / ₈	42.0	2900
450	18	38	1 ¹ / ₂	32.0	2200	50	2	44.0	3000	57	2 ¹ / ₄	48.0	3300
525	21	44	1 ³ / ₄	35.0	2400	57	2 ¹ / ₄	48.0	3300	69	2 ³ / ₄	56.0	3850
600	24	54	2 ¹ / ₈	38.0	2600	75	3	52.5	3600	85	3 ³ / ₈	64.0	4400
675	27	82	3 ¹ / ₄	41.0	2800	94	3 ³ / ₄	57.5	3950	94	3 ³ / ₄	67.0	4600
750	30	88	3 ¹ / ₂	44.0	3000	107	4 ¹ / ₄	63.0	4300	107	4 ¹ / ₄	69.5	4750
825	33	94	3 ³ / ₄	46.0	3150	113	4 ¹ / ₂	64.0	4400	113	4 ¹ / ₂	71.0	4875
900	36	100	4	48.0	3300	119	4 ³ / ₄	65.5	4500	119	4 ³ / ₄	73.0	5000

^a Subject to tolerance in Section 11.