



Designation: C1450/C1450M – 04 (Reapproved 2019)

Standard Specification for Non-Asbestos Fiber-Cement Storm Drain Pipe¹

This standard is issued under the fixed designation C1450/C1450M; 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 non-asbestos fiber-cement pipe intended for use in storm-water drainage of highways, airports, farms, foundations, and other similar drainage systems.

1.2 The values stated in either inch-pound units or SI units are to be regarded separately as standard. Within the text, the SI units are shown in brackets. The values stated in each system are not exact equivalents; therefore each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with the specification.

NOTE 1—Experience has shown that the successful performance of this product depends upon the proper selection of the pipe strength, the type of bedding and backfill, care that the installation conforms to the construction specifications, and provision for adequate inspection at the construction site. This specification does not include requirements for bedding, backfill, the relationship between field load conditions and the strength designation of the pipe, or durability. These requirements should be included in the project specification.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*²

C150/C150M Specification for Portland Cement

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

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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.

C497 Test Methods for Concrete Pipe, Concrete Box Sections, Manhole Sections, or Tile

C500/C500M Test Methods for Asbestos-Cement Pipe

C595/C595M Specification for Blended Hydraulic Cements

C1154 Terminology for Non-Asbestos Fiber-Reinforced Cement Products

2.2 *Federal Standard:*

Fed. Std. No. 123 Marking for Shipment and (Civil Agencies)³

2.3 *Military Standards:*

MIL-STD-105 Sampling Procedures and Tables for Inspection by Attributes⁴

MIL-STD-129 Marking for Shipment and Storage⁴

MIL-STD-414 Sampling Procedures and Tables for Inspection by Variables for Percent Defective⁴

2.4 *Other Standards:*

Uniform Freight Classification Rules⁴

National Motor Freight Classification Rules⁵

2.5 *ISO Standards:*

ISO 390: 1993 Products in Fibre Reinforced Cement—Sampling and Inspection⁶

ISO 2859 –1: 1999 Sampling Procedures for Inspection by Attributes Part 1: Sampling Schemes Indexed by Acceptance Quality Limit (AQL) for Lot-by-Lot Inspection⁶

ISO 3951: 1989 Sampling Procedures and Charts for Inspection by Variables for Percent Nonconforming⁶

3. Terminology

3.1 *Definitions:*

3.1.1 Refer to Terminology C1154.

3.1.2 *coupling, n—in fiber-cement conduit, sewer, underdrain and storm drain pipe*—component made from a larger diameter pipe of the same type or class, or of Type II and a higher class, or produced otherwise to yield at least equal performance, for joining fiber-cement pipe that when properly installed, forms a silt tight joint, allows alignment corrections

³ Available from Standardization Documents Order Desk, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5904 Attn: NPODS.

⁴ Available from the Uniform Classification Commission, Room 1106, 222 S, Riverside Plaza, Chicago, IL 60606.

⁵ Available from National Motor Freight Inc., 1616 “P” St. NW, Washington, DC 20036.

⁶ Available from International Organization for Standardization (ISO), 1 rue de Varembe, Case postale 56, CH-1211, Geneva 20, Switzerland.

and slight changes in direction, and provides an assembled joint equivalent in serviceability and strength to the pipe sections. Alternatively, for storm drain couplings, sleeves made from other materials that, when properly installed develop sufficient tightness to prevent the surrounding soil from entering the drain, may be used as couplings.

4. Classification

4.1 The types of pipe shall be shown as Type I and Type II corresponding to the chemical requirements given in S3.

NOTE 2—There are no chemical requirements for Type I pipe. Type II pipe is generally accepted as being unaffected by sulfates in groundwater which cause matrix expansion and consequential pipe deterioration.

