

*Standard Specification
for*

Vitrified Clay Pipe, Extra Strength, Standard Strength and Perforated

AASHTO DESIGNATION: M 65-93
(ASTM DESIGNATION: C 700-91)

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 SI units are to be regarded as the standard.

NOTE 1—Attention is called to ASTM C 425, ASTM Practice C 828, ASTM Methods C 301, and ASTM Definitions C 896.

1.3 In developing the metric conversions used in this specification, recognition has been made of the variable nature of clays, so that neither “soft” nor “hard” conversions, as they are defined in ASTM Practice E 380, have been made. For example, the inch is considered to be 25 mm instead of 25.4 mm.

1.4 The following precautionary caveat pertains only to the Test Method portion, Section 5.2 through 5.2.3.2 of this standard:

This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety problems 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 *AASHTO Standards:*
T 281 Testing Vitrified Clay Pipe
- 2.2 *ASTM Standards:*

- C 12 Practice for Installing Vitrified Clay Pipe Lines
- C 425 Specification for Compression Joints for Vitrified Clay Pipe and Fittings
- C 828 Practice for Low-Pressure Air Test of Vitrified Clay Pipe Lines (4 to 12-in.)
- C 896 Definitions of Terms Relating to Clay Products
- E 380 Metric Practice

3. TERMINOLOGY

3.1 Definitions:

3.3.1 Clay, fire clay, shale, and surface clay are as defined in ASTM Definitions 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 percent 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 manu-

facturer will be allowed a retest on two additional specimens for each one that failed. The pipe will be acceptable if all the specimens for retest meet the requirements.

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

Hydrostatic Pressure Test Times

Thickness of Barrel, mm (in.)	Test Times, minutes
Up to and including 25 (1)	7
Over 25 (1) and including 38 (1½)	9
Over 38 (1½) and including 51 (2)	12
Over 51 (2) and including 64 (2½)	15
Over 64 (2½) and including 76 (3)	18
Over 76 (3)	21

5.2.2 Hydrostatic Pressure Test:

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

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 Section 5.1.3.

5.2.3 Absorption:

Documents

Document Sharing Hub

TABLE 1 Minimum Strength (3-Edge Bearing)

Nominal Size		Extra Strength Vitrified Clay Pipe		Standard Strength Vitrified Clay Pipe		Perforated Vitrified Clay Pipe			
						Extra Strength		Standard Strength	
						kN/linear m	lbf/linear ft	kN/linear m	lbf/linear ft
mm	in.	m	ft	m	ft	m	ft	m	ft
75	3	29.2	2000	—	—	—	—	—	—
100	4	29.2	2000	17.5	1200	18.2	1250	14.6	1000
150	6	29.2	2000	17.5	1200	23.4	1600	14.6	1000
200	8	32.1	2200	20.4	1400	23.4	1600	14.6	1000
250	10	35.0	2400	23.4	1600	23.4	1600	16.1	1100
300	12	37.9	2600	26.3	1800	26.3	1800	17.5	1200
375	15	42.3	2900	29.2	2000	32.1	2200	20.4	1400
450	18	48.2	3300	32.1	2200	38.5	2640	24.8	1700
525	21	56.2	3850	35.0	2400	45.2	3100	29.2	2000
600	24	64.2	4400	37.9	2600	51.4	3520	35.0	2400
675	27	68.6	4700	40.9	2800	—	—	—	—
750	30	73.0	5000	48.2	3300	—	—	—	—
825	33	80.3	5500	52.5	3600	—	—	—	—
900	36	87.6	6000	58.4	4000	—	—	—	—
975	39	96.3	6600	—	—	—	—	—	—
1050	42	102.2	7000	—	—	—	—	—	—

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

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 Section 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 percent.

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 Section 5.1.3.

6. ALLOWABLE LIMITS FOR DIMENSIONAL VARIATION

6.1 Sizes and dimensions of pipe are as described in Table 2 (SI units) and Table 2A (inch-pound units).

6.2 The inside diameter shall not vary from a true circle by more than 3 percent 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 5 mm/m ($1/16$ in./ft) of length when the maximum offset is measured from the concave side of the pipe.

7.2 Measurements shall be taken by placing a straightedge on the concave side of the pipe's full length of the barrel, being sure not to include spigot joint material or socket, and measuring the maximum distance between the straightedge and concave side of the pipe.

8. GLAZE

8.1 Unless otherwise specified, the manufacturer may supply either glazed or unglazed pipe. On glazed pipe, the glaze shall be a continuously uniform layer that is substantially free of imperfections. Not more than 10 percent of the inner surface of any pipe barrel may be free of glaze. There shall be no well-defined crazing or hairline cracks.

8.2 Glazing is not required on the outer surface of the pipe at the spigot, for a longitudinal distance equal to the

depth of the socket. Glaze may be entirely absent from the inside of the socket.

8.3 When a ceramic glaze is used, it need only be applied to the inside of the pipe.

9. BLISTERS

9.1 Pipe of nominal sizes from 76 to 450 mm (3 to 18 in.) shall have no blister with a dimension exceeding 76 mm (3 in.), and no blister or pimple shall project more than 3 mm ($1/8$ in.) above the surface of the pipe.

9.2 Pipe of nominal sizes over 450 mm (18 in.) shall have no blister exceeding 166 mm/m (2 in./ft) of internal diameter, and no blister or pimple shall project above the surface of the pipe more than 10 mm/m ($1/8$ in./ft) of internal diameter.

9.3 Pipe shall have no broken blisters.

10. FRACTURES AND CRACKS

10.1 There shall be no fractures or cracks visible to the unaided eye passing through the barrel or socket, except that a single crack at the spigot end of the pipe not exceeding 75 percent of the depth of the socket, or a single fracture