Designation: C924M – 02 (Reapproved 2009)

Standard Practice for Testing Concrete Pipe Sewer Lines by Low-Pressure Air Test Method (Metric)[1]

This standard is issued under the fixed designation C924M; 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.

1. Scope

1.1 This practice covers procedures for testing concrete pipe sewer lines, when using the low-pressure air test method to demonstrate the integrity of the installed material and the construction procedures. This practice is used for testing 100 to 600-mm circular concrete pipe sewer lines utilizing gasketed joints.

1.2 This practice is also be used as a preliminary test to enable the installer to demonstrate the condition of the line prior to backfill.

1.3 This practice is the SI companion to Practice C924.

NOTE 1—The user of this practice is advised that air test criteria presented in this practice are similar to those in general use. The test and criteria have been used widely and successfully in testing smaller diameter pipe, but additional data are required to confirm the safety and applicability or develop criteria for pipe larger than 600 mm in diameter. Larger pipe will be accepted more conveniently by visual inspection and individual joint testing.

NOTE 2—The user of this practice is advised that no correlation has been found between air loss and water leakage.

1.4 *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 Section 6, Safety Precautions).

2. Referenced Documents

2.1 *ASTM Standards:*[2]

C822 Terminology Relating to Concrete Pipe and Related Products

C969 Practice for Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines

3. Terminology

3.1 *Definitions*—For definitions of terms relating to concrete pipe, see Terminology C822.

4. Summary of Practice

4.1 The sewer line to be tested is plugged. Air is introduced at low pressures into the plugged line. The amount of air loss is used to determine the acceptability of the sewer line.

5. Significance and Use

5.1 This is not a routine test. The values recorded are applicable only to the sewer being tested and at the time of testing.

6. Safety Precautions

6.1 The air test will be dangerous if a line is not prepared properly and proper procedures are not followed.

6.2 It is extremely important that plugs be installed and braced in such a way as to prevent blowouts. It is also imperative that the pressure in the pipe be relieved completely before any plug is loosened for removal.

NOTE 3—As an example, 27-kPa air pressure acting on one side of a 375-mm plug results in a total force of approximately 3100 N on the plug. Such a force is capable of causing the expulsion of an improperly installed plug.

6.3 Pressurizing equipment shall include a 42-kPa pressure relief device to reduce hazards and avoid over-pressurization with damage to the line.

6.4 No one shall be allowed in or near the manholes during pressurization, testing, or depressurization.

7. Capacity of Air Compressor

7.1 To provide satisfactory test results, the air compressor shall be capable of pressurizing the sewer test section in the required test time, or less, as determined by 9.1. The compressor capacity required to accomplish the pressurization is equal to the rate necessary to fill the sewer to the desired pressure plus the allowable air loss rate:

$$C = \frac{0.17D^2L}{T} + Q \quad (1)$$

[1] This practice is under the jurisdiction of ASTM Committee C13 on Concrete Pipe and is the direct responsibility of Subcommittee C13.09 on Methods of Test.

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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.

where:

C = compressor capacity, m^3/s,
T = required test time, or less, s,
D = pipe internal diameter, m,
L = length of test section, m, and
Q = allowable air loss, rate, m^3/s.

8. Preparation of the Sewer Line

8.1 Where practical, clean the sewer line prior to testing to wet the pipe surface and eliminate debris.

NOTE 4—The user of this practice is advised that a wetted interior pipe surface is desirable and will produce more consistent test results. Air may pass through the walls of dry pipe. This can be overcome by wetting the pipe. If the problem persists, segmental testing of the line will establish if there is a significant leak.

8.2 Plug all pipe outlets including laterals, which shall be given special attention. Review safety precautions in Section 6.

9. Procedure

9.1 Determine the test time for the sewer line to be tested by using Table 1. Table 1 has been established using the criteria specified in Table 2, and the formulas contained in Appendix X1. The test time is the time required for the pressure to drop from 24 kPa to 17 kPa.

NOTE 5—All test pressures are measured as gage pressure, which is defined as any pressure greater than atmospheric pressure. Since water produces a pressure of 3.0 kPa for every foot of depth, air test pressures must be increased to offset the depth of ground water over the sewer line. If the ground water level is 0.6 m or more above the top of the pipe at the upstream end or if the air pressure required for the test is greater than 34-kPa gage, the air test method shall not be used. In that event, the infiltration test, (see Practice C969), shall be used.

9.2 Add air until the internal air pressure of the sewer line is raised to approximately 27 kPa. Allow the air pressure to stabilize. The pressure will normally drop until the temperature of the air in the line stabilizes.

TABLE 1 Minimum Test Time for Various Pipe Sizes

Nominal Pipe Size, mm	T (time) min/100 m	Nominal Pipe Size, mm	T (time) min/100 m
100	0.9	375	6.8
150	2.0	450	7.7
200	3.5	525	9.7
250	4.7	600	11.0
300	6.0		

TABLE 2 Allowable Air Loss for Various Pipe Sizes

D, Nominal Pipe Size, mm	*Q*, m^3 /min	*D*, Nominal Pipe Size, mm	*Q*, m^3 /min
100	0.06	375	0.11
150	0.06	450	0.14
200	0.06	525	0.15
250	0.07	600	0.17
300	0.08		

9.3 When the pressure has stabilized and is at or above the starting test pressure of 24 kPa, commence the test by allowing the gage pressure to drop to 24 kPa at which point the time recording is initiated. Record the drop in pressure for the test period.

9.4 If the drop in pressure is 7 kPa or less during the test period, accept the line. If the drop in pressure is more than 7 kPa during the test period, inspect, evaluate, and retest the line to determine the cause of excessive air loss.

9.5 Use or failure of this air test shall not preclude acceptance by appropriate water infiltration or exfiltration testing, (see Practice C969), or other means.

10. Air Test Criteria

10.1 An appropriate allowable air loss, Q, in cubic metres per minute has been established for each nominal pipe size. Based on field experience the Q's that have been selected will enable detection of any significant leak. Table 2 lists the Q established for each pipe size.

10.2 When a main line with connected laterals is to be tested as a unit, the total volume of the main and laterals shall be considered, and the allowable air loss rate shall be that listed for the main.

11. Precision and Bias

11.1 No justifiable statement is presently capable of being made either on precision or bias of this procedure since the test result merely states whether there is conformance to the criteria for success specified. Due to the sealing effects of ground water and internal flow on sewerline, the test conditions and results are not reproducible.