

## **SECTION 02610 - PRESSURE TESTING OF PIPELINES**

### **PART 1 - GENERAL**

#### **1.1 WORK INCLUDED IN THIS SECTION**

- A. The WORK of this Section includes requirements for hydrostatic and leakage testing of pressure pipelines and appurtenances for transmission and distribution mains.

#### **1.3 SUBMITTALS**

- A. The following shall be submitted in compliance with Section 1300.
  - 1. Pressure test bulkhead locations and design calculations, water supply details including backflow preventors, flow meters, valves and drains.
  - 2. Requests for use of water from waterlines of DISTRICT 48 hours in advance.
  - 3. Provide a recent record of pressure gauge calibrations.
  - 4. Provide records of each pipe section during testing. Test records shall include:
    - a. Date of test.
    - b. Identification of pipeline, or pipeline section, tested or retested.
    - c. Identification of pipeline material.
    - d. Identification of pipe specification.
    - e. Test pressure.
    - f. Remarks: Leaks identified (type and location), types of repairs, or corrections made.
    - g. Certification by CONTRACTOR that the leakage rate measured conformed to the specifications.
    - h. Test duration.
    - i. Allowable losses.
    - j. Actual losses.

### **PART 2 - PRODUCTS**

#### **2.1 TEST BULKHEADS**

Design and fabricate test bulkheads per Section VIII of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code. Materials shall comply with Part UCS of said code. Design pressure shall be at least 2.0 times the specified test pressure for the section of pipe containing the bulkhead. Limit stresses to 70 percent of yield strength of the bulkhead at the bulkhead design pressure. Include air-release and water drainage connections.

## 2.2 TEST OUTLETS AND TEMPORARY VALVES

Provide additional outlets and temporary valves for releasing air or apply the test where automatic air valves or other outlets are available in the pipeline. Construct the outlets in the same manner as for a permanent outlet and after use, seal with a blind flange, pipe cap, or plug and coat equal to the adjacent pipe.

## 2.3 TEST FLUID AND TEMPORARY PIPING

Use only potable water for the hydrostatic pressure test. Provide an approved and certified reduced pressure backflow prevention assembly if source of potable water is from public waterlines. Provide temporary piping to convey and dispose of the test fluid used in the pipeline. Disconnect and remove temporary piping after complying with the allowable leakage.

## 2.4 TEST EQUIPMENT

Provide calibrated pressure gauges, pipes, pumps, meters, and other equipment necessary to perform the hydrostatic pressure test.

# PART 3 - EXECUTION

## 3.1 GENERAL

All testing shall be performed in the presence of the DISTRICT. Subject the pipeline and appurtenances to a hydrostatic pressure test after the pipe has been laid and backfilled for required restraint. Allow concrete pipe anchors, collars, encasements and thrust blocks to cure prior to pressure testing. Allow concrete structures to attain the specified 28-day compressive strength prior to testing. Existing facilities will be operated by or under the direction of the DISTRICT only. When the DISTRICT furnishes and installs valves at takeoffs from its existing system, the contractor shall omit a length of pipe, provide adequate blocking and test the piping independently of the DISTRICT's existing system. Test shall not be made against DISTRICT furnished or installed valves.

## 3.2 CLEANING

- A. In pipelines less than 24-inches in diameter, before conducting hydrostatic tests, flush pipes with water to remove dirt and debris. Maintain flushing velocity of at least 3 fps. Flush pipes for the minimum time period as given by the formula below and as required to thoroughly clear the pipeline of dirt and debris.

$$T = \frac{2L}{3}$$

Where:

T = flushing time (seconds)

L = pipe length (feet)

- B. In pipes 24-inches or larger in diameter, clean the pipe using high-pressure water jet, sweeping, scrubbing, or equally effective means. All water, sediment, dirt, and foreign material accumulated during this cleaning operation shall be discharged, vacuumed, or otherwise removed from the pipe.

3.3 TESTING AND DISENFECTION SEQUENCE

- A. Perform required disinfection after the completion of hydrostatic testing per Section 2600. Disinfection and hydrostatic testing may be carried on simultaneously upon approval of the DISTRICT.

3.4 LENGTH OF TEST SECTION

- A. Test the pipeline in sections. In any one test, do not exceed more than 2,500 feet, or as directed by the DISTRICT.

3.5 INITIAL PIPELINE FILLING FOR HYDROSTATIC TESTING

- A. Maximum rate of filling with test fluid shall not cause water velocity in the pipeline to exceed 1 fps. Expel air from the pipeline while filling and prior to testing. Provide necessary outlets to fill and test pipeline. When testing cement mortar lined piping, fill the pipe to be tested with potable water and allow it to soak for at least 48 hours to absorb water before conducting the pressure test.

3.6 PRESSURE AND DURATION OF HYDROSTATIC TEST

- A. Test pressure at the lowest point of the section being tested shall be 50 psi in excess of the class of pipe, but not less than 25 pounds per square inch in excess of the class of pipe at the highest point in the section.
- B. Maintain the test pressure for the duration indicated below by restoring it whenever it falls an amount of 5 psi. Use a calibrated recorder during the test and provide a record to the District.

Pipe Diameter (inches)	<u>Hours</u>
18 and less	4
20 to 36	8

The test duration for PVC pressure pipe may be reduced to two (2) hours upon approval of the DISTRICT.

3.7 ALLOWABLE LEAKAGE

- A. Apply the test pressure with a positive displacement pump. Provide a snubber or dampener between the pump and the pipeline to reduce instantaneous pressure pulses to 10-percent of the test pressure. Draw water from containers in which the volume of water can be readily measured or as directed by the DISTRICT.

- B. Leakage shall be considered as the total amount of water pumped into the pipeline during the test period. The allowable leakage rate is defined by the formula:

$$L = \frac{HND(P)^{1/2}}{148,000}$$

Where:

L = allowable leakage (gallons)  
D = diameter of the pipe (inches)  
N = length of pipe being tested (feet)  
P = specified test pressure (psig)  
H = duration of test (hours)

- C. The allowable leakage for welded steel pipe shall be zero gallons.
- D. The allowable leakage for buried piping having threaded, brazed, or welded (including solvent welded) shall be zero gallons.
- E. Repair and retest any pipes showing leakage rates greater than that allowed in the above criteria.

### 3.8 REPITION OF TEST

- A. If the actual leakage exceeds the allowable, locate and correct the faulty work and repeat the test until the leakage does not exceed the allowable. Restore the work and all damage resulting from the leak and its repair. All visible leakage shall be eliminated.

### 3.9 BULKHEAD AND TEST FACILITY REMOVAL

- A. After a satisfactory test, remove test bulkheads and other test facilities, restore the pipe lining and coatings, and fill the pipeline section tested with water and maintain it full until disinfection of pipeline at the completion of the contract. The CONTRACTOR shall assume all responsibility for any damage to the pipeline as a result of pressure imposed during the operations of filling the pipeline with water and conducting the tests.

END OF SECTION