



Designation: C 1449 – 99

Standard Specification for Non-Asbestos Fiber-Cement Nonpressure Sewer Pipe¹

This standard is issued under the fixed designation C 1449; 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.

1. Scope

1.1 This specification covers requirements relating to non-asbestos fiber-cement non-pressure sewer pipe, joints, and fittings suitable for use with gravity flow, intended for sewerage and drainage applications from point of use to point of treatment or disposal. It defines certain conditions of manufacture, classification, characteristics, and acceptance tests applicable to these products.

1.2 The values stated in SI units are to be regarded as the standard. The values given in parentheses are provided for information only.

NOTE 1—Rubber rings suitable for use with this pipe are covered in Specification D 1869.

NOTE 2—This specification is issued for product standardization and purchasing purposes only, and does not include requirements for installation or the relationships between operating conditions and the strength characteristics of the various classifications of pipe. The purchaser is cautioned that he must correlate installation and operating conditions with the specified characteristics of the pipe.

1.3 *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 ASTM Standards:

- C 150 Specification for Portland Cement²
- C 500 Test Methods for Asbestos-cement Pipe³
- C 595 Specification for Blended Hydraulic Cements²
- C 1154 Terminology for Non-Asbestos Fiber-Reinforced Cement Products⁴
- D 1869 Specification for Rubber Rings for Asbestos-cement Pipe³

2.2 Federal Standard:

No. 123 Marking for Domestic Shipment (Civilian Agencies)⁵

2.3 Military Standard:

No. 129 Marking for Shipment and Storage⁵

2.4 Other Standards:

Uniform Freight Classification Rules⁶

National Motor Freight Classification Rules⁷

3. Terminology

3.1 *Definitions*—Refer to Terminology C 1154.

3.1.1 *coupling*—section for joining fiber-cement non-pressure sewer pipe, as defined in 5.3, that when properly installed with the proper accessories, develops an assembled joint, equivalent in serviceability and strength to the pipe sections when tested in accordance with 7.3.

3.1.2 *fitting*—components such as wyes, tees, adaptors, for use in laying fiber-cement pipe, such that, when properly installed, yields develops an assembly fitting equivalent in serviceability and strength to the pipe sections.

3.1.3 *pipe*—fiber-cement non-pressure sewer pipe as defined in Sections 1, 3, and 5.

3.2 Lot:

3.2.1 A lot is used herein for designated pipe sizes 150 mm (6 in.) and smaller is defined as those lengths of pipe of that size, class, and type manufactured during the same shift.

3.2.2 A lot, used herein for designated pipe sizes 200 mm (8 in.) through 525 mm (21 in.), is defined as each 300 lengths of pipe or less, of identical size, class, and type manufactured on each machine during a 24-h period.

3.2.3 A lot, used herein for designated pipe sizes larger than 525 mm (21 in.), is defined as each 300 lengths of pipe or less, of identical size, class, and type manufactured on each machine during a period of consecutive working days not exceeding seven days.

¹ This specification is under the jurisdiction of ASTM Committee C-17 on Fiber-Cement Products and is the direct responsibility of Subcommittee C17.02 on Non-Asbestos Fiber-Cement Products.

Current edition approved Nov. 10, 1999. Published January 2000.

² *Annual Book of ASTM Standards*, Vol 04.01.

³ *Annual Book of ASTM Standards*, Vol 09.02.

⁴ *Annual Book of ASTM Standards*, Vol 04.05.

⁵ Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

⁶ Available from the Uniform Classification Commission, Room 1106, 222 S. Riverside Plaza, Chicago, IL 60606.

⁷ Available from National Motor Freight Inc., 1616 P St., NW, Washington, DC 20036.

4. Classification

4.1 Fiber-cement pipe furnished under this specification shall be designated as Classes 1500, 2400, 3300, 4000, 5000, 6000, and 7000 based on the respective crushing strengths, and shall be furnished in the designated sizes as shown in Table 1.

4.2 The type of pipe shall be designated as Type I or Type II in accordance with the chemical requirements of Section 6.

NOTE 3—To assist the purchaser in choosing the type of pipe most suitable for his use, guidelines for the definitions of aggressiveness of water and of soil environments for selection of the proper type of fiber-cement pipe are covered in the appropriate sections of Test Methods C 500.

5. Materials and Manufacture

5.1 Fiber-cement pipes shall be composed of an intimate mixture of an inorganic hydraulic binder (see Specification C 150) or a calcium silicate binder (see Specification C 595) formed by the chemical reaction of a siliceous material and a calcareous material reinforced by organic fibers, inorganic non-asbestos fibers, or both. Process aids, fillers and pigments which are compatible with fiber-reinforced cement are not prohibited from being added.

