



Designation: C 1103 – 94 (Reapproved 2000)

## Standard Practice for Joint Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines<sup>1</sup>

This standard is issued under the fixed designation C 1103; 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.

### 1. Scope

1.1 This practice covers procedures for testing the joints of installed precast concrete pipe sewer lines, when using either air or water under low pressure to demonstrate the integrity of the joint and the construction procedures. This practice is used for testing 27-in. and larger diameter precast concrete sewer lines utilizing rubber gasket sealed joints.

1.2 A complete metric companion to Practice C 1103 has been developed—C 1103M; therefore, no metric equivalents are presented in this practice.

NOTE 1—The owner shall specify the following: who will conduct, observe, and furnish labor, material, and measuring devices and pay for the tests; who is responsible for determining local ground conditions; and whether an air or water test is to be used.

NOTE 2—Test criteria presented in this practice are similar to those in general use. Pipe 24-in. diameter and smaller may be accepted by infiltration or exfiltration testing utilizing Practice C 969 or by low pressure air testing utilizing Practice C 924. Pipe greater than 24-in. diameter may be accepted by infiltration or exfiltration testing utilizing C 969.

NOTE 3—It should be understood that there is no correlation between air loss and water leakage.

1.3 *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.* Specific precautions are given in Section 6.

### 2. Referenced Documents

#### 2.1 ASTM Standards:

C 822 Terminology Relating to Concrete Pipe and Related Products<sup>2</sup>

C 924 Practice for Testing Concrete Pipe Sewer Lines by Low-Pressure Air Test Method<sup>2</sup>

C 969 Practice for Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines<sup>2</sup>

<sup>1</sup> 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. Current edition approved July 15, 1994. Published September 1994. Originally published as C 1103–89. Last previous edition C 1103–90.

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

### 3. Terminology

3.1 *Definitions*—For definitions of terms relating to concrete pipe, see Terminology C 822.

### 4. Summary of Practice

4.1 The joint in the sewer line to be tested is covered on the inside of the pipe by a ring with two end element sealing tubes. Air or water, at low pressure, is introduced through a connection on the ring into the annular space between the ring and joint. The amount of air, or water, loss is used to determine the acceptability of the installed 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 use of compressed air may be dangerous if a sewer line is not prepared properly and proper procedures are not followed.

6.2 It is imperative that all pressures be relieved completely before the test apparatus is loosened for removal.

6.3 Pressurizing lines for the two end element sealing tubes shall be separate from the lines for pressurizing the void volume created by the joint test apparatus. The pressures required to seal the end element tubes shall be as specified by the apparatus manufacturer, and are greater than the pressure required to test the joint. The line for pressurizing the void volume should include a 6-psi pressure relief device to reduce hazards and avoid overpressurization, which could cause possible damage to the sewer line.

### 7. Preparation of the Sewer Joint

7.1 Check the size of access openings to ensure that the test apparatus can be placed into the sewer line.

7.2 A wetted interior surface is desirable and will produce more consistent results. Air may pass through the walls of dry pipe. This may be overcome by wetting the pipe. Clean the joint and interior joint surfaces to eliminate debris prior to wetting and testing.

7.3 Review safety precautions in Section 6.

## 8. Procedures

8.1 The following procedures apply to testing with either air or water.

8.1.1 Determine groundwater conditions surrounding the sewer line to be tested, and select the type of test to be conducted.

8.1.2 If the groundwater pressure is equal to or greater than the test pressure, and the sewer line or joint is not leaking, the sewer line or joint is acceptable in accordance with Practice C 969 and no additional testing is required. If one or more joints are leaking, but the total amount of leakage in the sewer line being tested is equal to, or less than, the allowable leakage rate established in accordance with Practice C 969, the line is acceptable and no additional testing is required provided visible leaks are repaired. Moisture or beads of water appearing on the surface of the joint will not be considered as visible leakage.

8.1.3 Review proper operation, safety, and maintenance procedures as provided by the manufacturer of the joint test apparatus.

8.1.4 Move the joint test apparatus into the sewer line to the joint to be tested and position it over the joint. Make sure the end element sealing tubes straddle both sides of the joint and the hoses are attached. For the water test, the bleed-off petcock must be located at top dead center.

8.1.5 Inflate end element sealing tubes with air in accordance with equipment and manufacturer's instructions.

**NOTE 4**—All test pressures are measured as gage pressure, which is defined as any pressure greater than atmospheric pressure. Since water produces a pressure of 0.43 psi for every foot of depth, test pressures must be increased to offset the depth of groundwater over the sewer line. If the groundwater level is 2 ft or more above the top of the pipe at the upstream end or if the pressure required for the test is greater than 6-psi gage, the joint test method should not be used and the infiltration test may be used (see Practice C 969).

**NOTE 5**—An air or water reservoir should be included in the joint test system. By maintaining a constant supply of air or water in a reservoir, continuous pumping of air or water is not required, and any variances in test equipment and joint space will be negated. The reservoir should have a minimum volume of 2.5 ft<sup>3</sup>.

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8.2 *Joint Air Test:*

8.2.1 Review procedures in 8.1.

8.2.2 Pressurize the void volume with air to 3.5 psi greater than the pressure exerted by groundwater above the pipe. Allow the air pressure and temperature to stabilize before shutting off the air supply, and start of test timing.

8.2.3 If pressure holds, or drops less than 1 psi in 5 s, the joint is acceptable. Practically, the test is a go/no go test.

8.2.4 If the joint being tested fails, it may be retested, or repaired if necessary, and retested, in accordance with this practice.

8.2.5 After the joint test is completed, exhaust void volume, then exhaust end element tubes prior to removal of apparatus.

8.2.6 Use or failure of the joint air test shall not preclude acceptance by appropriate water infiltration and exfiltration testing (see Practice C 969), or other means.

8.3 *Joint Water Test:*

8.3.1 Review procedures in 8.1.

8.3.2 Introduce water into void volume until water flows evenly from open petcock. Close the petcock and pressurize with water to 3.5 psi above the pressure exerted by groundwater above the pipe. Shut off the water supply.

8.3.3 If the pressure holds, or drops less than 1 psi in 5 s, the joint is acceptable. Practically, the test is a go/no go test.

8.3.4 If the joint being tested fails, it may be retested, or repaired if necessary, and retested, in accordance with this practice.

8.3.5 After the joint test is completed, exhaust end element tubes which will automatically release the water from the void volume, prior to removal of apparatus.

8.3.6 Use or failure of this joint water test shall not preclude acceptance by appropriate water infiltration or exfiltration testing (see Practice C 969), or other means.

## 9. Precision and Bias

9.1 No justifiable statement can be made either on precision or bias of these procedures since the test results merely state whether this is in conformance to the criteria for success specified. Due to the sealing effects of groundwater and internal flow on concrete sewer lines, the test conditions and results are not reproducible.