

SECTION 3200 ACCEPTANCE TESTS FOR SANITARY SEWERS

3201 SCOPE. This section governs the furnishing of all labor, equipment, tools and materials, and the performance of any or all acceptance tests as required by the Plans, Special Provisions, and these specifications.

3202 ACCEPTANCE TESTS FOR GRAVITY SEWERS.

A. Visual Inspection

1. Contractor shall clean pipe of excess mortar, joint sealant and other dirt and debris prior to inspection.
2. Correct defects as required prior to conducting leakage tests.

B. Leakage Tests. A leakage test shall be performed on the full length of all sewer lines prior to acceptance.

1. Exfiltration Leakage Test.

- a. Contractor may perform leakage testing by exfiltration on sewer pipe larger than eighteen (18) inches I.D.
- b. Furnish all labor, equipment, tools and materials required including bulkheads, water and all miscellaneous items required to perform the tests.
- c. Test all sewer pipe over eighteen (18) inches I.D. after either the completed backfill or partial backfill sufficient to stabilize the position of the pipe in both alignment and grade is accomplished. Contractor may select section of the project for testing at any time by notifying the Engineer 24 hours in advance.
- d. Perform at depths of water as measured above center line of pipe of not less than two (2) feet nor more than ten (10) feet (consideration shall be given for water table above said centerline).
- e. Maintain test as necessary to locate all leaks but not less than two hours.
- f. Repeat as necessary after repair of leaks and defects until leakage, as measured, does not exceed 0.15 gallons per inch of internal diameter per hour per 1000 feet of pipe length (200 gal/inch of I.D./day/mile).
- g. Protect manholes and other structures by means of bulkheads to prevent bursting pressures from being applied inside the structure.
- h. De-water pipe upon completion of testing.

2. Air Leakage Testing.

- a. Contractor may perform air tests for all pipe sizes.
- b. Furnish all facilities required including necessary piping connections, test pumping equipment, pressure gauges, bulkheads, regulator to avoid over pressurization, and all miscellaneous items required.

(1) The pipe plug for introducing air to the sewer line shall be equipped with two taps. One tap will be used to introduce air into the line being tested, through suitable valves and fittings, so that the input air may be regulated. The second tap will be fitted with valve and fittings to accept a pressure test gauge indicating internal pressure in the sewer pipe. An additional valve and fitting will be incorporated on the tap used to check internal pressure so that a second test gauge may be attached to the internal pressure tap. The pressure test gauge will also be used to indicate loss of air pressure due to leaks in the sewer line.

(2) The pressure test gauge shall meet the following minimum specifications:

Size (diameter)	4-1/2 inches
Pressure Range	0-15 P.S.I.
Figure Intervals	1 P.S.I. Increments
Minor Subdivisions	0.05 P.S.I.
Pressure Tube	Bourdon Tube or Diaphragm
Accuracy	+/- 0.25% of maximum scale reading
Dial	White coated aluminum with black lettering, 270 deg. Arc and mirror edge.
Pipe Connection	Low Male 1.2" N.P.T.

Calibration data will be supplied with all pressure test gauges. Certification of pressure test gauge will be required from the gauge manufacturer. This certification and calibration data will be available to the Engineer whenever air tests are performed.

- c. Test each reach of sewer pipe between manholes after completion of the installation of pipe and appurtenances and the backfill of sewer trench.
- d. Plug ends of line and cap or plug all connections to withstand internal pressure. One of the plugs provided must have two taps for connecting equipment. After connecting air control equipment to the air hose, monitor air pressure so that internal pressure does not exceed 5.0 psig. After reaching

4.0 psig throttle the air supply to maintain between 4.0 and 3.5 psig for at least two (2) minutes in order to allow equilibrium between air temperature and pipe walls. During this time, check all plugs to detect any leakage. If plugs are found to leak, bleed off air, tighten plugs, and again begin supplying air. After temperature has stabilized, the pressured is allowed to decrease to 3.5 psig. At 3.5 psig, begin timing to determine the time required for pressure to drop from 3.5 psig to 2.5 psig. If the time, in seconds, for the air pressure to decrease from 3.5 psig to 2.5 psig is greater than that shown in the table below, the pipe shall be presumed free of defects.

