



Designation: **C14—15 C14 – 15a**

Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe¹

This standard is issued under the fixed designation C14; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 This 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 A complete metric companion to Specification C14 has been developed—C14M; therefore, no metric equivalents are presented in this specification.

NOTE 1—This specification is a manufacturing and purchase 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 upon the proper selection of the class of pipe, type of bedding and backfill, and care that the installation conforms to the construction specifications. The owner is cautioned that he 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 ASTM Standards:²

[C33/C33M](#) Specification for Concrete Aggregates

[C150/C150M](#) Specification for Portland Cement

[C260/C260M](#) Specification for Air-Entraining Admixtures for Concrete

[C309](#) Specification for Liquid Membrane-Forming Compounds for Curing Concrete

[C443](#) Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets

[C494/C494M](#) Specification for Chemical Admixtures for Concrete

[C497](#) Test Methods for Concrete Pipe, Manhole Sections, or Tile

[C595/C595M](#) Specification for Blended Hydraulic Cements

[C618](#) Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete

[C822](#) Terminology Relating to Concrete Pipe and Related Products

[C989/C989M](#) Specification for Slag Cement for Use in Concrete and Mortars

[C1017/C1017M](#) Specification for Chemical Admixtures for Use in Producing Flowing Concrete

[C1116/C1116M](#) Specification for Fiber-Reinforced Concrete and Shotcrete

[C1602/C1602M](#) Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete

3. Terminology

3.1 *Definitions*—For definitions of terms relating to concrete pipe, see Terminology [C822](#).

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](#).

¹ This specification is under the jurisdiction of ASTM Committee C13 on Concrete Pipe and is the direct responsibility of Subcommittee C13.01 on Non-Reinforced Concrete Sewer, Drain and Irrigation Pipe.

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² For referenced ASTM standards, visit the ASTM website, [www.astm.org](#), or contact ASTM Customer Service at [service@astm.org](#). For *Annual Book of ASTM Standards* volume information, refer to the standard’s Document Summary page on the ASTM website.

TABLE 1 Physical and Dimensional Requirements for Nonreinforced Concrete Pipe^A

Internal Designated Diameter, in.	Class 1		Class 2		Class 3	
	Minimum Thickness of Wall, in.	Minimum Three-Edge Bearing Strength, lbf/linear ft	Minimum Thickness of Wall, in.	Minimum Three-Edge Bearing Strength, lbf/linear ft	Minimum Thickness of Wall, in.	Minimum Three-Edge Bearing Strength, lbf/linear ft
4	5/8	1500	3/4	2000	3/4	2400
6	5/8	1500	3/4	2000	7/8	2400
8	3/4	1500	7/8	2000	1 1/8	2400
10	7/8	1600	1	2000	1 1/4	2400
12	1	1800	1 3/8	2250	1 3/4	2600
15	1 1/4	2000	1 5/8	2600	1 7/8	2900
18	1 1/2	2200	2	3000	2 1/4	3300
21	1 3/4	2400	2 1/4	3300	2 3/4	3850
24	2 1/8	2600	3	3600	3 3/8	4400
27	3 1/4	2800	3 3/4	3950	3 3/4	4600
30	3 1/2	3000	4 1/4	4300	4 1/4	4750
33	3 3/4	3150	4 1/2	4400	4 1/2	4875
36	4	3300	4 3/4	4500	4 3/4	5000

^ASubject to tolerances in Section 11.

5. Basis of Acceptance

5.1 The acceptability of the pipe shall be determined by the results of the test prescribed in this section, when required, and by inspection to determine whether the pipe conforms to this specification as to design and freedom from defects.

5.2 *Acceptance as to Strength Properties*—Pipe shall be acceptable under the strength tests when they have met the requirements as prescribed in 10.3.

5.3 *Acceptance as to Absorption Properties*—Pipe shall be acceptable under the absorption test when they have met the requirements as prescribed in 10.4.

5.4 *Acceptance as to Permeability Properties*—Pipe shall be acceptable under the permeability test when they have met the requirements as prescribed in 10.5.

NOTE 2—Prior to purchase, the owner has the option to specify the hydrostatic test prescribed in 10.6 instead of the permeability test.

5.5 *Acceptance as to Hydrostatic Properties*—Pipe shall be acceptable under the hydrostatic test when they have met the requirements as prescribed in 10.6.

6. Materials

6.1 *Concrete*—The concrete shall consist of cementitious materials, mineral aggregates, admixtures, if used, and water.

6.2 *Cementitious Materials:*

6.2.1 *Cement*—Cement shall conform to the requirements for portland cement of Specification ~~E150~~C150/C150M or shall be portland blast-furnace slag cement or slag-modified portland cement, cement, portland-limestone cement, or portland-pozzolan cement conforming to the requirements of Specification ~~E595~~C595/C595M, except that the pozzolan constituent in the Type IP ~~portland-pozzolan~~portland-pozzolan cement shall be fly ash.

6.2.2 *Fly Ash*—Fly ash shall conform to the requirements of Specification C618, Class F or Class C.

6.2.3 *Ground Granulated Blast Furnace Slag (GGBFS)*—~~Slag Cement~~GGBFS Slag cement shall conform to the requirements of Grade 100 or 120 of Specification ~~E989~~C989/C989M.

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~~blast-furnace slag cement only,

6.2.4.3 ~~Slag-modified portland~~Portland-pozzolan cement only,

6.2.4.4 ~~Portland-pozzolan~~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 and ground granulated blast-furnace slag, or or portland-limestone cement and slag cement,

6.2.4.7 A combination of portland cement, fly ash (not to exceed 25 % of the total cementitious weight) and ground granulated blast furnace slag (not to exceed 25 % of the total cementitious weight).cement or portland-limestone cement, fly ash, and slag cement, or

6.2.4.8 A combination of portland-pozzolan cement and fly ash.

6.3 *Aggregates*—Aggregates shall conform to Specification ~~E33~~C33/C33M, except that the requirement for gradation shall not apply.