

STANDARD SPECIFICATIONS  
SECTION 02511  
CHLORINATION AND DECHLORINATION

PART 1 GENERAL

1.1 DESCRIPTION

- A. Section includes requirements for chlorination and dechlorination procedures for water mains.

1.2 QUALITY ASSURANCE

- A. Commission employees will collect bacteriological samples and Commission laboratories will perform bacteriological testing.

1.3 SUBMITTALS

- A. Submit For Information Only.
  - 1. Qualifications and experience of personnel under whose supervision chlorination or dechlorination is to be performed when using pressurized liquid chlorine described in AWWA B301 or other pressurized chemicals.
  - 2. Method of Construction to include method of chlorination, type and quantity of chemicals, source of water for disinfection, discharge locations of chlorinated water or, if required, method of treating chlorinated water.

PART 2 PRODUCTS

2.1 MATERIALS: Follow Section 02510, AWWA standards, and specified herein.

- A. Dechlorination Tablets: LPD-CHLOR™ Sodium Sulfite, Bio-Max Sodium Sulfite, or VITA-D-CHLOR (ascorbic acid).
- B. Bag: 16 inch (top opening) by 8 inch nylon.
- C. Diffusers:
  - 1. For flow rates up to 120 gpm: Use 4-inch circular strainer to hold bag with sodium sulfite or ascorbic acid tablets, attach to fire hydrant or fire hose using adapter.
  - 2. For flow rates from 31 to 1250 gpm: Use Pollard LPD-250 or LPD-250A Diffusing Dechlorinator.
    - a. Low Flow Inserts: For flow rates from 31 to 200 gpm.
- D. Rubber Bands: Heavy duty to fit around nylon bag.

- E. Fire Hose: Standard 2 1/2 inch.
- F. Adapters: To connect 4-inch circular strainer to fire hydrant or fire hose.
- G. End Wall Cap: Threaded for use with standard fire hose.
- H. Protection Equipment: See LPD-CHLOR™ tablet Material Safety Data Sheets (MSDS).
- I. Chlorine Field Test Kit (Hach Colorimeter).

## PART 3 EXECUTION

### 3.1 WORK PERFORMED BY THE COMMISSION

- A. Take bacteriological samples within 3 working days after receipt of written notification from Contractor that chlorination is complete. Results of sample analysis will be available within 3 calendar days after sampling.

### 3.2 CHLORINATION BY CONTRACTOR

- A. Notify Engineer 3 working days before performing chlorination and dechlorination.
  - 1. Provide blow off with sample point at end of each branch and end of main line.
  - 2. All valves including fire hydrant lead valves within chlorinated section to be left open during chlorination.
- B. Supply water for disinfection and filling mains from temporary jumper with approved backflow preventer.
  - 1. When no source of water from existing main is available, provide potable water.
  - 2. Pre-flush water source prior to chlorination until water has chlorine residual less than 2.5mg/l and pH is less than 9.2.
- C. Use continuous feed method or tablet method for chlorination following AWWA C651 for disinfecting water mains, except section 4.4.2.1., and as required herein.
- D. Approved Forms of Chlorine: Liquid chlorine, sodium hypochlorite solution, and calcium hypochlorite granules or tablets following AWWA C651.

### 3.3 CHLORINATION METHODS

- A. Continuous Feed Method.
  - 1. Proportion mixture of chlorine solution and water so that minimum of 25 mg/l free chlorine concentration is placed into main and appurtenances to be chlorinated. See table below for guidelines regarding quantity of chlorine needed for initial feed.

2. Retain concentrated chlorinated water in main for 24 hour period.
3. At end of 24 hour period, treated water shall contain no less than 10 mg/l free chlorine throughout main.
4. Flush out main at end of 24 hour period using jumper until water has chlorine residual less than 2.5 mg/l total chlorine and pH less than 9.2.

