



Designation: C 668 – 98

Standard Specification for Asbestos-Cement Transmission Pipe¹

This standard is issued under the fixed designation C 668; 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 Department of Defense.

1. Scope

1.1 This specification covers asbestos-cement transmission pipe intended for use in transmission systems that carry fluids under pressure. A transmission system consists of pipe lines which convey fluids from their source to a point of distribution or discharge. The system is characterized by relatively steady flow and few appurtenances, thereby permitting reasonable hydraulic analysis, including surge analysis.

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

NOTE 1—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. See Note 4 for a specific hazards statement.*

2. Referenced Documents

2.1 ASTM Standards:

- C 150 Specification for Portland Cement²
- C 458 Test Method for Organic Fiber Content of Asbestos-Cement Products³
- C 500 Test Methods for Asbestos-Cement Pipe³
- C 595 Specification for Blended Hydraulic Cements²
- C 618 Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete⁴

¹ This specification is under the jurisdiction of ASTM Committee C-17 on Fiber-Cement Products and is the direct responsibility of C17.03 on Asbestos-Cement Products.

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

³ *Annual Book of ASTM Standards*, Vol 04.05.

⁴ *Annual Book of ASTM Standards*, Vol 04.02.

D 1869 Specification for Rubber Rings for Asbestos-Cement Pipe⁵

D 2946 Terminology for Asbestos and Asbestos-Cement Products³

2.2 Federal Standard:

Fed. Std. No. 123 Marking for Shipment (Civil Agencies)⁶

2.3 Military Standard:

MIL-STD-129 Marking for Shipment and Storage⁶

2.4 Other Standards:

Uniform Freight Classification Rules⁷

National Motor Freight Classification Rules⁸

3. Terminology

3.1 Definitions:

3.1.1 *coupling*—fitting made from larger diameter pipe of the same type and class, or of Type II and a higher class for joining asbestos-cement pipe that, when properly installed with the proper accessories, develops a joint equivalent in strength and serviceability to the pipe sections.

3.1.2 *lot, n*—for pipe sizes 525 mm (21 in.) in diameter and smaller, each 300 lengths of pipe or less, of identical class and size manufactured on each machine during a 24-h period. For pipe larger than 525 mm (21 in.), each 300 lengths of pipe or less, of identical class and size manufactured on each machine during a period of consecutive working days not exceeding seven days.

3.1.3 Additional terminology is given in Terminology D 2946.

4. Classification

4.1 Asbestos-cement pipe furnished under this specification shall be manufactured in Classifications 21, 24, 28, 31, 34, 41, 58, 55, and 62. Note that these numbers correspond to ten times the minimum hydrostatic strength, in MPa (30, 35, 40, 45, 50, 60, 70, 80, and 90. This classification corresponds to one tenth of the minimum hydrostatic strength, in psi).

4.2 The types of pipe shall be known as Type I and Type II

⁵ *Annual Book of ASTM Standards*, Vol 09.02.

⁶ Available from Standardization Documents Order Desk, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094 Attn: NPODS.

⁷ Available from the Uniform Classification Commission, Room 1106, 222 S. Riverside Plaza, Chicago, IL 60606.

⁸ Available from National Motor Freight Inc., 1616 “P” St., NW, Washington, DC 20036.



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TABLE 1 Applied Hydrostatic Proof Pressures^A

Pipe Classification		Applied Hydrostatic Pressure	
10 × MPa rating	($\frac{1}{10}$ psi rating)	MPa	(psi)
21	(30)	1.55	(225)
24	(35)	1.81	(262)
28	(40)	2.07	(300)
31	(45)	2.32	(337)
34	(50)	2.58	(375)
41	(60)	3.10	(450)
48	(70)	3.62	(525)
55	(80)	4.13	(600)
62	(90)	4.65	(675)

^AThe pressures and classifications indicated apply to all sizes.

TABLE 2 Minimum Hydrostatic Strength^A

Pipe Classification		Hydrostatic Pressure Rating	
10 × MPa rating	($\frac{1}{10}$ psi rating)	MPa	(psi)
21	(30)	2.1	(300)
24	(35)	2.4	(350)
28	(40)	2.8	(400)
31	(45)	3.1	(450)
34	(50)	3.4	(500)
41	(60)	4.1	(600)
48	(70)	4.8	(700)
55	(80)	5.5	(800)
62	(90)	6.2	(900)

^AThe pressures and classifications indicated apply to all sizes.

corresponding to the chemical requirements in 7.1.

