



## SECTION 12

# WATER TESTING AND INSPECTION

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### 12.1 PURPOSE

This section outlines the requirements for acceptance testing of water main.

### 12.2 GENERAL

Testing shall be accomplished through the combination of visual inspections and hydrostatic pressure testing. The Contractor shall provide all labor, material, and equipment necessary for conducting tests. All testing shall be performed in the presence of the Board's representative, tests performed in the absence of the Board's representative shall be considered invalid and shall be repeated at the Contractor's expense.

### 12.3 VISUAL INSPECTION

The Board's representative shall visually inspect selected pipe and appurtenances at the point of delivery for damage and other defects. The Board's inspection of random materials delivered to the site in no way relieves the Contractor of his responsibility to make certain that all materials comply with the Board's requirements. Damaged materials or materials not meeting the Board's requirements shall be removed from the site and replaced.

### 12.4 HYDROSTATIC TESTING

The purpose of a pressure test is to locate defects in materials or workmanship, thereby permitting proper repair. All pressure testing of lines should be done hydrostatically. Do not use air-pressure to test water lines. **THE USE OF AIR TO PRESSURE TEST A LINE, OR THE FAILURE TO REMOVE ALL AIR FROM A LINE PRIOR TO TESTING, CAN CAUSE EXPLOSIVE PRESSURES TO BUILD UP IN THE LINE CAUSING SERIOUS PERSONAL INJURY.**

#### 12.4.1 PRESSURE TEST RESTRICTIONS

The following restrictions shall be adhered to.

- Test pressure shall not be less than 1.50 times the working pressure at the lowest point along the test section.

- Test pressures shall not exceed pipe or thrust-restraint design pressures.
- Hydrostatic tests shall be of at least 2 hour duration.
- The test pressure shall not exceed the rated pressure of the valves when the pressure boundary of the test section includes closed, resilient-seated gate valves. Note: Resilient wedge gate valves approved by the Board typically have a working pressure limit of 200 psig while resilient wedge gate valves incorporated with large backflow devices have a working pressure limit of 175 psig.

The following items must be considered prior to testing:

- The pipe to be tested must be sufficiently backfilled (partial backfill) to prevent movement while under pressure.
- Joint restraint at fittings should be permanent and constructed to withstand test pressure. If concrete thrust blocks are used, sufficient time must be allowed before testing to permit the concrete to cure. Cure time of seven days is recommended when Type I portland cement is used; three days is recommended when Type III portland cement is used.
- Test ends should be restrained to withstand the applicable thrusts that are developed under the test pressure.

#### **12.4.2 AIR TESTING OF TAPPING SLEEVE**

The Board's maintenance staff will air test each tapping sleeve installed to ninety (90) psig for a period of 10 minutes. No pressure drop will be allowed. Successful testing of sleeve shall not relieve the Contractor of any leaks that may occur during the warranty period. At the Contractor's expense, the Board will fix all leaks that occur in the warranty period.

#### **12.4.3 HYDROSTATIC TEST PROCEDURE**

Construction of all service lines, fire hydrants and any/all other connections involving restrained joints and/or thrust blocking shall have been completed and inspected prior to scheduling of hydrostatic pressure test. Hydrostatic pressure test shall be scheduled with the Board's representative a minimum of two (2) working days in advance. The Board's representative must be on site while flushing and testing is being performed.

##### *12.4.3.1 Flushing*

Foreign material left in the pipeline during installation often results in valve or hydrant seat leakage during pressure testing. Every effort should be made to keep lines clean during installation. Flushing shall be accomplished by partially opening and closing valves and hydrants several times under expected line pressure with adequate flow velocities to flush foreign materials out of the valves and hydrants. If required by the Board's inspector mains shall be flushed to atmosphere at full port/non obstructed opening (open end of pipe) to ensure a velocity of greater than 2 ft/second has been obtained.

*12.4.3.2 Filling the Line*

The main should be filled slowly from the Board approved source of potable water. The water may be introduced from lines in service through valved connections, or by temporary connections to hydrants, or by taps made at the connection cap. All such connections, however, should be made at the lowest point in the line whenever possible.

*12.4.3.3 Expelling Air from Pipeline*

Compressed entrapped air can greatly amplify any surges as well as pumping pressures. Furthermore, entrapped air can cause erroneous pressure test results. **All** air should be expelled from the pipeline during filling and again before making either pressure or leakage tests. Automatic air release valves located at high points are recommended for extended sections of new water main. If permanent air vents are not present at the high points, the Contractor may use corporation cocks at these points to expel the air as the line is filled with water. After the air has been expelled, the corporation cocks shall be closed and the test pressure applied. At the conclusion of the pressure test, the corporation cocks shall be removed and the pipe plugged or left in place. It will be left to the Board's representative to determine if flushing alone (without the use of air vents or corporation stops) is sufficient to expel the entrapped air from the main.

*12.4.3.4 Pressure Testing*

All valves not required to be closed for isolation of the new main being tested shall be open during the testing, including fire hydrant valves. The line shall be pumped up to no less than 150 psig and no more than 200. Once the pressure equalizes, the line shall hold said pressure for a minimum of two hours. If line is not holding specified pressure at time of arrival of the Board's representative, the test will be cancelled and rescheduled at the convenience of the Board. This shall be repeated until the test requirements are satisfactory.

*12.4.3.5 Examination*

The Contractor shall examine all exposed pipe, fittings, valves, hydrants, thrust blocks, restraints, and joints during the course of the hydrostatic testing. Any damaged or defective work or material shall be repaired or replaced, and the test shall be repeated until satisfactory results are obtained.

## **12.5 DISINFECTION AND BACTERIOLOGICAL TESTING**

Upon successful passing of the pressure test, the main(s) shall be disinfected by the Board's certified staff. The Contractor shall contact the Board to perform bacteriological testing of water mains. If such samples do not demonstrate satisfactory results, re-chlorination will be required. All service connections shall be made before testing and shall also be disinfected.

The Contractor shall be responsible for the cost of chlorination during construction and testing.

## **12.6 FINAL INSPECTION**

For the final inspection before acceptance by the Board, all valve boxes shall be plumb and to grade, and curb stops shall be adjusted to the proper elevations (see standard drawing). The Board's representative will check each valve to verify the valve's being in the "open" position. He will open each curb stop and paint a blue "W" on the curb, after which the Contractor shall re-cover each curb stop. By-pass valves on meters shall be in the "closed" position. Adjustment of the by-pass valve after final inspection is prohibited.

Upon completion of the project the Board's inspector shall verify that all valves are in the "open" position with the sole exception of the by-pass valve on large meters. By-pass valves on large meters shall be in the "closed" position

## **12.7 TEST FAILURE**

Should a line fail to pass any of the acceptance tests as outlined, the Contractor shall, at his expense, determine the source of the failure, make any necessary repairs, and re-test the segment of piping in question.

## **12.8 PRESSURE TEST EQUIPMENT**

Equipment systems used to perform water pressure test shall be specifically designed for this purpose. The continuous monitoring pressure gage shall be liquid filled (glycerine) having a pressure range from 0 psig to at least 200 psig with minimum divisions of 2 psig. The gage face shall be a minimum of 4 inches in diameter and have an accuracy of  $\pm .04$  psig. The gauge shall meet or exceed Grade B ANSI-ASME B40.1



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