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AMERICAN NATIONAL STANDARD A165.5
AMERICAN NATIONAL STANDARDS INSTITUTE*Standard Specifications for*
ASBESTOS-CEMENT PRESSURE PIPE¹

ASTM Designation: C 296 - 72

This Standard of the American Society for Testing and Materials is issued under the fixed designation C 296; 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.

Scope

1. These specifications cover asbestos-cement pressure pipe intended for use in supply lines and distribution systems that carry water under pressure. The specifications also cover asbestos-cement pressure pipe for use in sewer force mains which carry sewage under pressure.

NOTE 1.—Rubber rings suitable for use with this pipe are covered in the Specification for Rubber Rings for Asbestos-Cement Pipe (ASTM Designation: D 1869).²

Classes and Types

2. (a) Asbestos-cement pipe furnished under these specifications shall be manufactured in the pressure class designations of Classes 100, 150, and 200. The pressure class designations shall mean that the pipe is intended for water

service at operating pressures corresponding to the class designation under the conditions of installation and operation encountered in many water distribution systems.

NOTE 2.—The purchaser should determine for himself the proper class of pipe to be used under the installation and operating conditions that will exist on the project on which the pipe is to be used. For this purpose, reference can be made to AWWA H2, Standard Practice for the Selection of Asbestos-Cement Water Pipe.

(b) The types of pipe shall be known as Types I, II, and III, corresponding to the chemical requirements given in Section 8.

NOTE 3.—To assist the purchaser in choosing the type of pipe most suitable for his use, the following descriptions of usage may be considered:

Type I.—For use where moderately aggressive water and soil of moderate sulfate content are expected to come in contact with the pipe.

Type II.—For use where highly aggressive water or water and soil of high sulfate content, or both, are expected to come in contact with the pipe.

Type III.—For use where contact with aggressive waters and sulfates are not expected.

¹ Under the standardization procedure of the Society, these specifications are under the jurisdiction of the ASTM Committee C-17 on Asbestos-Cement Products.

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² Annual Book of ASTM Standards, Part 12.

Description of Terms

3. (a) *Pipe*.—The word pipe, in these specifications, shall be understood to

TABLE I.—APPLIED HYDROSTATIC PROOF PRESSURES.

Class	Applied Pressure, psi
100.....	350
150.....	525
200.....	700

TABLE II.—APPLIED FLEXURAL PROOF LOADS.

Nominal size, in.	Total Applied Load, lb		
	Class 100	Class 150	Class 200
4.....	1200	1470	1 870
6.....	2800	3700	4 900
8.....	5330	7600	10 130

TABLE III.—MINIMUM CRUSHING LOADS.

Nominal Size, in.	Crushing Strength per Lineal Foot, lb		
	Class 100	Class 150	Class 200
4.....	4 100	5 400	8 700
6.....	4 000	5 400	9 000
8.....	4 000	5 500	9 300
10.....	4 400	7 000	11 000
12.....	5 200	7 600	11 800
14.....	5 200	8 600	13 500
16.....	5 800	9 200	15 400
18.....	6 500	10 100	17 400
20.....	7 100	10 900	19 400
24.....	8 100	12 700	22 600
30.....	9 700	15 900	28 400
36.....	11 200	19 600	33 800

mean asbestos-cement pressure pipe as defined in Sections 1, 2, and 4.

(b) *Coupling*.—A section for joining asbestos-cement pipe that, when properly installed with the proper accessories, de-

velops a joint equivalent in strength and serviceability to the pipe sections.

(c) *Purchaser*.—Whenever the word purchaser is used in these specifications, it shall be understood to mean the actual purchaser of the pipe or his authorized agents acting within the scope of the duties entrusted to them.

(d) *Lot*.—The word lot in these specifications shall be understood to mean those lengths of pipe of that size and class manufactured during the same shift.

Manufacture

4. Asbestos-cement pressure pipe shall be composed of an intimate mixture of portland cement or portland blast-furnace slag cement and asbestos fiber with or without silica; or it shall be composed of portland-pozzolan cement and asbestos fiber. The mixture shall be free of organic additives. The material shall be formed under pressure and cured to meet the physical and chemical requirements of these specifications.

Hydrostatic Strength

5. (a) Each standard, random, or short length of pipe (Section 10) and each coupling sleeve, when 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 I, when tested in accordance with Section 4 of the Methods of Testing Asbestos-Cement Pipe (ASTM Designation: C 500).²

(b) From each 300 lengths of pipe of each size and class which have passed the routine hydrostatic and flexure proof tests, one length shall be selected by the inspector. Each selected length shall be hydrostatically tested in accordance with Section 4 of Method C 500 to a

pressure of four times the rated working pressure for the class of pipe, maintaining such pressure for not less than 5 sec. The pipe shall not fail under this pressure. Each pipe so tested shall be retested in accordance with Section 5(a) of this specification.

Flexural Strength

6. Each length of pipe in sizes 4, 6, and 8 in. shall have sufficient flexural strength to withstand, without failure, the total load prescribed in Table II, when tested in accordance with Section 7 of Methods C 500.

Crushing Strength

7. When specifically requested by the purchaser in his order, crushing tests shall be conducted before shipment at the purchaser's expense. One-foot lengths of pipe cut from unmachined portions of the pipe shall have the minimum crushing strength prescribed in Table III, when tested in accordance with Section 10.1.1 of Methods C 500.