NOTE 2—To assist the purchaser in choosing the type of pipe most suitable for his use, guidelines for the definition of aggressiveness of water and of soil environments for selection of the proper type of asbestos-cement pipe are covered in Sections 19 to 25 of Test Methods C 500.

5. Manufacture

5.1 Asbestos-cement furnished under this specification shall be composed of an intimate mixture of portland cement, conforming to Specification C 150, or portland slag or pozzolan cements conforming to Specification C 595, and asbestos fiber with or without finely divided silica or silica-containing mineral additives conforming to Specification C 618 that can react to form calcium silicate reaction products, and asbestos fiber. The mixture shall not contain more than 0.2 % of non-deleterious organic components, as determined by Test Method C 458. The material shall be of laminar construction formed under pressure to a homogeneous structure and cured to meet the physical and chemical requirements of this specification.

6. Rubber Rings

6.1 The rubber rings used to seal the joints of the asbestos-cement pipe shall conform to the requirements of Specification D 1869.

7. Chemical Requirements

7.1 When uncombined calcium hydroxide tests are requested, one sample shall be taken from each lot of pipe and tested in accordance with Test Methods C 500. The sample to be tested may be taken from one of the specimens selected for the crushing test. The amount of uncombined calcium hydroxide shall not exceed 1 % for Type II pipe.

NOTE 3—There are no chemical requirements for Type I pipe.

TABLE 3 Minimum Applied Flexural Proof Loads

Pipe Classification		Nominal Size			
10 × MPa rating	$\frac{1}{10}$ psi rating	15 cm (6 in.)		20 cm (8 in.)	
		kN	(lbf)	kN	(lbf)
21	(30)	—	—	16	(3700)
24	(35)	—	—	20	(4400)
28	(40)	10	(2300)	23	(5100)
31	(45)	11	(2500)	25	(5700)
34	(50)	12	(2800)	28	(6400)
41	(60)	14	(3200)	31	(6900)
48	(70)	16	(3700)	34	(7600)
55	(80)	18	(4000)	39	(8800)
62	(90)	22	(4900)	45	(10100)

8. Hydrostatic Strength

8.1 Each standard, random, or short length of pipe (see Section 11) and each coupling sleeve, manufactured from the same material as the pipe, shall be hydrostatically tested by the manufacturer prior to shipment and shall have sufficient strength to withstand the internal hydrostatic pressure prescribed in Table 1, when tested in accordance with Test Methods C 500.

8.2 From each lot of pipe which has passed the routine hydrostatic proof test, one length shall be selected by the inspector. A 30 cm (12 in.) or longer section of pipe cut from an unmachined portion of the selected length shall have the minimum hydrostatic strength designated in Table 2, when tested in accordance with Test Methods C 500, except that the pressure need not be held for 5 s.

9. Flexural Strength

9.1 Each length of pipe in sizes 15 and 20 cm (6 and 8 in.) nominal diameter having lengths 30 cm (12 in.) or longer shall have sufficient flexural strength to withstand without failure the total load prescribed in Table 3 when tested in accordance with Test Methods C 500.

10. Crushing Strength

10.1 From each lot, one length shall be selected by the inspector. A 30 cm (1 ft) section of pipe cut from an unmachined portion of the selected length shall have the minimum crushing strength prescribed in Table 4 and Table 5 when tested in accordance with Test Methods C 500, Vee Shaped Three Edge Bearing Method.

NOTE 4—**Precaution:** In addition to other precautions, when cutting asbestos-cement products minimize the dust that results. Prolonged or frequent breathing of significant airborne concentrations of silica or asbestos dust is hazardous. When such dusts are generated, effective measures shall be taken to prevent inhalation. Refer to approved techniques.⁹

11. Dimensions, Mass, and Permissible Variations

11.1 Couplings and coupling areas of pipe shall be machined or otherwise finished to such dimensions as will provide tight joints when assembled with the proper accessories and put into service for which the pipe is intended.

⁹ Available from Asbestos Information Association, 1745 Jefferson Davis Highway, Crystal Square 4, Suite 509, Arlington, VA 22202.



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