Designation: C500/C500M – 07 (Reapproved 2019)

Standard Test Methods for Asbestos-Cement Pipe[1]

This standard is issued under the fixed designation C500/C500M; 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 These test methods cover the testing of asbestos-cement pipe for hydrostatic strength, flexural strength, crushing strength, straightness, and uncombined calcium hydroxide; they are for use in conjunction with the individual product specifications for asbestos-cement pipe.

1.2 Test methods appear in the following sections:

	Section
Hydrostatic Pressure Test	4
Flexural Test	5
Crushing Test	6
Straightness Test	7
Uncombined Calcium Hydroxide Test	8

1.3 Guidelines for internal and external corrosion included in Section 9 serve as an aid in determining the type of pipe which should be specified to maximize service life for a particular application.

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

1.5 **Warning**—Breathing of asbestos dust is hazardous. Asbestos and asbestos products present demonstrated health risks for users and for those with whom they come into contact. In addition to other precautions, when working with asbestos-cement products, minimize the dust that results. For information on the safe use of chrysoltile asbestos, refer to "Safe Use of Chrysotile Asbestos: A Manual on Preventive and Control Measures."[2]

1.6 *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. For a specific safety hazard, see 1.5.*

1.7 *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:*[3]

D1067 Test Methods for Acidity or Alkalinity of Water

D1126 Test Method for Hardness in Water

D2946 Terminology for Asbestos and Asbestos–Cement Products

E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves

E200 Practice for Preparation, Standardization, and Storage of Standard and Reagent Solutions for Chemical Analysis

2.2 *BNQ Standard:*

BNQ 3807-098 Vulcanized Rubber: Hardness Determination[4]

2.3 *Other Standard:*

Regulation No. 3, Formula for Completely and Specifically Denatured Alcohol[5]

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *crushing strength*—a property of solid material that indicates its ability to withstand collapse from external compressive loads.

3.1.1.1 *Discussion*—Consider failure of the crushing test to have taken place when, as a result of application of the crushing load to the pipe during the test, a break occurs in the pipe before reaching the minimum crushing load designated in the specification.

[1] These test methods are under the jurisdiction of ASTM Committee C17 on Fiber-Reinforced Cement Products and are the direct responsibility of Subcommittee C17.03 on Asbestos - Cement Sheet Products and Accessories.

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[2] Available from The Asbestos Institute, http://www.chrysotile.com/en/sr_use/manual.htm.

[3] 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.

[4] Bureau de Normalisation du Québec, Department of Industry and Commerce, 50 St. Joseph St. East, Quebec, QC, Canada G1K 3A5.

[5] Published by the US Treasury Department, Bureau of Industrial Alcohol, Washington, DC.

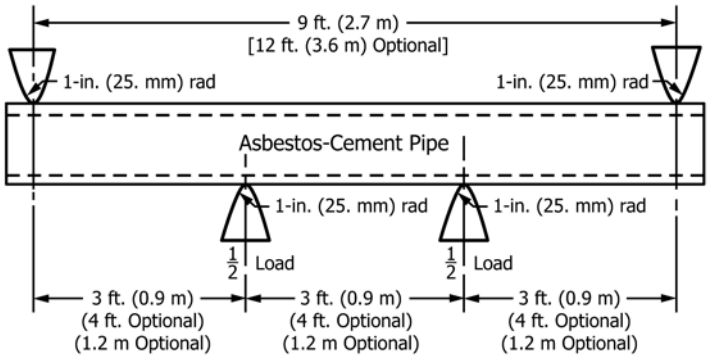

FIG. 1 Assembly for Flexural Strength Test

3.1.2 *flexural strength*—the ability of a standard pipe longitudinal section to withstand external loads that bear on the pipe transversely to its longitudinal axis and induce bending.

3.1.3 *hydrostatic strength*—the ability of the pipe and coupling sleeve to withstand the forces resulting from internal pressure.

3.1.4 *uncombined calcium hydroxide*—the content of unreacted calcium hydroxide that remains in the sample of cured product when tested.

NOTE 1—See Terminology D2946 for additional terms.

4. Hydrostatic Pressure Test

4.1 *Significance and Use*—The hydrostatic pressure test establishes the fact that the pipe has sufficient strength to withstand the hydrostatic pressure loads stated in the specifications. The strength level required by the specifications assures, with a reasonable or designed margin of safety, minimum strengths that will satisfactorily withstand the magnitude of internal operating and surge pressures that are normally encountered in field service.

4.2 *Procedure:*

4.2.1 Place the pipe, coupling, or pipe and coupling with a factory-assembled joint, in a hydrostatic pressure testing machine with gaskets that seal the ends but exert no end pressure. Expel all air, and apply the internal water pressure at a uniform rate of not less than 690 kPa/s [100 psi/s] nor more than 10 MPa/s [1500 psi/s] to the specified pressure; maintain the pressure.

4.2.1.1 Couplings may be tested separately with a rubber bladder inside of the coupling.

4.2.2 Consider failure of the hydrostatic pressure test to have taken place when the pipe or coupling fails to sustain the test pressure for the 5-s period.

5. Flexural Test

5.1 *Significance and Use*—The flexural test establishes the fact that the pipe has sufficient strength to withstand the flexural bending loads stated in the specifications. Provided that proper bedding methods are employed by the installer, the strength level required by the specifications assures minimum strengths that will satisfactorily withstand the magnitude of tranverse bending loads normally encountered in field service.

5.2 *Procedure:*

5.2.1 Support the pipe in a flexural testing machine over a clear span of 2.75 m [9 ft]. Distribute the load equally, and apply the load at the third points of the clear span as indicated in Fig. 1. Unless otherwise specified, it shall be optional with pipe lengths in excess of 3.8 m [12.5 ft] to test at 75 % of the specified loads on supports 3.65 m [12 ft] apart. Apply the load at a uniform rate between 1.1 and 10 kN/s [250 and 2300 lbf/s] until it equals the proof load specified; maintain this load for at least 5 s.

5.2.2 Consider failure of the flexural proof test to have taken place when, as a result of application of the flexural load to the pipe during the test, a break occurs in the pipe either before reaching the minimum flexural load that is designated in the specification or while holding at that minimum flexural load.

6. Crushing Test

6.1 *Significance and Use*—The crushing test establishes the fact that the pipe has sufficient strength to withstand the crushing loads stated in the specifications. Provided that proper bedding methods are employed by the installer, the strength level required by the specifications ensures minimum strengths that will, with a reasonable margin of safety, satisfactorily withstand the magnitude of external crushing loads normally encountered in field service.

6.2 *Procedure:*

6.2.1 *V-Shaped Three Edge Bearing Method:*

6.2.1.1 Test each specimen by the V-shaped bearing method as indicated in Fig. 2.

6.2.1.2 The lower press-block consists of a V-shaped support that has an included angle of 2.6 rad (150°) and is made of metal or hardwood. Interpose strips of rubber of the thickness and width specified in 6.2.1.3 between the press-block and the test piece.

6.2.1.3 The rubber strips shall be 16 ± 3 mm [0.625 ± 0.125 in.] thick and have a hardness between 50 and 68 DIDC (45 and 65 Shore A durometer)[6] as specified in BNQ 3807-098.

6.2.1.4 The flat upper press-block, made of the same material as the lower press-block, shall have a minimum width of 15 cm [6 in.]. Interpose a strip of rubber of the thickness and hardness specified in 6.2.1.3 between the press-block and the test piece.

[6] DIDC Means Dégré International de Dureté des Caoutchoucs (International Degrees for Hardness of Rubbers).