

SECTION 02510 - WATER DISTRIBUTION**PART 1 GENERAL****1.1 REFERENCES**

1. General: The work shall comply with the most recent standards or tentative standards as published at the date of the contract and as listed in this specification using the abbreviation shown.
2. Related Sections: Additional Sections of the Documents which are referenced in this Section include:
 - 1) Section 02080 - Utility Pipe and Materials
 - 2) Section 02085 - Valves and Cocks
 - 3) Section 02515 – Hydrants
3. American National Standards Institute (ANSI)/American Water Works Association (AWWA):
 - 1) C 651 Standard for Disinfecting Water Mains
4. American National Standards Institute / National Sanitation Foundation (ANSI/NSF):
 - 1) Std. 61 Drinking Water System Components-Health Effects

PART 2 PRODUCTS**2.1 MATERIALS**

1. General: All materials for use with potable water shall be in accordance with applicable ANSI/AWWA standards and approved for use with potable water in accordance with ANSI/NSF 61.
2. Waterlines: Water mains and distribution lines shall be ductile iron pipe; thickness class 52 for pipe diameters 12 inches and less, and thickness class 51 for pipe diameters 14 inches and greater, in accordance with Section 02080 – Utility Pipe and Materials. The Authority reserves the right to select the type of material. (See the Approved Products List for a complete list of manufacturer's materials and model numbers approved for use.)
3. Small Waterlines: Waterlines 2 inches and smaller shall be SDR 21 in accordance with the Section 02080 - Utility Pipe and Materials.
4. Service Laterals: Service laterals shall be type “K” copper and shall be 1” minimum in diameter when serving 2 or more connections or under roadways. Laterals serving only one connection may be ¾” in diameter. Laterals shall be in accordance with the Section 02080 - Utility Pipe and Materials and Standard Detail W-8.
5. Pipe Fittings: All fittings 4 inch and larger shall be ductile iron and shall be in accordance with the Section 02080 - Utility Pipe and Materials.
6. Valves: All valves shall be in accordance with Section 02085 - Valves and Cocks.
7. Concrete: Miscellaneous concrete shall be VDOT Type A-3 specifications.
8. Restrained Joints: Joint restraint shall be performed by mechanical joint pipe and retainer glands in accordance with Section 02080 – Utility Pipe and Materials. Tie rods may be used with hydrant installations in accordance with Section 02080 – Utility Pipe and Materials.

9. **Stone:** Stone for repair of gravel road shoulder shall be VDOT #25 or #26.
10. **Drain, Waste, and Vent:** Shall be Schedule 40 PVC in accordance with Section 02080 – Utility Pipe and Materials.
11. **Water Plumbing Pipe:** Interior potable water plumbing shall be Schedule 40 CPVC pipe in accordance with Section 02080 – Utility Pipe and Materials.
12. **Vault and Interior Piping:** Pipe lines inside of buildings or vaults shall be flanged ductile iron pipe for 4 inches and larger pipe. Pipe which is less than 4 inches in diameter shall be galvanized steel pipe with NPT threaded couplings. Pipe shall be in accordance with Section 02080 – Utility Pipe and Materials.

PART 3 EXECUTION

3.1 INSTALLATION OF PIPE, FITTINGS, AND ACCESSORIES

1. **Pipe and Fitting Installation:** All work shall be in accordance with Section 02080 - Utility Pipe and Materials.
2. **Valve Installation:** All work shall be in accordance with Section 02085 - Valves and Cocks.
3. **Hydrant Installation:** Shall be in accordance with Section 02515 - Hydrants.

3.2 DISINFECTION

1. **Disinfecting Water Mains:** Water mains and accessories shall be disinfected using the “continuous-feed” or “slug method” in accordance with ANSI/AWWA C 651. The “Tablet Method” described in ANSI/AWWA C 651 shall not be used. The Contractor shall obtain the most recent applicable AWWA standard. This standard shall be at jobsite with access granted to the Authority’s Representative. Care shall be taken to minimize entrance of foreign material into pipe, fittings and valves. The main shall be flushed prior to disinfection with sufficient flow to produce a velocity of 2.5 fps. Flushing shall take place in areas with adequate drainage.

