

SECTION 33 31 00.01
FACILITY SANITARY SEWERS (Sanitary Sewer Testing)

PART 1 GENERAL**1.1 DESCRIPTION**

- A. The work of this section includes, but is not limited to:
1. Testing Gravity Sewer Pipelines:
 - a. Low-pressure air test
 - b. Infiltration test
 - c. Deflection test - PVC pipe only
 2. Testing Pressure Pipelines:
 - a. Hydrostatic leakage test
 3. Testing Manholes:
 - a. Vacuum test
- B. Related Work Specified Elsewhere:
1. Facility Sanitary Sewers (Sanitary Sewer Pipe): Section 33 31 00.00
 2. Facility Sanitary Sewers (Sanitary Sewer Testing): Section 33 31 00.01
- C. Definitions: NONE
- D. Applicable Standard Details: NONE

1.2 QUALITY ASSURANCE

1. No test will be accepted until the results are within the specified limits.
2. The CONTRACTOR shall, at his own expense, determine and correct the causes of test failure and retest until successful test results are achieved.

1.3 SUBMITTALS

- A. Testing procedures
- B. List of test equipment
- C. Testing sequence schedule
- D. Provisions for disposal of flushing and test water
- E. Certificate of test gauge calibration

1.4 JOB CONDITIONS

- A. Do not allow personnel in manholes during pressure and vacuum testing.
- B. Provide relief valves set at 10 psig to avoid accidentally over-pressurizing gravity sewer line during low pressure air testing.

PART 2 PRODUCTS**2.1 AIR TEST EQUIPMENT**

- A. Air compressor
- B. Air supply line
- C. Shut-off valve
- D. Pressure regulator
- E. Pressure relief valve
- F. Stop watch
- G. Plugs

- H. Pressure gauge, calibrated to 0.1 lbs./sq. in.

2.2 INFILTRATION TEST EQUIPMENT

- A. Weirs

2.3 DEFLECTION TEST EQUIPMENT

- A. Go, No-Go mandrels, as approved by ENGINEER
- B. Pull/retrieval ropes
- C. Certificate of mandrel gauge calibration

2.4 VACUUM TEST EQUIPMENT

- A. Vacuum pump
- B. Pipe plugs
- C. Vacuum hose
- D. Test connections
- E. Vacuum gauge
- F. Vacuum relief valve

2.5 NON-SHRINK GROUT

- A. Fastsetting, cement based mortar such as Waterplug, manufactured by Thoro Division of ChemRex, Shakopee, MN, or approved equal.

PART 3 EXECUTION

3.1 PREPARATION

- A. Backfill trenches in accordance with Section 31 20 00.02.
- B. Provide pressure pipeline with concrete reaction support blocking.
- C. Clean and flush pipeline with water to remove debris. Collect and dispose of flushing water and debris in accordance with Federal, State and local regulations.
- D. Plug outlets, wye-branches and laterals. Brace plugs to offset thrust.

3.2 TESTING GRAVITY SEWER PIPELINES

- A. Low Pressure Air Test:
 1. Test each newly installed section of gravity sewer line, including service connections.
 2. Slowly introduce air pressure to approximately 5.0 psig.
 3. Once pressure has stabilized, start test.
 4. Test:
 - a. Determine the test duration for a sewer section with a single pipe size from the table below:

Low Pressure Air Test - Test Times

Nominal <u>Pipe Size(in.)</u>	Time <u>Min./100 Ft.</u>	Nominal <u>Pipe Size(in.)</u>	Time <u>Min./100 Ft.</u>
4	.3	21	3.0
6	.7	24	3.6
8	1.2	27	4.2
10	1.5	30	4.8

12	1.8	33	5.4
15	2.1	36	6.0

- b. Record the drop in pressure during the test period. If the air pressure has dropped more than 1.0 psig during the test period, the line is presumed to have failed. If the 1.0 psig air pressure drop has not occurred during the test period, the test shall be discontinued and the line will be accepted.
- c. If the line fails, determine the source of the air leakage, make corrections and retest the entire section between manholes.
- d. All laterals installed into manholes shall be air tested or included in vacuum test. Regardless of pipe length, the minimum test times for 4" dia., 6" dia., and 8" dia. pipes are 2 ½, 4 and 5 minutes, respectively.
- e. All tests subject to 5 psig. for 5 minutes, minimum.

B. Infiltration Test:

1. Use only when leakage is visible.
2. Maximum Allowable Infiltration: 50-gallons per inch of pipe diameter per mile per day for the section under test.

C. Deflection Testing of Plastic Sewer Pipe (8" dia. or larger):

1. Perform vertical ring deflection testing on all portions of PVC sewer piping, in the presence of the ENGINEER, after backfilling.
2. The maximum allowable deflection for installed plastic sewer pipe shall be limited to 5% of the original vertical internal diameter.
3. Perform deflection testing with a properly sized 'Go, No-Go' mandrel approved by ENGINEER.
4. Pipe exceeding the allowable deflection shall be located, excavated, replaced, and retested at the sole expense of the CONTRACTOR, including surface restoration.
5. During the 12th month of the warranty period, the OWNER reserves the right to perform a second deflection test at the OWNER's expense.

3.3 TESTING PRESSURE PIPELINES

- A. Hydrostatic Leakage Test: Section 33 11 16.03

3.4 TESTING MANHOLES

- A. Test all new manholes for exfiltration utilizing the vacuum test method and equipment developed by NPC Systems, Inc., Milford, NH, or approved equal.
- B. The CONTRACTOR shall provide the necessary labor, equipment or materials to conduct the vacuum test.
- C. The testing shall be done after complete assembly of the manhole, including frame and cover.
- D. The CONTRACTOR shall plug the pipe openings, taking care to securely brace the plugs and the pipe.
- E. With the vacuum tester set in place:
 1. Inflate the compression band to effect a seal between the vacuum base and the structure at top of manhole frame.
 2. Connect the vacuum pump to the outlet port with the valve open.
 3. Draw a vacuum to 10" of Hg. and close the valve.
- F. All tests subject to 10" of Hg for 60 seconds.
- G. A vacuum of 9 in. of Hg. or more shall be maintained for at least the period of time indicated in the following table in order to successfully complete the test:

<u>Depth of Manhole (ft.)</u>	<u>TIME (sec.)</u>		
	<u>Diameter of Manhole (in.)</u>		
	<u>48"</u>	<u>60"</u>	<u>72"</u>
up to 10	30	30	30
12	30	30	34
14	30	32	40
16	30	37	45
18	32	41	51
20	35	46	57
22	39	51	62
24	42	55	68
26	46	60	74
28	49	64	80
30	53	69	85

- H. If the manhole fails the initial test, the CONTRACTOR shall locate the leak and make proper repairs. Leaks and lift holes shall be filled with approved non-shrink grout.

END OF SECTION