



**WATER ENVIRONMENT SERVICES
A DEPARTMENT OF CLACKAMAS COUNTY**

LOW PRESSURE AIR / MANDREL TEST

PROJECT: _____

DATE: _____

CONTRACTOR: _____

PROJ #: _____

TESTING COMPANY: _____

INSPECTOR: _____

Tested section:

Air Test:

Passed **Failed** **Mandrel Test:** **Passed** **Failed**

Diameter (in)	Length (ft)	$K=0.011D^2$	$C=.0003382DL$
TOTALS			

if $C < 1$ then $K =$ Time required
if $C > 1$ then $K/C =$ Time required

1. Average Ground Water Height Above Pipe = _____ feet
2. psi / ft Of Ground Water x 0.433 psi / ft
3. Average Ground Water Pressure = _____ psi
4. Test Pressure + 4.00 psi
5. Beginning Test Pressure = _____ psi
6. Timed Pressure Drop - _____ psi
7. Ending Test Pressure = _____ psi
8. TIME REQUIRED BY SPEC = _____ Sec

Tested section:

Air Test:

Passed **Failed** **Mandrel Test:** **Passed** **Failed**

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- TIME REQUIRED BY SPEC = _____ Sec

NOTE: All air tests will be performed in accordance with CCSD#1 Standard Sewer Specifications, Section 2-C-3-c. All mandrel tests will be performed in accordance with CCSD#1 Standard Sewer Specifications, Section 2-B-1-b.

Inspector's Signature: _____

Procedures on back

Procedure for Air Testing of Sewer Pipe & Appurtenances

1. The Contractor may desire to make an air test prior to backfilling for his own purposes. However, the acceptance air test shall be made after backfilling and compaction has been completed to finish grade.
2. The Contractor shall furnish all facilities and personnel for conducting the test under the observation of the Engineer. The equipment and personnel shall be subject to the approval of the Engineer. The pressure gauge used shall have minimum divisions of 0.10 psi and have an accuracy of 0.0625 psi (one ounce per square inch). All air used shall pass through a single control panel.
3. The first section of pipe not less than 300 feet in length installed by each crew shall be tested in order to qualify the crew and/or material. Successful installation of this section shall be a prerequisite to further pipe installation by said crew.
4. All tees, and/or ends of side sewer stubs shall be plugged and banded, or acceptable alternate and securely fastened to withstand the internal test pressures. The Contractor shall clean the line before proceeding with the air test. All debris shall be removed at the first manhole where its presence is noted. In the event cemented or wedged debris or a damaged pipe shall prevent cleaning, the contractor shall remove the obstruction.
5. Safety Provisions. The plugs must be firmly secured and care should be exercised in their removal. The total force on a 12" plug at 4.0 psi is over 450 pounds. Care must be exercised in not loading the sewer line with the full pressure of the compressor. Keep all personnel out of manholes until the pressure has been released. If water leaks into the line after the plugs are installed and floods the air inlet and the needle on the air pressure gage indicates zero, then possibly the water column has balanced the air pressure in this instance and care is necessary in releasing the pressure. If testing below ground water level, inject the air at the upper plug and/or turn the inlet up as with a water test apparatus.
6. The pipe or sections of pipe to be tested may be wetted before the air test is started. Immediately following the pipe cleaning and wetting, the pipe shall be tested with low pressure air. Air shall be slowly supplied to the plugged pipe installation until the internal air pressure reaches 4.0 pounds per square inch greater than the average back pressure of any ground water that may submerge the pipe.
7. At least two minutes shall be allowed for temperature stabilization before proceeding further. After the two minute temperature stabilization period, disconnect the air supply.
8. The pipeline shall be considered acceptable, when tested for the calculated period of time at an average pressure of 4.0 pounds per square inch greater than the average back pressure of any ground water that may submerge the pipe; if: (1) the total rate of air loss from any section tested in its entirety between manhole and cleanout structures does not exceed 2.0 cubic feet per minute, or (2) the section under test does not lose air at a rate greater than 0.0030 cubic feet per minute per square foot of internal pipe surface.
9. If the Pipe installation fails to meet these requirements, the Contractor shall determine at his own expense the source or sources of leakage, and he shall repair or replace all defective materials and correct all faulty workmanship. The type of repairs proposed by the Contractor must be approved by the Engineer before the repair work is begun. The completed pipe installation shall meet the requirements of the air test before being considered acceptable.

Mandrel Testing Procedures

1. In addition to hydrostatic or air testing, sanitary sewers constructed of PVC sewer pipe shall be deflection tested not less than 30 days after the trench backfill and compaction has been completed. The test shall be conducted by pulling an approved solid pointed mandrel through the completed pipeline. The diameter of the mandrel shall be 95 percent of the inside diameter of the pipe. The mandrel shall be a rigid, nonadjustable, odd-numbered-leg (9 legs minimum) mandrel having an effective length of not less than its nominal diameter.
2. Testing shall be conducted on a manhole to manhole basis and shall be done after the line has been completely cleaned and flushed. Any portion of the sewer which fails to pass the test shall be excavated, repaired or realigned, and retested with both air and deflection tests.

Procedure for manhole vacuum test

1. All lift holes shall be plugged with an approved non-shrink grout.
2. All pipes entering the manhole shall be plugged, taking care to securely brace the pipes and plugs from being drawn into the manhole. The manhole shall be set to finish grade and all paving (if applicable) completed.
3. The test head shall be placed at the inside of the top of the frame and the seal inflated in accordance with the manufacturers' recommendations.
4. A vacuum of 10 inches of mercury shall be drawn, the valve on the vacuum line of the test head closed, and the vacuum pump shut off. With the valves closed, the time shall be measured for the vacuum to drop to 9 inches.
5. The manhole shall pass if the time for the vacuum reading to drop from 10 inches of mercury to 9 inches meets or exceeds the values indicated below.

Depth of Manhole (feet)	Allowable Time (seconds)		
	48 - inch	60 - inch	72 - inch
8	20	26	33
10	25	33	41
12	30	39	49
14	35	46	57
16	40	52	67
18	45	59	73
20	50	65	81
22	55	72	89
24	59	78	97
26	64	85	105
28	69	91	113
30	74	98	121

6. If the manhole fails the initial test, necessary repairs shall be made with a non-shrink grout after the vacuum has been released. Retesting shall proceed until a satisfactory test is obtained.