<u>Pipe size</u>	<u>Required Time per 100 LF</u>	<u>Minimum Required Time</u>
8"	70 sec	227 sec
10"	110 sec	283 sec
12"	158 sec	340 sec
15"	248 sec	425 sec
18"	356 sec	510 sec
21"	485 sec	595 sec
24"	634 sec	680 sec
27"	765 sec	765 sec
30"	851 sec	851 sec
33"	935 sec	935 sec

Sanitary sewer mains with service stubouts shall be tested with a pressure at 5 psi for a duration of 15 minutes with no drop in test pressure.

If air test fails to meet above requirements, repeat test as necessary after all leaks and defects have been repaired. Prior to acceptance all constructed sewer lines shall satisfactorily pass the low pressure air test.

- e. In areas where ground water is know to exist, install a one-half inch diameter capped pipe nipple, approximately 10" long, through manhole wall on top of one of the sewer lines entering the manhole. This shall be done at the time the sewer line is installed. Immediately prior to the performance of the line acceptance test, ground water level shall be determined by removing pipe cap, blowing air through pipe nipple into the ground so as to clear it, and then connecting a clear plastic tube to pipe nipple. The hose shall be held vertically and a measurement of height in feet of water shall be taken after the water stops rising in this plastic tube. The height in feet shall be divided by 2.3 to establish the pounds of pressure that will be added to all readings.

- C. Deflection Tests. A deflection test shall be required on all installations involving flexible or semi-rigid pipe after said pipe has been laid and backfilled. The maximum allowable deflection shall not exceed 5.0% of the pipe's internal diameter. The deflection test shall consist of guiding a devise of the appropriate size for the pipe involved to accurately measure

any deflection in the pipe. The device to be used shall be approved by the City Engineer prior to its use. Attention is directed to the fact that the pipe's nominal diameter is greater than the actual internal diameter of the pipe. Lamping or other visual testing will not be approved as a substitution for deflection testing.

Upon completion of the testing, all piping showing a deflection greater than 5.0% shall be excavated, replaced, backfilled, and retested to the satisfaction of the Engineer.

3203 ACCEPTANCE TESTS FOR PRESSURE SEWAGE FORCE MAINS.

- A. Perform hydrostatic pressure and leakage tests. Conform to AWWA C 600 procedures as modified herein. Test shall apply to all pressure sewers. Perform after backfilling.
- B. Test separately in segments between sectionalizing valves, between a sectionalizing valve and a test plug, or between test plugs. Select test segments such that adjustable seated valves are isolated for individual checking. Contractor shall furnish and install test plugs at no additional cost to the Owner, including all anchors, braces, and other devices to withstand hydrostatic pressure on plugs. Contractor shall be responsible for any damage to public or private property caused by failure of plugs. Limit fill rate of line to available venting capacity.

Conduct test at a pressure of 150 psi measured at the highest point of the main. Duration of the test shall not be less than two (2) hours with no loss in pressure.

- 1. All joints shall be watertight and free from leaks.

3204 ACCEPTANCE TESTS FOR SANITARY SEWER MANHOLES.

Test all manholes after completion but prior to backfilling of structure. Interior of manhole shall be dry with no standing water. All pipes entering and exiting the manhole shall be adequately plugged for the purposes of the vacuum testing. A vacuum of 10" Hg shall be drawn and the time recorded for the vacuum to drop to 9" Hg. The time to drop shall meet or exceed the values as follows:

- A. 48" Manhole Diameter
Up to 10 feet depth – 60 seconds, 10-15 feet depth – 75 seconds, 15-25 feet depth – 90 seconds
- B. 60" Manhole Diameter
Up to 10 feet depth – 75 seconds, 10-15 feet depth – 90 seconds, 15-25 feet depth – 105 seconds

If the test fails or the manhole joint mastic or gasket is displaced, the manhole structure shall be repaired and re-tested.