

PipeNotes
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Summary of Field Tests Concrete Pipe



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Below is a summary of common field test methods for concrete pipe. The intent of this summary is to provide guidance for specifications that require products to adhere to standards for allowable leakage. Depending on the application and performance requirements, one or multiple tests may be appropriate for a given project. Specifying any field performance testing will typically result in much higher quality installations.

In addition to field test requirements it is also important to require product design calculations, proof of design testing, and inspection records from the manufacturer. This will ensure quality design in addition to quality installation. Recommended calculations, testing and records for field performance products are outlined in the ACPA's Q-Cast program for sanitary pipe and manholes.

Test: ASTM C 924 Standard Practice for Testing Concrete Pipe Sewer Lines by Low Pressure Air Test Method

Summary: Pipe is plugged and pressurized with air to 3.5 psig. Leakage is determined by measuring the time required for pressure to drop to 2.5 psig. Due to the inherent danger of this testing method, it has been removed from ASTM.

ASTM C 969 Standard Practices for Infiltration and Exfiltration Testing of Installed Precast Concrete Pipe Sewer Lines

Summary: ASTM C969 is one of the most specified standards for determining leakage. This test will usually produce the most accurate and useful data about the line. Typically, testing with the C969 is more difficult and time consuming than some of the other tests listed.

Actual leakage of water going into or leaking out of the pipe is measured. Limits are typically set in units of gallons per inch of dia per mile per day (200 gal/(in. of internal diameter) (mile of sewer) (24 h)). Infiltration testing is done when ground water is present with at least 2' of head above the line being tested. Exfiltration testing is done when ground water is not present. For exfiltration testing, the pipe is filled with water; a stand pipe (or manhole) is used to measure leakage and maintain head.

Required test equipment:

Bulkheads/plugs, plumbs, hoses, weir, water, stop watch

Advantages:

- This test actually measures leakage into or out of the pipe
- Data on actual leakage rate is available

- It is often possible to identify individual leaks (Water will be visible coming into the pipe)

Disadvantages:

- Setup can be difficult, especially for exfiltration testing due to the large volume of water required
- Test can only be done on a completed line
- Time required for concrete to saturate to perform an accurate exfiltration test.
- Ground water elevation may not be available to calculate leakage rate for infiltration testing.

ASTM C 1103 Standard Practice for Joint Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines



Summary: The individual joint tester is used at each joint to verify the integrity of every joint as the product is being installed. The apparatus is centered over each joint. The sealing bladders are inflated, and the joint is pressurized to 3.5 psig. Once the test is begun the pressure is required to remain above 2.5 psi for at least 5 seconds.

The intent of this test is to identify installation problems as they occur so they can be corrected. The equipment works exceptionally well for the intended use. The equipment does not work especially well for hydrostatic testing of each joint as fluid tends to leak past the sealing bladders.

Even though this test does not actually verify the leakage rate on the line it is one of the most valuable field performance tests as it allows for problems to be corrected as they occur, rather than identifying them at the close of the project.

Required test equipment:

Individual joint tester, Stopwatch, Air compressor

Advantages:

- Problems are identified while the line is being laid
- Problems can be fixed easily
- Test is relatively quick and easy

Disadvantages:

- Test does not determine actual leakage on line
- This test does not check the barrel of the pipe

ASTM C 1214 Standard Test Method for Concrete Pipe Sewer lines by Negative Air Pressure (Vacuum) Test Method

Summary: Pipe is plugged and air is removed to create -3.5 psig. Leakage is determined by measuring the time required for pressure to increase to -2.5 psig. Tables with allowable test times are given in ASTM C1214.

In general the C1214 is an easy test for small diameter pipe. It will give the owner assurance that the line has been installed correctly. This test does not require a lot of startup time or additional work. Unlike its counterpart C924, this test is safe for many diameters of concrete pipe.

Required test equipment:

Bulkheads/ plugs, vacuum pump, regulator, stop watch, gauges.

Advantages:

- Test is relatively easy to setup equipment is typically available
- Air is a much easier test medium than water
- Lines do not need to be filled with water to complete the test
- Vacuum tests are much safer than air tests and yield similar results

Disadvantages:

- This test is not as stringent as some of the other testing standards
- Air leakage tests do not give any data as to what potential water infiltration will be
- Will not identify a specific leak
- Test can only be done on a completed / partially completed line