Chemical Requirements

8. When tested in accordance with the method of test for uncombined calcium hydroxide, Sections 16 and 17 of Methods C 500, the amount of uncombined calcium hydroxide shall not exceed 3.0 per cent for Type I pipe or 1.0 per cent for Type II pipe.

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

Sampling

9. (a) All pipe and couplings tested under these specifications shall be in a normal air-dried condition.

(b) Each standard, random, or short length of pipe (Section 10) and each coupling sleeve, when manufactured from the same material as the pipe, shall be

hydrostatically tested by the manufacturer prior to shipment.

(c) Each length of pipe in sizes 4, 6, and 8 in. nominal diameter having lengths 10 ft or longer shall be tested in flexure by the manufacturer prior to shipment.

(d) When crushing tests are requested (Section 7), one length of pipe shall be selected from each 300 lengths of each size and class of pipe covered by the order. One test specimen 12 in. long shall be cut from an unmachined portion of the selected length of pipe.

(e) When uncombined calcium hydroxide tests are requested (Section 8), one sample shall be taken from each lot of pipe. The sample to be tested may be taken from one of the specimens selected for the crushing test.

Sizes and Dimensions

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

(b) Pipe shall be manufactured with nominal inside diameters of 4, 6, 8, 10, 12, 14, 16, 18, 20, 24, 30, and 36 in. in classes 100, 150, and 200 as defined in Section 2. The average diameters of standard and random lengths may be less than the nominal by not more than 5.0 per cent, when measured approximately 3 in. from the end.

(c) The standard length shall be 13 ft $\pm$ 1 in. Alternative lengths shall be 10 ft $\pm$ 1 in. for 4 and 6-in. pipe and 16 ft $\pm$ 1 in. for 14-in. and larger pipe. At least 85 per cent of the total footage of pipe of any one class, type, and size, excluding short lengths, shall be furnished in standard lengths. The remaining 15 per cent may be in random lengths of not less than 7 ft. Short lengths, when specifically ordered, shall not exceed 6 ft 6 in.

Workmanship and Finish

11. (a) Machined ends of the pipe that receive the coupling shall be free from dents and gouges that will affect the tightness of the joint.

(b) Each pipe shall be free from bulges, dents, and tears in the inside surface that result in a variation in diameter of more than $\frac{1}{16}$ in. from that obtained on adjacent unaffected portions of the surface.

(c) Each length of pipe shall not vary in straightness by more than 0.05 in./ft of length when the variation is measured in accordance with Section 12 of Methods C 500.

Marking and Shipping

12. (a) Each standard and random length of pipe shall be marked by the manufacturer with the trade name, nominal size, class, hydrostatic proof pressure, and date of manufacture. Each coupling sleeve, if made of the same material as the pipe, shall be marked by the manufacturer with the nominal size, class, and the letter "T" to indicate that it has been hydrostatically tested.

(b) Pipe and couplings shall be prepared for commercial shipment so as to ensure acceptance by common or other carriers.

Inspection and Rejection

13. (a) All material furnished under these specifications shall conform to the requirements stated herein and shall be subjected to the factory inspection and tests prescribed in these specifications. When requested by the purchaser in his order, the manufacturer shall notify the purchaser of the time that the inspection and testing will take place so that the purchaser may arrange for witnessing such tests and inspections at his own expense. In lieu of such inspection, when requested, the manufacturer shall be pre-

pared to certify that his product conforms to the requirements of these specifications.

(b) Each pipe and coupling shall be inspected by the manufacturer, before shipment, for compliance with the standards for dimensions, tolerances, and workmanship and finish (see also Section 9).

(c) Failure of any specimen tested for crushing strength to withstand 75 per cent of the load specified in Section 7 shall be cause for rejection of the lot from which the test specimen was taken. When any specimen tested for crushing strength withstands over 75 per cent but under 100 per cent of the load specified in Section 7, one specimen shall be cut from each of two additional pipes of the same lot. Failure of either of these additional specimens to meet the strength requirements of Section 7 shall be cause for rejection of the entire lot from which the original sample was taken.

(d) If any pipe subjected to the hydrostatic test described in Section 4 of Methods C 500 fails to withstand the higher pressure specified in Section 5(b), two additional lengths of the same size and class shall be selected from the pipe manufactured during the same shift and shall be subjected to the higher hydrostatic test. The failure of one of these additional lengths to withstand the specified pressure shall be cause for rejection of the entire lot of that size and class manufactured during the same shift as the test lengths.

(e) If the results of the uncombined calcium hydroxide test show that the sample failed to meet the specification requirements, two additional specimens shall be selected and sampled for test. The failure of one of these two additional samples to meet the specification requirements of Section 8 shall be cause for rejection of the lot.

(See Appendix on following page.)

APPENDIX

It is suggested to the purchaser, without being made a part of these specifications, that the purchaser may request inclusion of the following information in his order or agreement for purchase of the pipe.

- (1) Any tests, in addition to those prescribed by these specifications, as the special circumstances may require,
- (2) The place or places where any additional tests are to be made,
- (3) Description of the additional testing facilities,
- (4) Who shall bear the expense of such additional tests,
- (5) Whether such additional tests may be made by any sound sampling process or other method approved by the parties, and
- (6) Such other matters as the parties may find desirable to include in their written agreement.

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