SP-151094
(New)

SPECIAL PROVISIONS
FOR
TESTING AND DISINFECTION

Story County
STBG-SWAP-0155(703)--SG-85

Effective Date
May 18, 2021

THE STANDARD SPECIFICATIONS, SERIES 2015, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Pressure and Leak Testing of Water System

B. Disinfection of Potable Water Systems

1.02 DESCRIPTION OF WORK

Test and disinfect water mains, valves, fire hydrants, and appurtenances.

1.03 SCHEDULING AND CONFLICTS

A. Notify the Engineer two working days in advance of testing or disinfection operations to coordinate the operations.

B. The Engineer or his/her representative is required to be in attendance during testing or disinfection.

1.04 SPECIAL REQUIREMENTS

Comply with the procedures and requirements stipulated in the supplemental documents titled “City of Ames Water Main Disinfecting, Flushing, and Testing Using the Continuous-Feed Method”. This document is available by request from the City of Ames.

1.05 MEASUREMENT AND PAYMENT

Testing and disinfection of water systems is incidental to the construction of pipe and fittings.

PART 2 - PRODUCTS

2.01 DISINFECTION AGENT - CHLORINE

A. Liquid Chlorine complying with AWWA B300 and AWWA B301.

B. Sodium Hypochlorite complying with AWWA B300.

C. Calcium Hypochlorite complying with AWWA B300.

D. All disinfecting agents to be NSF 60 certified. Supply and store in the original container.

PART 3 - EXECUTION

3.01 SEQUENCE OF TESTING AND DISINFECTION

Perform operations according to AWWA C651 in the sequence below. Successfully complete each operation before continuing to the next operation. The Jurisdiction will provide reasonable quantities of water for flushing and testing.

A. Continuous-Feed or Slug Method (After Water Main Installation): The sequence of testing and disinfection may be modified with approval of the Engineer.

1. Perform initial flush.
2. Perform disinfection.
3. Flush after disinfection.
4. Perform pressure and leak testing.

B. Tablet Method (Concurrent with Water Main Installation): Modify the procedure for flushing, disinfection, and pressure and leak testing as needed if tablet method is used.

1. Perform disinfection.
2. Flush after disinfection.
3. Perform pressure and leak testing.

3.02 INITIAL FLUSHING

A. Flushing:

1. Coordinate flushing with the Jurisdiction.
2. Flush pipe prior to disinfection using potable water.
3. Measure flushing velocity.

4. Obtain a minimum flushing velocity of 3 feet per second in the pipe to be disinfected.

B. Minimum Flushing Rate: According to AWWA C651, Table 3, based on 40 psi residual pressure (see table below).

Table 1: Minimum Flushing Rate

Pipe Diameter (inches)	Flow Rate for Flushing (gpm)	Number of Taps[2]			Number of 2 1/2" Fire Hydrant Outlets[1]
		1"	1 1/2"	2"	
4	120	1	-	-	1
6	260	-	1	-	1
8	470	-	2	-	1
10	730	-	3	2	1
12	1,060	-	-	3	2
16	1,880	-	-	5	2

[1]With a 40 psi pressure in the main with the fire hydrant flowing to atmosphere, a 2 1/2 inch fire hydrant outlet will discharge approximately 1000 gpm; and a 4 1/2 inch fire hydrant outlet will discharge approximately 2500 gpm.
[2]Number of taps on pipe based on discharge through 5 feet of galvanized iron pipe with one 90 degree elbow.

C. Property Protection: Protect public and private property from damage during flushing operations.

3.03 DISINFECTION

A. General:

1. Disinfect according to AWWA C651. The tablet method contained in AWWA C651 is not to be used unless approved by the Engineer.

