

**PART 1 GENERAL**

## 1.1 SCOPE:

- A. This section includes the materials, equipment, procedures, and requirements to disinfect new and repaired water mains to acceptable levels as provided by the State of Oregon Health Division and City Ordinance.

## 1.2 BACKGROUND:

- A. Water supply for the City of Woodburn, OR. has **NO** chlorination in its treatment process and no chlorine residual. Therefore, it is critical new facilities be properly installed and disinfected to ensure potable water for public consumption. Contractor's unfamiliar with disinfecting a system under this condition may find it economical to hire an outside contractor, which is competent.

## 1.3 REFERENCE STANDARDS:

- A. All work will meet the requirements set forth herein and comply with Oregon Administrative Rule (OAR) 333-61-050, and AWWA C651.92, or latest revision.
- B. In the event of conflicts between specifications this is the order of precedence:
1. These specifications
  2. The direction of the Engineer
  3. OAR 333
  4. AWWA C651 (Latest revision)

**PART 2 PRODUCTS**

## 2.1 CHLORINE:

- A. Two forms of chlorine disinfection product will be allowed in city water mains:
1. **SODIUM HYPOCHLORITE** - Sodium hypochlorite conforming to ANSI/AWWA B300, in pre-mixed solution, 12.5% available chlorine by weight and 87.5% inert material. Solution shall be contained in approved container and clearly marked by the manufacturer including date solution was prepared, form of the solution, and total weight by volume of chlorine.
  2. **CALCIUM HYPOCHLORITE** - Calcium hypochlorite conforming to ANSI/AWWA B300, in granular form or pre-mixed solution. Solution shall be contained in approved container and clearly marked by the manufacturer including date solution was prepared, form of solution, and total weight by volume of chlorine. Calcium hypochlorite shall be 65% available chlorine by weight.

**2.2 PUMPING EQUIPMENT:**

- A. Any pump used for injection of disinfection solution shall be clean, operational, well maintained and for the single purpose of injecting chlorine into potable water systems.
- B. The Contractor shall know in advance what the pumping rate of the pump is against an average city system pressure of 55-psi.

**2.3 HYDRANT WRENCH:**

- A. Fire hydrants shall be operated under the direct supervision of the Engineer. Fire hydrants shall only be opened and closed using standard hydrant wrenches. Pipe wrenches, crescent wrenches and/or other types of wrenches are strictly forbidden.

**2.4 IN-LINE CONTROL VALVES:**

- A. In-line control valves, connecting directly to city system, shall be operated by the Contractor in the presence of the Engineer with an approved gate valve wrench. Under no circumstances shall Contractor operate valves without an agent of the city present.
- B. Contractor shall ensure that only one valve be opened to or from the city main at a time and that all valves have been returned to the closed position before vacating the site for the day.

**2.5 DISINFECTION DOSING AND MIXING RESERVOIR:**

- A. Any mixing/dosing reservoir shall be inspected and approved by the Engineer and shall be clean and free of debris that, in the opinion of the Engineer, presents a risk to the disinfection operations.

**2.6 WATER SUPPLY:**

- A. The Contractor shall make arrangements for providing water for mixing, cleaning, and/or supplying the disinfection operations specifically for use in mixing granulated chlorine in the dosing reservoir.

**2.7 SAMPLING TAPS:**

- A. Sampling taps shall be in accordance with Standard Detail No.5100-1 of the Standard Specifications. Taps shall be connected to a copper gooseneck service with an approved corporation stops and shut off valves at the sampling points.
- B. Saddles shall not be allowed in tapping operations, unless approved by the Engineer.
- C. Upon acceptance of new water lines sampling taps and assemblies will be removed by City personnel.

**PART 3 EXECUTION****3.1 INITIAL FLUSHING:**

- A. Prior to disinfection operations all lines shall be flushed at a minimum of 2.0 fps and a maximum velocity of 10.0 fps. The Engineer will make provisions to quantify the flow rates and times required to completely flush newly installed lines.
- B. Prior to flushing operations the Contractor and the Engineer shall plan how a given system shall be flushed and sequence in which valves will be operated and times required to flush each leg of the system.
- C. During flushing operations fire hydrant valve shall be fully opened and flows shall be controlled, if necessary, by the in-line control valve at connection to existing city main.
- D. Flushing of water mains shall not be allowed after ambient temperature has exceeded 85<sup>0</sup> F. Should it be imperative to flush on hotter days (above 85<sup>0</sup> F) it shall be done only with the consent of the Engineer.