5.2 The pipe shall be of laminar construction formed under pressure to a homogeneous structure and cured under natural or accelerated conditions to meet the chemical and physical requirements of this specification.

5.3 Couplings:

5.3.1 Fiber-cement non-pressure sewer couplings shall be made in conformance with 5.1 and 5.2.

5.3.2 Fiber-cement non-pressure sewer couplings shall be equivalent in serviceability to those couplings defined in 5.3.1 and shall be installed in accordance with the manufacturer's recommendations.

5.4 Fittings:

5.4.1 Fiber-cement non-pressure sewer fittings shall be made in conformance with 5.1 and 5.2.

5.4.2 Fiber-cement non-pressure sewer fittings shall be equivalent in serviceability to those fittings defined in 5.4.1 and shall be installed in accordance with the manufacturer's recommendations.

6. Chemical Composition

6.1 When tested in accordance with the appropriate sections of Test Methods C 500, the amount of uncombined calcium hydroxide shall not exceed 1.0 % for Type II pipe.

NOTE 4—There are no chemical requirements for Type I pipe.

7. Physical Properties

7.1 *Crushing Strength*—Crushing tests shall be conducted before shipment. A test specimen cut from an unmachined portion of the pipe shall have the minimum crushing strength prescribed in Table 2, when tested in accordance with 10.3 and the V-Shaped Bearing Method of Test Methods C 500.

7.2 *Flexural Strength*—Longitudinal bending tests shall be conducted before shipment. Each length of pipe 3 m (10 ft) or longer, for designated sizes 200 mm (8 in.) and less, shall have the minimum proof flexural strength prescribed in Table 3, when tested in accordance with the appropriate section of Test Methods C 500.

7.3 *Joint Tightness*—The tests outlined in this section are considered to be one-time qualification tests to establish the adequacy of the manufacturer's joint design. Instead of requiring performance of these tests, the purchaser may require the manufacturer to certify that pipes and couplings equivalent in material and design have passed the tests enumerated in this section. At his own expense, however, the purchaser, by designation with his order, shall have the option to require that assembled pipes and couplings pass the following performance tests without leakage.

7.3.1 *Couplings*—The couplings, when assembled on pipe, shall be capable of withstanding simultaneously:

7.3.1.1 The minimum crushing load prescribed in Table 2, when tested in accordance with Section 5 of Test Methods C 500, and

7.3.1.2 The hydrostatic pressure tests described in 7.3.1.3 and 7.3.1.4.

7.3.1.3 *Straight Alignment*—A hydrostatic pressure test shall be made on an assembly of two sections of pipe properly connected with a coupling in accordance with the joint design. An equivalent alternative shall be a single pipe with a coupling on each end. The assembly shall be subjected to an internal hydrostatic pressure of 70 kPa (10 psi) for 10 min. Any visible water leakage shall be considered failure of the test requirements.

TABLE 1 Designated Sizes of Pipes According to Classes

Designated Size, mm (in.)	Classes ^A						
	1500	2400	3300	4000	5000	6000	7000
100 (4)	X	X	X	...	...	...	...
125 (5)	X	X	X	...	...	...	...
150 (6)	X	X	X	...	...	...	...
200 (8)	X	X	X	...	...	...	...
250 (10)	X	X	X	X	X	...	...
300 (12)	X	X	X	X	X	...	...
350 (14)	X	X	X	X	X	...	...
375 (15)	X	X	X	X	X	...	...
400 (16)	X	X	X	X	X	...	...
450 (18)	...	X	X	X	X	X	X
500 (20)	...	X	X	X	X	X	X
525 (21)	...	X	X	X	X	X	X
600 (24)	...	X	X	X	X	X	X
675 (27)	...	...	X	X	X	X	X
750 (30)	...	...	X	X	X	X	X
825 (33)	...	...	...	X	X	X	X
900 (36)	...	...	...	X	X	X	X
975 (39)	...	...	...	X	X	X	X
1050 (42)	...	...	...	X	X	X	X

^A Other classes may be available on special order.

TABLE 2 Crushing Strength

Class	Minimum Crushing Load, kN/m (lb/ft)
1500	21.9 (1500)
2400	35.0 (2400)
3300	48.2 (3300)
4000	58.4 (4000)
5000	73.0 (5000)
6000	87.6 (6000)
7000	102.2 (7000)