2. Keep piping to be chlorinated isolated from lines in service and from points of use.

3. Coordinate disinfection and testing with the Engineer.

4. Obtain and test water samples, unless otherwise provided by the Engineer.

B. Procedure:

1. Induce a flow of potable water through the pipe.

2. Introduce highly chlorinated water to the pipe at a point within 5 pipe diameters of the pipe's connection to an existing potable system, or within 5 pipe diameters of a closed end, if there is no connection to an existing system.

3. Introduce water containing a minimum of 25 mg/L free chlorine until the entire new pipe contains a minimum of 25 mg/L free chlorine.

4. Retain chlorinated water in the pipe for at least 24 hours and no more than 48 hours.

3.04 FINAL FLUSHING

A. Flush pipe using potable water until chlorine residual equals that of the existing potable water system.

B. Dispose of chlorinated water to prevent damage to the environment. Dechlorinate highly chlorinated water from testing before releasing into the ground or sewers. Obtain Contracting Authority approval prior to flushing activities.

1. Check with the local sewer department for the conditions of disposal to the sanitary sewer.

2. Chlorine residual of water being disposed will be neutralized by treating with one of the chemicals listed in the following table.

Table 2: Amounts of Chemicals Required to Neutralize Various Residual Chlorine Concentrations in 100,000 Gallons of Water

Residual Chlorine Concentration mg/L	Sulfur Dioxide (SO_2) lb	Sodium Bisulfite ($NaHSO_3$) lb	Sodium Sulfite (Na_2SO_3) lb	Sodium Thiosulfate ($Na_2S_2O_3 + 5H_2O$) lb	Ascorbic Acid ($C_6O_8H_6$) lb
1	0.8	1.2	1.4	1.2	2.1
2	1.7	2.5	2.9	2.4	4.2
10	8.3	12.5	14.6	12.0	20.9
50	41.7	62.6	73.0	60.0	104

3.05 PRESSURE AND LEAK TESTING

A. Remove debris from within the pipe. Clean and swab out pipe, if required.

B. Secure unrestrained pipe ends against uncontrolled movement.

C. Isolate new piping from the existing water system.

D. Fill and flush all new piping with potable water. Ensure all trapped air is removed.

E. Pressurize the new pipe to the test pressure at the highest point in the isolated system. Do not pressurize to more than 5 psi over the test pressure at the highest point in the isolated system. All new fire hydrant assemblies 10 feet in length or greater shall be pressure tested.

F. Test and monitor the completed piping system at 1.5 times the system working pressure or 150 psi, whichever is greater, for 2 continuous hours.

G. If at any time during the test the pressure drops to 5 psi below the test pressure, repressurize the pipe by pumping in potable water in sufficient quantity to bring the pressure back to the original test pressure.

H. Accurately measure the amount of water required to repressurize the system to the test pressure.

I. No leakage is allowed.

J. Repair all visible leaks regardless of the amount of leakage.

3.06 BACTERIA SAMPLING

Test water mains according to AWWA C651, except as modified below:

A. Collect samples every 1200 feet of new water main plus one set from the end of the line and at least one from each branch greater than one pipe length. If trench water entered the new main during construction, or if excessive quantities of dirt and debris entered the main, the Engineer may reduce the sampling interval to every 200 feet of new main.

B. Collect samples according to one of the following methods as directed by the Engineer:

1. Collect an initial set of samples after flushing and then an additional set after a minimum of 24 hours without any water use. The engineer may reduce the sampling interval to 16 hours.

2. Allow water to sit in the new main for a minimum of 16 hours after flushing without any water use. Collect an initial set of samples and allow the sampling ports to run for a minimum of 15 minutes. Collect a second set of samples from the sampling ports.

3.07 RE-DISINFECTION

If the initial disinfection fails to produce satisfactory bacteriological samples, flush the main again and reinitiate the sampling process. If check samples show the presence of coliform organisms, re-chlorinate the main prior to flushing and sampling until satisfactory results are obtained.

3.08 PUTTING WATER MAIN IN SERVICE

Put the completed water system in service only after obtaining permission from the Contracting Authority.