



Designation: C 700 – 00

# Standard Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated<sup>1</sup>

This standard is issued under the fixed designation C 700; 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 ( $\epsilon$ ) 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 establishes the criteria for acceptance, prior to installation, of extra strength and standard strength vitrified clay pipe and fittings to be used for the conveyance of sewage, industrial wastes, and storm water; and extra strength perforated and standard strength perforated vitrified clay pipe to be used for underdrainage, filter fields, leaching fields, and similar subdrainage installations.

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

NOTE 1—Attention is called to Specification C 425, Test Method C 828, Test Method C 1091, Test Methods C 301, and Terminology C 896.

1.3 The following precautionary caveat pertains only to the Test Method portion, 5.2-5.2.3.2 of this standard: *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 301 Test Methods for Vitrified Clay Pipe<sup>2</sup>
- C 425 Specification for Compression Joints for Vitrified Clay Pipe and Fittings<sup>2</sup>
- C 828 Test Method for Low-Pressure Air Test of Vitrified Clay Pipe Lines<sup>2</sup>
- C 896 Terminology Relating to Clay Products<sup>2</sup>
- C 1091 Test Method for Hydrostatic Infiltration and Exfiltration Testing of Vitrified Clay Pipe Lines<sup>2</sup>
- IEEE/ASTM SI 10 Standard for Use of the International

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee C-4 on Vitrified Clay Pipe and is the direct responsibility of Subcommittee C04-20 on Methods of Test and Specifications

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 04.05.

System of Units (SI): The Modern Metric System<sup>3</sup>

## 3. Terminology

3.1 *Definitions*—Clay, fire clay, shale, and surface clay are as defined in Terminology C 896.

## 4. Materials and Manufacture

4.1 Vitrified clay pipe shall be manufactured from fire clay, shale, surface clay, or a combination of these materials that, when formed into pipe and fired to suitable temperatures, yields a product that conforms to this specification.

## 5. Physical Properties

### 5.1 Bearing Strength:

5.1.1 Pipe shall meet the bearing strength requirements of Table 1.

5.1.2 The number of specimens to be tested shall not exceed 0.5 % of the number of pipe of each size furnished, except that no less than two specimens shall be tested.

5.1.3 If any of the test specimens fail to meet the requirements, the manufacturer will be allowed a retest on two additional specimens for each one that failed. The pipe will be acceptable if all the retest specimens meet the test requirement.

5.1.4 If, subsequent to an initial pipe strength failure, the accuracy of the testing equipment is questioned, at the request of the manufacturer, the equipment shall be recalibrated and a retest made or a retest made upon equipment of known accuracy.

### 5.2 Hydrostatic Pressure Test or Absorption Test:

5.2.1 The manufacturer shall at his option, apply either a hydrostatic pressure test or an absorption test to all of the test specimens in each size and run of the pipe.

#### 5.2.2 Hydrostatic Pressure Test:

5.2.2.1 When the pipe is subjected to an internal hydrostatic pressure of 10 psi (68.9 KPa) for the elapsed time shown in the following table, there shall be no leaking on the exterior of the pipe. Moisture appearing on the surface of the pipe in the form

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 14.02.

**TABLE 1 Minimum Strength (3-Edge Bearing)**

Nominal Size, in. (mm)	Extra Strength Vitrified Clay Pipe		Standard Strength Vitrified Clay Pipe		Perforated Vitrified Clay Pipe			
					Extra Strength		Standard Strength	
	lbf/linear ft	kN/linear m	lbf/linear ft	kN/linear m	lbf/linear ft	kN/linear m	lbf/linear ft	kN/linear m
3 (75)	2000	29.2	...	...	...	...	...	...
4 (100)	2000	29.2	1200	17.5	1250	18.2	1000	14.6
6 (150)	2000	29.2	1200	17.5	1600	23.4	1000	14.6
8 (205)	2200	32.1	1400	20.4	1600	23.4	1000	14.6
10 (255)	2400	35.0	1600	23.4	1600	23.4	1100	16.1
12 (305)	2600	37.9	1800	26.3	1800	26.3	1200	17.5
15 (380)	2900	42.3	2000	29.2	2200	32.1	1400	20.4
18 (455)	3300	48.2	2200	32.1	2640	38.5	1700	24.8
21 (535)	3850	56.2	2400	35.0	3100	45.2	2000	29.2
24 (610)	4400	64.2	2600	37.9	3520	51.4	2400	35.0
27 (685)	4700	68.6	2800	40.9	...	...	...	...
30 (760)	5000	73.0	3300	48.2	...	...	...	...
33 (890)	5500	80.3	3600	52.2	...	...	...	...
36 (915)	6000	87.6	4000	58.4	...	...	...	...
39 (990)	6600	96.3	...	...	...	...	...	...
42 (1065)	7000	102.2	...	...	...	...	...	...