4.2 Fiber-cement storm drain pipe furnished under this specification shall be designated as Class I, II, III, IV, and V. The corresponding strength requirements are prescribed in **Table 1**. The D load is the saturated crushing test load expressed in pounds-force per linear foot per foot of diameter. [The D1 load is the saturated crushing test load expressed in Newtons per linear metre per millimetre of diameter.] The pipe shall be furnished in 4, 6, 8, 10, 12, 15, 18, 21, 24, 27, 30, 33, 36, 42 and 48-in. [100, 150, 200, 250, 300, 375, 450, 525, 600, 675, 750, 825, 900, 1050 and 1200-mm] sizes.

4.3 When requested by the owner, the manufacturer shall provide the owner the relationship between the short-term crush load required to achieve long-term design loads with supporting estimates of service life using recognized calculation methods.

5. Composition and Manufacture

5.1 *Composition*—Fiber-cement drain pipes shall be composed of an intimate mixture of an inorganic hydraulic binder (see Specification **C150/C150M**) or a calcium silicate binder (see Specification **C595/C595M**) 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.

5.1.1 The manufacturer shall state the type of fiber used in the pipe, and, where requested, provide the owner with documented evidence that the fibers employed are compatible with other materials of that manufacturer.

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

6. Dimensions, Mass, and Tolerances

6.1 The nominal length for fiber-cement storm drain pipe shall be designated by the manufacturer. Unless otherwise agreed by the Owner, furnish a maximum of 15 % of the total footage of any one size and type for any order, at the manufacturer’s option, in pipe lengths shorter than the nominal lengths.

6.2 The underrun in length of a section of pipe shall not be more than 1/8 in./ft [10 mm/m] with a maximum of 1/2 in. [12.7 mm] in length in any pipe.

6.3 The average inside diameter shall not be less than the nominal size by more than 0.25 in. [6 mm] or 1 1/2 % of the nominal size, whichever is greater in value.

6.4 The manufacturer shall state the minimum wall dimensions of the product it produces that complies with the minimum crush loads presented in **Table 1**.

7. Sampling

7.1 All material tested under this specification shall be tested in the saturated condition after immersion in water at an ambient temperature above 41°F [5°C] for a period of 21 to 28 days immediately prior to testing.

7.1.1 Employ sampling procedures providing an average outgoing quality limit (AOQL) of 6.5 %, except where specific sampling is required by particular test procedures. Appendix X2 describes a sampling plan which provides an AOQL of 6.5 %.

7.1.2 The minimum sample size for sampling and acceptance by attributes or variables shall be in **Table 2**.

7.1.3 Pipes of different sizes or classes but of sequential manufacture in a continuous manufacturing process may be sampled as being in the same inspection lot.

7.2 For crushing tests sample the required number of full lengths of pipe according to the inspection lot size. Cut one test specimen no shorter than 6 inches [150 mm] long from the unmachined end of each of the selected pipe lengths. (**Warning**—In addition to other precautions, when cutting fiber-cement products minimize the dust that results. Prolonged breathing or frequent breathing of significant airborne concentrations of silica is hazardous. When such dust is generated, effective measures shall be taken to prevent inhalation.)

NOTE 3—When sampling from continuous production, these tests may be conducted on dry, equilibrium, or saturated specimens, provided a relationship can be established between this testing and the specified values.

NOTE 4—A manufacturer’s process with an AOQL of 6.5 % indicates that better than 93.5 % of the inspected production exceeds the specifications for marginally accepted product. This type of specification provides the protection and confidence of a clearly defined lower boundary. This would not be true if acceptance were based solely on the

TABLE 1 Minimum Crushing Load

Pipe Class	D Load lbf/ft/ft	D1 Load N/m/mm
I	1200	60
II	1500	75
III	2000	100
IV	3000	150
V	3750	175

TABLE 2 Minimum Quality Sample Size

Inspection by Variables		Inspection by Attributes	
Inspection Lot Size	Number Samples	Inspection Lot Size	Number Samples
< 280	3	< 150	5
281 – 500	4	151 – 500	8
502 – 1200	5	501 – 3200	13