

D. Testing and Inspection of Water and Sewer Pipework

1. General

During construction and at the completion of the work, the City of Milton shall be present during **all** testing as required in these specifications.

In general, tests shall conform to usually accepted testing practices for the specific type and class of test. All data, observations and results will be carefully recorded for the City of Milton. Project acceptance may be held contingent on receipt of satisfactory test reports. A minimum of 24 hours notice shall be given prior to performance of any tests specified herein. The test shall be scheduled so that the test is completed prior to 4 p.m. during normal working days.

All water systems, both Public and Private, that connect to the City of Milton Water System will be pressure tested to City of Milton specifications, with a City of Milton representative present.

2. Hydrostatic Tests of Pressure Pipework

a. Pressure During Test

After the pipe has been laid and backfilled as specified, each valved section of newly laid pipe shall, unless otherwise specified, be subjected to a hydrostatic pressure of 150 psi for water mains and 100 psi for sewer force mains. The Contractor shall notify the city of the time and date of the test and shall record the testing by the use of a pressure recording chart and after all testing is complete, the recordings shall be turned over to the City Water & Sewer Director for the city's files.

b. Duration of Pressure Test

The duration of each pressure test shall be at least two hours after the pressure has stabilized.

c. Procedure

Each section of pipe shall be slowly filled with water and the specified test pressure, measured at the lowest point of elevation, shall be applied by means of a pump connected to the pipe in a

satisfactory manner. The pump, pipe connection, gauges, meter and all necessary apparatus shall be furnished by the Contractor. The test shall be applied to each valved section in order to check the leakage through all valves.

d. Expelling Air Before Test

Before applying the specified test pressure, all air shall be expelled from the pipe. To accomplish this, taps shall be made, if necessary, at points of highest elevation, and afterwards tightly plugged.

e. Definition of Leakage

Leakage is defined as the quantity of water to be supplied into the newly laid pipe, or any valve section of it, necessary to maintain the specified leakage test pressure after the pipe has been filled with water and the air expelled.

f. Permissible Leakage

Suitable means shall be provided by the Contractor for determining the quantity of water lost by leakage under normal operating pressure. No pipe installation will be accepted until or unless this leakage (evaluated at specified pressure) is less than the figures stated below:

Pipe Size gals/1000'/24 hrs. gals/1000'/1hr.

2"	3.8 gal.	0.16 gal.
3"	5.7 gal.	0.24 gal.
4"	7.6 gal.	0.32 gal.
6"	11.4 gal.	0.47 gal.
8"	15.2 gal.	0.63 gal.
10"	18.9 gal.	0.79 gal.
12"	22.7 gal.	0.95 gal.

g. Variation from Permissible Leakage

Should any test of combined sections of pipe laid disclose leakage greater than the specified limit, the Contractor shall, at his own expense, locate and repair the defective joints until the leak is within the specified allowance.

h. Water for Testing

Water for testing shall be provided by the Contractor at his

expense.

i. Time for Making Test

Pipe may be subjected to hydrostatic pressure, inspected, and tested for leakage at any convenient time, during normal working hours and after partial completion of backfill. The Contractor may test the system with joints exposed or with backfilling complete at his option. The City of Milton's Water and Sewer Director shall be notified at least 24 hours before beginning testing. The duration of the test shall be two hours minimum and shall be documented using a chart-recording device.

3. Tests for Gravity Pipework

a. Inspection

It is imperative that all sewers and manholes be built practically watertight and the Contractor must adhere rigidly to the specifications for material and workmanship. After completion, the sewers, or sections thereof, will be tested and gauged and if infiltration is above allowable limits specified, the sewer will be rejected. All gravity sewer pipes are to be air tested at 4 psi. from manhole to manhole for six (6) minutes total (2 minutes stabilization and 4 minutes pressure test). One PSI shall be added for each foot of water above the invert of the pipe.

On completion of each section of sewer, the section of sewer is to be cleaned, tested and inspected. All repairs shown necessary by the tests are to be made, broken or cracked pipe replaced, all deposits removed and the sewers left true to line and grade as herein specified, or shown on the plans, entirely clean and ready for use. Each section of the sewer between manholes is to show from either end on examination, a full circle of light. Each manhole or other appurtenance to the system shall be of the specified size and form, be watertight, neatly and substantially constructed, with the top set permanently to exact position and grade.

All sewer systems, both Public and Private, connecting to City of Milton Sewer System will be pressure tested with a City of Milton representative present.

b. Limits of Infiltration and Methods of Testing

The allowable limit of groundwater infiltration for the entire system shall be in complete accordance with ASTM C425-71T and shall not exceed a limit of infiltration equal to 0.2 gal/inch diameter/hour/100 linear feet of pipe.

The test will be made by measuring the infiltration flow of water over a measuring weir set up in the invert of the sewer, or by alternate method approved by the City, a known distance from a temporary bulkhead or other limiting point of infiltration. After the sewer or sewers have been pumped out, and normal infiltration conditions prevail, tests shall be started.

Tests shall be run continuously for a period of not less than three (3) hours, with weir readings taken at 20 minute intervals. The test shall be made by the Contractor during normal working hours. The City shall be notified 24 hours in advance. Where infiltration occurs in excess of the specified amount, the defective pipe or joints shall be located and repaired at the expense of the Contractor. If the defective portions cannot be so located, the Contractor, at his own expense, shall remove and reconstruct as much of the original work as necessary to obtain a sewer within the allowable infiltration limits upon such retesting as necessary.

4. Chlorination of Water Distribution Facilities

a. Disinfection

The water distribution system has to be disinfected in accordance with AWWA Specification C-601 and FDEP requirements which provides for contact with a 50 ppm solution of chlorine remaining for 24 hours, with chlorine residual of at least 10 ppm. After properly disinfecting the system, the Contractor shall hydrostatically test to the satisfaction of the City Inspector. The contractor shall be responsible for the cost of the water and the proper disposal of all water used in testing. Chlorinated water shall not reach an active body of water.

b. Chlorinating Valves and Flushing Hydrants

In the process of chlorinating water pipe, all valves or other appurtenances shall be operated while the pipe line is filled with the chlorinating agent.

c. Final Flushing and Test

Following chlorination, all treated water shall be thoroughly flushed from the newly laid pipe at its extremities until the replacement water throughout its length shall, upon test, both chemically and bacteriologically, be approved by the Florida Department of Environmental Protection. The Contractor shall be responsible for arranging for paying for all costs of the Test Samples. Bacteria tests samples shall be taken by the City. Contractors shall pay at a rate determined by the City of Milton to cover the city's expenses.

d. Repetition of Procedure

Should the initial treatment, in the opinion of the City, prove ineffective, the chlorination procedure shall be repeated until confirmed tests show that the water sampled conforms to the requirements stated above.

5. Florida Department of Environmental Protection and/or City of Milton Acceptance

Prior to the City accepting the water or sewer system for use, the Contractor and Engineer of Record shall have the approval of the Florida Department of Environmental Protection. A copy of the clearance letter shall be sent to the City for their records along with as-built drawings. Two paper "as-built" drawings and one electronic drawing shall be provided to the city before the system is placed into service.