of beads adhering to the surface shall not be considered leakage. However, moisture which starts to run on the pipe shall be construed as leakage regardless of quantity.

**Hydrostatic Pressure Test Time**

Thickness of Barrel in. (mm)	Test Time (min.)
Up to and including 1 (25)	7
Over 1 (25) including 1½ (40)	9
Over 1½ (40) including 2 (50)	12
Over 2 (50) including 2½ (65)	15
Over 2½ (65) including 3 (75)	18
Over 3 (75)	21

5.2.2.2 If any of the test specimens fail to meet the Hydrostatic Pressure Test requirements, a retest will be allowed and the pipe accepted as provided in 5.1.3.

**5.2.3 Absorption Test:**

5.2.3.1 The absorption of vitrified clay pipe shall not exceed 8%.

5.2.3.2 If any of the test specimens fail to meet the absorption requirements, a retest will be allowed and the pipe accepted as provided in 5.1.3.

**5.3 Acid Resistance:**

5.3.1 This test is used to determine the resistance of pipe to the action of acids encountered in sanitary sewers. The test

shall be performed only when specified.

5.3.2 The pipe of each size and shipment shall be acceptable if the acid-soluble matter, from specimens representing such pipe, does not exceed 0.25 %.

5.3.3 If any of the tests specimens fail to meet the acid resistance requirements, a retest, representative of the original material lot, in that particular acid will be allowed and the pipe accepted as provided in 5.1.3.

**6. Allowable Limits for Dimensional Variation**

6.1 Sizes and dimensions of pipe are as described in Table 2.

6.2 The inside diameter shall not vary from a true circle by more than 3 % of its nominal diameter.

6.3 The average inside diameter shall be determined by taking any two 90° (1.6-rad) opposing measurements and averaging the readings.

**7. Straightness**

7.1 Pipe shall not deviate from straight by more than ¼ in./ft (5 mm/m) of length when the maximum offset is measured from the concave side of the pipe.

7.2 Measurement shall be taken by placing a straightedge on

**TABLE 2 Available Limits for Dimensional Variation**

Nominal Size, in. (mm) <sup>A</sup>	Laying Length Limit of Minus Variation, in./ft (mm/m)	Difference in Length of Two Opposite Sides Max, in. (mm)	Limit of Minus Variations from Nominal Size in Average Inside Diameter, in. (mm)
3 (75)	¼ (21)	⅝ (8)	⅜ (5)
4 (100)	¼ (21)	⅝ (8)	⅜ (5)
6 (150)	¼ (21)	⅜ (10)	¼ (6)
8 (205)	¼ (21)	⅞ (11)	⅝ (8)
10 (255)	¼ (21)	⅞ (11)	⅜ (10)
12 (305)	¼ (21)	⅞ (11)	⅞ (11)
15 (380)	¼ (21)	½ (13)	⅞ (14)
18 (455)	¼ (21)	½ (13)	1⅛ (17)
21 (535)	⅜ (31)	⅞ (14)	1⅜ (21)
24 (610)	⅜ (31)	⅞ (14)	1⅝ (24)
27 (685)	⅜ (31)	⅝ (16)	1⅞ (30)
30 (760)	⅜ (31)	⅝ (16)	1⅞ (30)
33 (840)	⅜ (31)	⅝ (16)	1⅞ (33)
36 (915)	⅜ (31)	1⅛ (17)	1⅞ (37)
39 (990)	⅜ (31)	¾ (19)	1⅞ (37)
42 (1065)	⅜ (31)	⅞ (22)	1⅞ (37)

<sup>A</sup> Specifiers should be aware that all pipe sizes are not universally available.