## PART ONE - GENERAL

### 1.1 DESCRIPTION OF WORK

The work to be performed under this section of the specifications shall consist of furnishing all labor, materials, and equipment necessary to test and sterilize the water main as specified herein.

## PART TWO - PRODUCTS

2.1 N/A

## PART THREE - EXECUTION

### 3.1 PRESSURE (HYDROSTATIC) TEST

3.1.1 After the pipe has been laid for at least seven (7) days, the line shall be tested in such sections approved by the Engineer. The Contractor shall furnish all labor, materials, tools, and equipment required to bulkhead and seal off the line for testing, fill it with water, raise the filled line to test pressure and measure both pressure and leakage over the test period.

3.1.2 The entire length of the installed line shall be field tested for water tightness in the following manner: The section of the line to be tested shall be filled with water and allowed to stand for such time as is required for the cement lining of the pipe to absorb such water as it will and for the escape of all air from the line. During the filling of the line, care shall be exercised to see that all air vents are open and all bulkheads, valves, manholes, connections, etc. in the section undergoing test shall be carefully examined for leakage. All known leaks shall be stopped, regardless of these test requirements.

3.1.3 The test shall consist of raising and holding the hydrostatic pressure in the test section to 150 psi in the test section. Such pressure shall be maintained for a period of not less than four (4) hours, during which time the water pumped into the line to maintain the test pressure shall be accurately measured in a satisfactory manner.

3.1.4 Leakage test shall be in compliance with Texas Natural Resource Conservation Commission (TNRCC) formula for allowable leakage given below. In the event any section of the line tested fails to meet the above specified requirements for water tightness, the cause of the excessive leakage shall be determined and

remedied to the satisfaction of the Engineer, at the expense of the Contractor, including retesting.

3.1.5 It shall be the responsibility of the Contractor to provide the necessary outlets for testing the pipeline.

3.1.6 The Contractor shall furnish the Owner a signed certification stating the pressure test(s) has been performed in accordance with the specifications. The certificate should contain but not be limited to the following:

(1) Date tests were performed.

(2) Name of people in attendance.

(3) Brand names of pipe and pressure rating.

(4) Test pressure and length of time applied.

(5) Number of leaks found during testing.

(6) Comments.

3.1.7 <u>Texas Natural Resource Conservation Commission Criteria.</u>

The formulas to be used for the allowable leakage are as follows:

(1) Ductile Iron Pipe $L = \frac{SDP^{1/2}}{133{,}200}$

Where L = Allowable leakage in gallons per hour
S = Length of pipe tested in feet
D = Nominal Diameter of pipe in inches
P = Average test pressure during the leakage test in psi gauge

(2) Polyvinyl Chloride (PVC) Pipe $L = \frac{NDP^{1/2}}{7{,}400}$

Where L = Allowable leakage in gallons per hour
N = Number of joints in length of pipe tested
D = Nominal diameter of pipe
P = Average test pressure during the leakage test in psi gauge

3.2 STERILIZATION

3.2.1 Prior to sterilizing, each valved section of the new pipeline shall be pressure tested and flushed with clean water from the existing system to remove all apparent evidence of dust, soil and fine debris which may have entered the line during construction and testing. The entire system shall be disinfected in accordance with the requirements of the Texas Natural Resource Conservation Commission (TNRCC) and AWWA C651a-90, whichever is the most restrictive.

3.2.2 Chlorine shall be used to sterilize the pipeline by the following method: The amount of chlorine applied shall be such as to provide dosage of not less than fifty (50) parts per million. The chlorinating material shall be introduced to the water lines and distribution system in a manner approved by the Engineer. After a contact time of not less than twenty-four (24) hours, the system shall be flushed with clean water until the residual chlorine content is not greater than 0.2 parts per million. All valves in the lines being sterilized shall be opened and closed several times during the contact period.

3.2.3 Bacteria samples shall be taken from the new water lines at every air release valve and submitted to the TNRCC for analysis. All samples shall be taken during the same day with a minimum of three (3) samples being collected and submitted for each segment of water line installed. Results of the tests shall be submitted to the Engineer.

3.2.4 Unless otherwise provided for in the Bid Schedule and Proposal, the cost of furnishing the chlorine, labor, tools, equipment, and test of chlorine content and bacteriological tests shall be at the expense of the Contractor.

3.3 FLUSHING AND DISINFECTION PLAN

The Contractor shall submit to the Engineer for approval the schedule for and the method of flushing and disinfecting the water lines installed under this project. No lines will be flushed, disinfected, or placed in service until the schedule and methodology have been approved.

3.4 TESTING OF 16 GAUGE TRACING WIRE

Continuity and conductivity of the 16-gauge tracing wire shall be tested by the Contractor in the presence of the Engineer. Any Section or sections not showing continuity and/or conductivity shall be corrected and retested by the Contractor. All costs of testing shall be borne by the Contractor.

PART FOUR - MEASUREMENT AND PAYMENT

4.1 The cost of the work described in this specification shall not be paid for separately, but shall be considered subsidiary to the cost of pipe installation and related work.