CONTINUOUS FEED METHOD																
Pipe Diameter (inches)	LENGTH OF PIPE TO BE CHLORINATED															
	100'	200'	300'	400'	500'	600'	700'	800'	900'	1K	2K	3K	4K	5K	6K	7K
1.5	0.025	0.01	0.016	0.02	0.03	0.033	0.038	0.04	0.05	0.06	0.11	0.16	0.22	0.28	0.33	0.38
2	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.20	0.30	0.40	0.50	0.60	0.70
2.5	0.02	0.03	0.05	0.06	0.08	0.09	0.10	0.12	0.13	0.15	0.30	0.45	0.60	0.75	0.90	1.10
3	0.022	0.04	0.06	0.08	0.10	0.13	0.15	0.16	0.20	0.22	0.43	0.60	0.86	1.10	1.30	1.51
4	0.038	0.07	0.12	0.15	0.20	0.23	0.26	0.30	0.35	0.38	0.76	1.15	1.53	1.92	2.30	2.68
6	0.09	0.18	0.26	0.35	0.45	0.53	0.62	0.70	0.80	0.88	1.77	2.70	3.50	4.40	5.30	6.20
8	0.20	0.30	0.50	0.60	0.80	0.90	1.10	1.20	1.40	1.60	3.10	4.70	6.20	7.80	9.30	10.90
10	0.24	0.48	0.70	1.00	1.20	1.50	1.70	2.00	2.20	2.40	4.90	7.30	9.70	12.20	14.60	17.00
12	0.35	0.70	1.10	1.40	1.80	2.10	2.50	2.80	3.20	3.50	7.00	9.00	14.00	17.50	21.00	24.50
16	0.60	1.30	1.90	2.50	3.10	3.70	4.30	5.00	5.60	6.20						
18	0.80	1.60	2.40	3.20	4.00	4.70	5.50	6.30	7.10	7.90						
20	1.00	2.00	2.90	3.90	4.90	5.90	6.80	7.80	8.70	9.70						
24	1.40	2.80	4.20	5.60	7.00	8.40	9.80	11.20	12.60	14.00						

CHART LIST POUNDS OF HTH (70% CHLORINE) TO BE USED TO CHLORINATE GIVEN SIZE PIPE FOR DESIRED PIPE LENGTH.

5. Preliminary flushing of pipe required by AWWA C651 before chlorination is optional if interior is broom swept or in clean condition, as determined by Contractor.

**B. Tablet Method.**

1. Do not use this method unless interior of pipe, fittings, and valves can be kept clean and dry.
2. Average Chlorine Dose: Approximately 25 mg/l free chlorine.
3. Seal ends of pipelines that contain tablets or granules to prohibit entry.
4. Flush out main at end of 24 hour period using jumper until water has chlorine residual less than 2.5 mg/l and pH is less than 9.2.

**3.4 COMPLETION OF CHLORINATION**

- A. Notify Engineer in writing when chlorination is complete and ready to have bacteriological samples taken.

- B. Should residual and bacteriological analyses not be satisfactory to Engineer, rechlorinate main and notify Engineer in writing when rechlorination is complete and ready to have bacteriological sample taken.
- C. Place mains in service when analysis is complete and approved by Engineer.

### 3.5 DISCHARGING CHLORINATED WATER

#### A. Methods.

- 1. Discharge into existing sanitary sewer manholes.
  - a. Maintain minimum 1 foot vertical air gap between end of discharge pipe and manhole frame.
  - b. Do not cause surcharge or disrupt sewer service.
  - c. Flow rate into the sanitary sewer may not exceed 0.25 mgd.
    - 1) If flow rate is expected to exceed 0.25 mgd, disposal to sanitary sewer may be possible through coordination with WSSC's Wastewater Collection System Group and/or the appropriate Production Team wastewater treatment plant.
- 2. If a sanitary sewer is not available, an on-site tank or detention pond may be used to hold discharge water until chlorine naturally dissipates or can be treated with dechlorination chemicals.
  - a. Maintain 12-inches of freeboard above water level in the on-site tank or detention pond to prevent the on-site tank or detention pond from overflowing due to rainfall.
  - b. Tank or detention pond may not be emptied to environment until chlorine residual tested within 15 minutes of sample collection from at least 3 representative locations in the tank or pond is non-detectable (<0.10 mg/l) as required by Part IV, Section D of the General Discharge Permit.
- 3. When sanitary sewers and detention ponds are not available, dechlorinate chlorinated water, or store chlorinated water before discharging as specified below.