**3.2 DISINFECTION:**

- A. Install an injection point adjacent to the valve connecting the new water main to the existing city water supply on the new main side of the valve.
- B. Disinfection will be accomplished by continuous feed method, defined as follows:
  - 1. Sodium hypochlorite is recommended alternative to calcium hypochlorite though calcium hypochlorite is acceptable.
  - 2. The dosing rate shall be a enough to obtain a minimum of 50 ppm at each sample point. The Engineer will sample the solution to ensure rate has been accomplished. Each sampling point will be checked along the pipeline to ensure that strength is at the minimum of 50 ppm.
  - 3. If the dosing reservoir is of insufficient size as to require mixing of additional batches all subsequent batches shall be mixed at the same dosage rate. A second reservoir shall be set-up adjacent to the primary reservoir so as to ensure a continuous operation.
  - 4. As the chlorinated water flows past fittings, valves, service lines, and hydrants, they shall be thoroughly operated so as to disinfect appurtenances and pipe branches.
  - 5. Minimum contact time shall be 24 hours. The Engineer, in the presence of the Contractor, shall test at each sampling point a minimum of 24 hours after completion of the chlorination operation. Chlorine residual shall be a minimum of 10 ppm. If at this point there is not a residual of 10 ppm in the line at each sampling point the line shall be flushed and steps 1 -5 shall be repeated.

**3.3 FINAL FLUSHING:**

- A. After required contact time has elapsed and all the requirements of subsection 3.2 have been met the heavily chlorinated water shall be flushed from newly installed lines. Flushing shall continue until the chlorine residual is measured at 0.0 ppm.
- B. Flushing of water mains shall not be allowed after the ambient temperature reaches 85<sup>0</sup> F without the prior approval of the Engineer.
- C. The environment into which the chlorinated water is to be discharged shall be inspected. If there is any possibility that chlorinated discharge will cause damage to the environment, one of the following procedures, as directed by the Engineer, shall be accomplished.
  - 1. **FLUSH TO EXISTING SANITARY SEWER SYSTEM** - Heavily chlorinated water shall be flushed into the nearest sanitary sewer manhole. The City will provide, to the Contractor, a hose and diffuser, which shall be installed at the direction of the Engineer.
  - 2. **REMOVAL BY TANKER TRUCK** - In the event that a manhole is not within a reasonable distance Contractor shall provide a tanker truck which shall act as a receptacle for flushed chlorinated water then transported to the nearest sanitary sewer and deposited. Tanker shall equipped with a backflow prevention device or an approved air gap shall be employed.
- D. During flushing operations the fire hydrant valve shall be fully opened and the flow shall be controlled by the in-line control valve.

**3.4 SAMPLING POINTS:**

- A. Sampling taps shall be of the type as described in subsection 2.7 of these specifications.
- B. Sampling taps shall be installed at the end of each length of pipe which extends at least 5 ft. and at other points in the system as instructed by the Engineer to include a minimum of 200 ft. and a maximum of 500 ft. along a continuous section of pipe.

**3.5 SERVICE LINES:**

- A. Service lines as well as all valves, fire hydrants, sampling points, and etc. shall be chlorinated in accordance with these specifications.

**3.6 MEASUREMENT AND PAYMENT:**

- A. Payment will be paid per the unit price indicated in the Bid.

**PART 4 TESTING****4.1 GENERAL:**

- A. After final flushing a sample set shall be taken by a certified laboratory in accordance with

subsection 4.3 herein.

#### 4.2 SAMPLE SET:

- A. A sample set is the total of individual samples taken on a project at the rate of one for each sample point.
- B. Two (2) consecutive sample sets shall be taken and pass lab test before the line shall be accepted and put in service.

#### 4.3 SCHEDULE OF SAMPLING:

- A. Contractor shall notify the Engineer 48-hours in advance of the time he proposes to schedule sampling operations.
- B. The first sample set shall be take at 48-hours after final flushing is accomplished and the second sample set shall be taken at 72-hours after final flushing.

#### 4.4 TESTING PROCEDURES:

- A. The Contractor shall hire a State of Oregon certified laboratory to come to the site and take a sample set as previously defined.
- B. Samples shall be taken only at approved sample points, no samples will be allowed at fire hydrants or hoses.
- C. Samples shall be placed and transported in, a sterile bottles treated with sodium thiosulfate as required by *Standard Methods for the Examination of Water and Wastewater*.
- D. Samples in a given sample set shall be tested in conformance with approved State of Oregon test methods for microbiological analysis of coliform.
- E. Sample set must show no coliform (total coliform and E.coli) presence at all sample points. The Contractor shall supply an original signed copy or carbon copy of the satisfactory test results to the Engineer.
- F. If testing confirms coliform presence the system shall be completely flushed and re-disinfection repeating the aforementioned procedure.
- G. When samples are satisfactory and all other applicable installation standards are complied with, the City will then assume responsibility for the new main.
- H. Additional testing may be required prior to allowing the line to be placed in service.

END OF SECTION