

SECTION 15030

PRESSURE AND LEAKAGE TESTS

PART 1: GENERAL

1.01 SCOPE OF WORK

Test all piping, valves, and appurtenances installed under these Contract Documents. Testing shall be performed prior to any disinfection of the pipeline. All pipeline installations shall be tested.

1.02 SUBMITTALS

Prepare and submit schedules and procedures to the Engineer for testing of all parts of the water main installed in accordance with these Contract Documents. Submit the schedule at least seven days prior to any testing.

PART 2: PRODUCTS

2.01 EQUIPMENT

Furnish the pump, pipe connections, and all necessary apparatus for the pressure and leakage tests including gauges and metering devices. The Owner reserves the option to furnish the gauges and metering devices for the tests. Excavate, backfill, and furnish all necessary assistance for conducting the tests.

PART 3: EXECUTION

3.01 GENERAL

- A. Perform hydrostatic pressure and leak tests in accordance with the current version of AWWA C600 and AWWA C605, respectively, after the pipe or section of pipe has been laid, thrust blocking cured (min. 5 days), and the trench is completely or partially backfilled. Where practical, testing shall be performed fully isolated from the active distribution system.
- B. The Contractor may, at his option, completely backfill the trench or partially backfill the trench over the center portion of each pipe section to be tested. However, the Engineer may direct the Contractor to completely backfill the trench if local traffic or safety conditions require.
- C. For system operating pressures of 200 psi or less, perform the hydrostatic test at a pressure of no less than 100 psi above the normal operating pressure without exceeding the rating of the pipe and appurtenances. For system operating pressures in excess of 200 psi, perform the hydrostatic test at a pressure that is 1.5 times the normal operating pressure, but no more than the design rating of the pipe and appurtenances.

- D. Valves shall not be operated in either direction at a differential pressure exceeding the rated valve working pressure. A test pressure greater than the rated valve working pressure can result in trapped test pressure between the gates of a double-disc gate valve. For tests exceeding the rated valve working pressure, the test setup should include a provision, independent of the valve, to reduce the line pressure to the rated valve working pressure on completion of the test. The valve can then be opened enough to equalize the trapped pressure with the line pressure, or the valve can be fully opened if desired.
- E. The test pressure shall not exceed the rated working pressure or differential pressure of the valves when the pressure boundary of the test section includes closed, resilient-seated gate valves or butterfly valves.
- F. Attach a tapping sleeve and valve assembly to the main. Pressure test the assembly prior to making the tap. The required test pressure shall be determined in the same manner as for pipe. The test is acceptable if there is no pressure drop in 15 minutes at test pressure.

3.02 FILLING AND TESTING

- A. Slowly fill each segregated section of pipeline with water ensuring that all air is expelled. Extreme care must be taken to ensure that all air is expelled during the filling of pipe. The line shall stand full of water for at least twenty-four hours prior to testing to allow all air to escape. If necessary, tap the main at points of highest elevation to expel air as the pipe is filled. Remove the corporation stops and plug the taps after successfully filling the pipeline and expelling all air as approved by the Engineer.
- B. Apply the specified test pressure, measured at the point of lowest elevation, using a pump connected to the pipe in a manner satisfactory to the Engineer. If the elevation of the high point of the pipeline being tested is such that the pressure during testing will be below 85% of the required test pressure, the Engineer will require a separate test to be performed on this section of pipeline. In lieu of a separate test, the test pressure measured at the lowest elevation may be increased, within the pressure rating of the pipeline material, such that the resulting pressure at the highest point exceeds 85% of the required test pressure. The test will be conducted for at least two hours at the required test pressure ± 5 psi.
- C. Conduct a leakage test concurrently with the pressure test. Leakage is defined as the volume of the water that must be supplied into the newly laid pipeline to maintain pressure within 5 psi of the test pressure after it is filled and purged of air. Measure the volume of water using a calibrated container or meter.
- D. No pipeline installation will be accepted by the Engineer if the leakage is greater than that shown in the following table:

Allowable Leakage per 1000 ft. of Pipeline*---gph

Avg. Test Pressure psi	Nominal Pipe Diameter---in.										
	4	6	8	12	16	20	24	30	36	42	48
100	0.27	0.41	0.54	0.81	1.08	1.35	1.62	2.03	2.43	2.84	3.24
125	0.30	0.45	0.60	0.91	1.21	1.51	1.81	2.27	2.72	3.17	3.63
150	0.33	0.50	0.66	0.99	1.32	1.66	1.99	2.48	2.98	3.48	3.97
175	0.36	0.54	0.72	1.07	1.43	1.79	2.15	2.68	3.22	3.75	4.29
200	0.38	0.57	0.76	1.15	1.53	1.91	2.29	2.87	3.44	4.01	4.59
225	0.41	0.61	0.81	1.22	1.62	2.03	2.43	3.04	3.65	4.26	4.86
250	0.43	0.64	0.85	1.28	1.71	2.14	2.56	3.21	3.85	4.49	5.13
275	0.45	0.67	0.90	1.34	1.79	2.24	2.69	3.36	4.03	4.71	5.38
300	0.47	0.70	0.94	1.40	1.87	2.34	2.81	3.51	4.21	4.92	5.62
350	0.51	0.76	1.01	1.52	2.02	2.53	3.03	3.79	4.55	5.31	6.07
400	0.54	0.81	1.08	1.62	2.16	2.70	3.24	4.05	4.86	5.68	6.49
450	0.57	0.86	1.15	1.72	2.29	2.87	3.44	4.30	5.16	6.02	6.88

*If the pipeline under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each size. The table has been generated from the formula: $L = \frac{S \cdot D \cdot P^{1/2}}{148,000}$ where L is the allowable leakage in gallons per hour, S is the length of pipe in feet, D is the nominal pipe diameter in inches, and P is the test pressure in psig.

- E. Should any test disclose damaged or defective materials or leakage greater than that permitted, the Contractor shall, at Contractor's expense, locate and repair and/or replace the damaged or defective materials. Materials used for repair must be approved by the Engineer and meet the specifications. Repeat the tests until the leakage is within the permitted allowance and is satisfactory to the Engineer.

END OF SECTION