#### B. Dechlorination or storage of chlorinated water before discharge.

- 1. Chemically dechlorinate water or store water until chlorine residual is non-detectable.
- 2. The discharge must meet all Maryland Department of the Environment (MDE) requirements as specified in General Discharge Permit number 06 HT, Part IV Sections A and D.
  - a. Collect at least 3 grab samples evenly spaced over course of discharge.
  - b. Analyze samples for chlorine residual.
  - c. Chlorine residual: Non-detectable in all samples.
  - d. If water is chemically dechlorinated, dissolved oxygen (DO) must be measured as well in each of the 3 samples.
  - e. DO: 5.0 mg/L or greater for discharges to I, I-P, and II waters and 6.0 mg/L or greater for discharges to III, III-P, and IV-P waters.

#### C. Safety Procedures:

- 1. Commission health and safety programs.

2. May use subcontractor specializing in dechlorination of superchlorinated water.
  - a. List of such contractors is provided in Appendix F of the Pollution Prevention Plan.

3.6 DISCHARGING POTABLE WATER (0 – 4 milligram per liter [mg/L] Chlorine)

- A. Discharge potable water as specified in 3.5 A.
- B. When sanitary sewers, tanks, or detention ponds are not available at project site, dechlorinate potable water, store, or discharge specified herein.
  1. Safety Procedures: LPD-CHLOR™ MSDS and the Commission health and safety programs.
  2. To treat flow rates up to 120 gpm: Use fabricated diffuser of 4-inch strainer and adapter.
    - a. Place 8 tablets in 8 inch by 16 inch (top opening) nylon bag with 4 tablets pushed to each side of bag.
    - b. Fold bag over tablets, twisting in center.
    - c. Secure with rubber bands and position firmly inside fabricated diffuser.
    - d. Estimated time to replenish tablets: 3 days for flows of 1 to 30 gpm and 15 hours for flows of 31 to 120 gpm.
  3. To treat flow rates from 31 – 1250 gpm: Use Pollard LPD-250 or LPD-250A Diffusing Dechlorinator with low flow insert for flow rates from 31-200 gpm.
    - a. Minimum tablets: 10 for every discharge.
    - b. Carefully stack tablets in column chamber of LPD unit.
    - c. Estimated discharge duration for Pollard diffuser.

Number of Tablets	Estimated Discharge Duration (in hours) that Can Be Treated by the Pollard LPD-250			
	Low flow (1 – 30 gpm)	Medium flow (31 – 150 gpm)	High flow (151 – 300 gpm)	Very High flow (301 – 1250 gpm)
10	Do not use for flows < 30 gpm	8	4	1/2
11		9	4-1/2	1/2
12		10	5	1/2
13		10-1/2	5-1/2	1/2
14		11-1/2	6	1/2
15		12-1/2	6	1/2
16		13	6-1/2	1
17		14	7	1
18		15	7-1/2	1
19		16	8	1
20		16-1/2	8	1

4. Number of tablets used during a given discharge: Dependent on various factors such as flow rate and water temperature.
5. Before being released into the environment, test treated water to assure complete dechlorination has been achieved.
6. Discharging from fire hydrant:
  - a. Attach fabricated diffuser directly to either 2 1/2 inch side or 4 inch side of fire hydrant using appropriate adapters or attach 2 1/2 inch hose to 2 1/2 inch side of hydrant and to fabricated diffuser using appropriate adapter.
  - b. Pollard LPD-250A Diffusing Dechlorinator: Attach directly to 2 1/2 inch side of hydrant or attach 2 1/2 inch hose to hydrant and diffuser.
  - c. Pollard LPD-250 Diffusing Dechlorinator:
    - 1) Attach to 1 end of 2 1/2 inch hose and attach other end of hose to fire hydrant.
    - 2) Do not attach directly to hydrant.
  - d. Direct flow so discharge does not cause erosion or disrupt traffic.
7. Discharging from blowoff or pump:
  - a. Use standard fire hose and appropriate adapters and position diffuser so discharge does not cause erosion, using filter geotextile or tarp when necessary.
  - b. When discharging from end wall-type blowoffs, replace the standard end wall cap with a modified cap equipped with 2 1/2 inch or 4 inch threaded connection.

### 3.7 CONNECTION BETWEEN EXISTING AND NEW MAINS

- A. Clean and spray or swab new pipe, fittings, and valves with minimum 1 percent solution of chlorine just before installation.

## PART 4 MEASUREMENT AND PAYMENT

- 4.1 Providing for and complying with requirements in this Section will not be measured for payment, but cost will be considered incidental to Contract.

**\*\*WSSC\*\***