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Standard Test Method for Low-Pressure Air Test of Vitrified Clay Pipe Lines¹

This standard is issued under the fixed designation C828; 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 U.S. Department of Defense.

1. Scope

1.1 This test method defines procedures for testing vitrified clay pipe lines, using low-pressure air, to demonstrate the integrity of the installed line. Refer to Practice C12.

1.2 This test method shall be performed on lines after connection laterals, if any, have been plugged and braced adequately to withstand the test pressure, and after the trenches have been backfilled for a sufficient time to generate a significant portion of the ultimate trench load on the pipe line. The time between completion of the backfill operation and low-pressure air testing shall be determined by the approving authority.

1.3 This test method may also be used as a preliminary test, which enables the installer to demonstrate the condition of the line prior to backfill and further construction activities.

1.4 This test method is suitable for testing gravity-flow sewer pipe constructed of vitrified clay or combinations of clay and other pipe materials.

1.5 Terminology C896 is to be used for clarification of terminology in this test method.

1.6 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.7 *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.*

1.8 *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:*²

¹ This test method is under the jurisdiction of ASTM Committee C04 on Vitrified Clay Pipe and is the direct responsibility of Subcommittee C04.20 on Methods of Test and Specifications.

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² 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.

C12 Practice for Installing Vitrified Clay Pipe Lines
 C1091 Test Method for Hydrostatic Infiltration Testing of Vitrified Clay Pipe Lines
 C896 Terminology Relating to Clay Products

3. Summary of Test Method

3.1 The section of the line to be tested is plugged. Air, at low pressure, is introduced into the plugged line. The line passes the test if the rate of air loss, as measured by pressure drop, does not exceed a specified amount in a specified time. This may be determined by the use of **Table 1**, or calculated by use of the formulas in **Appendix X1**.

4. Hazards

4.1 The low-pressure air test may be dangerous to personnel if, through lack of understanding or carelessness, a line is over-pressurized or plugs are installed improperly. It is extremely important that the various plugs be installed so as to prevent the sudden expulsion of a poorly installed or partially inflated plug. As an example of the hazard, a force of 250 lbf (1110 N) is exerted on an 8-in. (205-mm) plug by an internal pressure of 5 psi (35 kPa). Observe the following safety precautions:

4.1.1 No one shall be allowed in the manholes during testing because of the hazards.

4.1.2 Install all plugs securely.

4.1.3 When lines are to be tested, it may be necessary that the plugs be braced as an added safety factor.

4.1.4 Do not over-pressurize the lines. Do not exceed 5 psi (35 kPa).

5. Preparation of the Line

5.1 Air may pass through the walls of dry pipe. A wetted interior pipe surface is desirable and will produce more consistent test results. Usually moisture absorbed from the backfill is sufficient to cope with this situation. Where practical, clean the line prior to testing to wet the pipe surface and eliminate debris.

6. Procedure

6.1 Determine the test time for the section of line to be tested using **Table 1** or **Table X1.1** or the formulas in **Appendix X1**.

6.2 Plug all openings in the test section.

6.3 Add air until the internal pressure of the line is raised to approximately 4.0 psi (28 kPa). After this pressure is reached, allow the pressure to stabilize. The pressure will normally drop as the air temperature stabilizes. This usually takes 2 to 5 min, depending on the pipe size. The pressure should be reduced to 3.5 psi (24 kPa) before starting the test.

TABLE 1 Minimum Test Time for Various Pipe Sizes

Nominal Pipe Size, in. (mm)	T (time), min/100 ft (min/100 m)
48 (1220)	8.5
4 (100)	0.3 (0.98)
6 (150)	0.7 (2.3)
8 (205)	1.2 (3.9)
10 (255)	1.5 (4.9)
12 (305)	1.8 (5.9)
15 (380)	2.1 (6.9)
18 (455)	2.4 (7.9)
21 (535)	3.0 (9.8)
24 (610)	3.6 (11.8)
27 (685)	4.2 (13.8)
30 (760)	4.8 (15.7)
33 (840)	5.4 (17.7)
36 (915)	6.0 (19.7)
39 (990)	6.6 (21.6)
42 (1065)	7.3 (23.9)

6.4 Start the test when the pressure is at 3.5 psi (24 kPa). If a 1 psi (6.9 kPa) drop does not occur within the test time, the line has passed. If the pressure drop is more than 1 psi (6.9 kPa) during the test time, the line is presumed to have failed the test. If the line fails the test, segmental testing may be utilized solely to determine the location of leaks, if any, but not for the acceptance test as required by this section. (see X2.3.3.2.)

NOTE 1—Ground water above the pipe will reduce air loss. If the section of line under test shows significant infiltration, the agency may require an infiltration test. Refer to Test Method C1091.

7. Test Time

7.1 Table 1 shows the required test time, T , in minutes/100 ft of pipe for each nominal pipe size. Test times are for a 1.0-psi (6.9-kPa) pressure drop from 3.5 to 2.5 psi (24 to 17 kPa). Table 1 has been established using the formulas contained in the appendix.

7.2 If the section of line to be tested includes more than one pipe size, calculate the test time for each size and add the test times to arrive at the total test time for the section.

7.3 It is not necessary to hold the test for the whole period when it is clearly evident that the rate of air loss is less than the allowable.

8. Precision and Bias

8.1 No information is presented about either precision or bias of this test since the results are not reported in a quantitative fashion.

9. Keywords

9.1 air test; clay pipe; pipe; pressure test; sewers; testing; test section; vitrified clay pipe

APPENDIXES

(Nonmandatory Information)

X1. FORMULAS AND ALLOWABLE AIR LOSS STANDARDS USED IN TEST METHOD C828

X1.1 Calculate the required test time at a given allowable air loss as follows:

$$T = K \times \frac{D^2 L}{Q}$$

X1.2 Calculate air loss with a timed pressure drop as follows:

$$Q = K \times \frac{D^2 L}{T}$$

X1.3 Symbols :

- D = nominal size, in. (mm),
- K = 0.371×10^{-3} for inch-pound units,
- K = 0.534×10^{-7} for S.I. units,
- L = length of line of one pipe size, ft (m),