1) Continuous Feed Method

During construction, calcium hypochlorite granules shall be placed at the upstream end of the first section of pipe, at the upstream end of each branch main, and at 500-ft intervals. The quantity of granules shall be as shown in Table 1. This procedure shall provide a strong chlorine concentration in the first flow of flushing water that flows down the main. The main shall be filled prior to flushing to eliminate air pockets and to remove particulates.

Water supplied from a temporary, backflow prevented connection to the existing distribution system or other approved source of supply shall be made to flow at a constant, measured rate into the newly installed water main. At a point not more than 10 ft downstream from the beginning of the new main, water entering the new main shall receive a dose of chlorine fed at a constant rate such that the water will have not less than 50 mg/L free chlorine. The chlorinated water shall remain in the pipe at least 24 hours, after which, the chlorine concentration in the water shall be at least 10 mg/l. All valves and appurtenances shall be operated while the chlorinated water remains in the pipe. Table 2 gives the amount of chlorine required for each 100 ft of pipe of various diameters.

Table 1. Application of Calcium Hypochlorite Granules in Water Main for the Continuous Feed Method

Pipe Diameter (inch)	Calcium Hypochlorite Granules (ounce)
4	1.0

6	2.0
8	4.0
12	8.0
16	16.0

Direct feed chlorinators, which operate solely from gas pressure in the chlorine cylinder, shall not be used for the application of liquid chlorine.

Table 2. Chlorine Required to Produce 50 mg/L Concentration in 100 ft. of Pipe by Diameter.

Pipe Diameter (inch)	100% Chlorine (lb)	1% Chlorine Solution (gallon)
4	0.026	0.32
6	0.060	0.72
8	0.108	1.30
10	0.170	2.04
12	0.240	2.88
16	0.434	5.20

2) Slug Method

Calcium hypochlorite granules shall be placed in the main during construction as in the Continuous Feed Method. Preliminary flushing and chlorinating of the main shall be the same as in the Continuous Feed Method except for free chlorine concentrations and contact time. At a point not more than 10 ft. downstream from the beginning of the new main, water entering the new main shall receive a dose of chlorine fed at a constant rate such that the water will have not less than 100 mg/L free chlorine. The chlorine shall be applied continuously and for a sufficient period to develop a "slug" of chlorinated water that will, as it moves through the main, expose all interior surfaces to a concentration of 100 mg/L for at least 3 hours.

The free chlorine residual shall be measured in the slug as it moves through the main at intervals not more than 2000 ft.

As the chlorinated water flows past fittings and valves, related valves and hydrants shall be opened so as to disinfect appurtenances and pipe branches.

After the required retention period, the main shall be flushed using potable water until the water leaving the system shows a chlorine concentration of less than 1 mg/L or no higher than that prevailing in the water used for flushing. A neutralizing chemical shall be applied to the water to be wasted to neutralize thoroughly the remaining chlorine residual.

In the event the mains are damaged and are in need of repairing, cleaning, disinfection, flushing, testing, or similar operational actions, they shall be done in accordance with the most current standard issued by AWWA (AWWA C-601).

2. **Final flushing:** Shall be preformed with potable water and shall follow to ensure that the chlorine concentration is not higher than that generally prevailing in the system. Chlorinated water shall not be discharged to any water course or drainage way until it is diluted or reduced to a level, which will result in no damage to aquatic life.
3. **Bacteriological Tests:** After final flushing and before the water main is placed in service, 2 consecutive samples shall be collected at 24 hours intervals for each 2000 feet of line. These samples shall be tested for bacteriological quality by the State Laboratory or other certified laboratory and shall show the absence of

coliform organisms. Samples will be collected by the Authority Inspector (through the use of sample taps supplied by the Contractor) and delivered to the Testing Laboratory by the Authority within 48 hours of written notifications from Contractor. If the initial disinfection fails to produce satisfactory samples, the new main may be flushed again and re-sampled. If bacteriological samples still fail to produce acceptable results, then disinfection shall be repeated until satisfactory samples have been obtained. The contractor/developer will be billed by the Authority for the cost of the bacteriological testing.

END OF SECTION