

Water Main Testing Specifications

Pressure and Leakage Test

A. Testing Procedures

1. All pressure leakage testing shall be tested against installed pipe, fittings, valves, joints, and fire hydrants up to nozzles.

B. Valve Operations

Village of Mundelein Water Division personnel are the only individuals authorized to operate any water valves.

C. Taps for Testing

Contractor/developer is required to provide one (1)-inch service taps in manholes for test gauges, flushing needs, and for disinfection at each end of the pipe test section.

1. Service tap materials are to be purchased from the Village of Mundelein Water Division.
2. Contractor shall make the tap connection using an approved tapping tool on PVC C-900 piping, contractor shall provide removed coupon to Village of Mundelein Water Division Inspector.
3. Contractor shall schedule an appointment with the Village of Mundelein Water Division for the witnessing/inspection of all taps. 24-hour notice prior to appointment must be provided to the Village of Mundelein Water Division.
4. Contractor shall remove copper tube with goose neck assembly from manholes upon completion of testing and chlorination procedures.

D. Air Removal

Before applying the specified test pressure, air shall be expelled completely from the section of piping under test. Air removal will be done in conjunction with the flushing procedures of the water main (see Flushing Requirements.)

E. Allowable Leakage

No pipe installations will be accepted if the leakage is greater than that determined by the following formula:

In inch-pound units,

$$\frac{L}{133,200} = \frac{SDv}{P}$$

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Where:

L	=	allowable leakage, in gallons per hour
S	=	length of pipe tested, in feet
D	=	nominal diameter of the pipe, in inches
P	=	average test pressure during the leakage test, in pounds per square inch (gauge)

In metric units,

$$L_m = \frac{SDvP}{715,317}$$

Where:

LM	=	allowable leakage, in liters per hour
S	=	length of pipe tested, in meters
D	=	nominal diameter of the pipe, in millimeters
P	=	average test pressure during the leakage test, in kPa

These formulas are based on an allowable leakage of 11.85 gpd/mi/in. of nominal diameter at a pressure of 150 psi.

When testing against closed metal-seated valves, an additional leakage per closed valve of 0.0078 gal/b/in. of nominal valve size shall be allowed. When hydrants are in the test section, the test shall be made against the main valve in the hydrant.

F. Acceptance of Installation

1. Acceptance shall be determined as the basis of allowable leakage or the procedures established by the Village of Mundelein Engineering Department. If any test of laid pipe discloses leakage greater than that specified, repairs or replacements shall be accomplished in accordance with the Specifications.
2. All visible leaks are to be repaired regardless of the amount of leakage.
3. Dye or any other form of colorizing the water will not be introduced into the water main for the purpose of locating leaks.

Disinfection of Water Mains

Water main disinfection will be in accordance with the State of Illinois Rules and Regulations Title 35, Subtitle F, Chapter 11, Section 652.203 of the Technical Policy Statement.

A. Flushing Water Main

1. Sections of pipe to be disinfected shall first be flushed to remove any solids or contaminated material that may have become lodged in the pipe. Fire hydrants in these sections will be flushed using either the two and a half (2 ½)-inches nozzle or the pumper nozzle to develop a velocity of at least two and five-tenths (2 5/10)-feet per second in the main.

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2. All fire hydrants will be flushed and operated in the section of water main to be tested/disinfected.
3. Village of Mundelein Water Division personnel are the only individuals authorized to operate any water valves.
4. All valves that are closed will have a tap with copper tube and goose neck assembly installed in the vault for the purpose of flushing, and disinfecting the water main to the furthest end point of each section being tested.

B. Requirement of Chlorine

Before being placed into service, all new mains and repaired portion of, or extensions to existing mains shall be chlorinated so that the initial chlorine residual is not less than 50 mg/1 and that a chlorine residual of not less than 25 mg/1 remains in the water after standing 24 hours in the pipe.

1. Liquid Chlorine

A chlorine gas-water mixture shall be applied by means of a solution-feed chlorinating device, or the dry gas may be fed directly through proper devices for regulating the rate of flow and providing effective diffusion of the gas into the water within the pipe being treated. Chlorinating devices for feeding solutions of the chlorine gas, or the gas itself, must provide means for preventing the backflow of water into the chlorine.

2. Chlorine- Bearing Compounds in Water

This method must have prior approval from the Village of Mundelein Water Superintendent before introduction. A mixture of water and high-test calcium hypochlorite (65-70% Chlorine) may be substituted for the chlorine gas water mixture. The dry powder shall first be mixed as a paste and then thinned to a one (1) percent chlorine solution by adding water to give a total quantity of seven and five-tenths (7 5/10) gallons of water per pound of dry powder. This solution shall be injected in one (1) end of the section of main to be disinfected while filling the main with water in the amounts as shown in the table which follows:

**Chlorine Requirements to Produce to mg/1
Concentration in 100-feet of Pipe – By Diameter**

Pipe Size In Inches	100 % Chlorine, Lb.	1 % Chlorine Solution, Gals.
4	0.027	0.33
6	0.061	0.73
8	0.108	1.30
10	0.170	2.04
12	0.240	2.88



3. Tablet Disinfection

This method must have prior approval from Village of Mundelein Water Superintendent before introduction. Since preliminary flushing must be eliminated in using this method, it should be utilized only when scrupulous cleanliness has been used in construction. It shall not be used if trench water or foreign material has entered the main or if the water is below 41° F, or if the piping length exceeds 50 linear feet.

Tablets should be placed in each section of pipe, hydrants, hydrant branches, and other appurtenances. Tablets must be at the top of the main and shall be attached by an adhesive approved by the Village Water Superintendent. Tablets in joints between pipe sections, hydrants, hydrant branches, or appurtenances are to be crushed and placed inside the annular space, rubbed like chalk in butt ends of sections to coat them if the type of assembly does not permit crushing.

In filling a section of piping with water when using the tablet method water velocity shall be less than one (1)-foot per second.

Number of 5-Grain Hypochlorite Tablets Required For a Dosage of 50 MG/L per Length of Pipe Section

Pipe Size Inches	Length of Pipe Section (Foot)					
	Up to 13	18	20	30	40	
2	1	1	1	1	1	
4	1	1	2	2	2	
6	2	2	3	3	4	
10	3	5	7	7	9	
12	5	6	10	10	14	

B. Point of Application

The preferred point of application of the chlorinating agent is at the beginning of the pipeline extension or any valved section of it, and through a corporation stop inserted in the pipe.

1. The contractor will install corporation cocks with a copper tube gooseneck assembly for the purpose of disinfecting and as sample collection point at each branch, dead end, or a location which has a closed valve. Fire hydrants will be disinfected as part of this procedure.
2. At a point not to exceed five (5)-feet downstream from the beginning of the new main the water entering the new main will receive a dose of chlorine fed at a constant rate such that the water will have not less than 25 mg/1 free chlorine.

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3. Water from the existing distribution system shall be made to flow at a constant rate into the new main.
4. The Village of Mundelein Water Division personnel must witness the disinfection process. An appointment with 24-hour prior notice must be scheduled with Village of Mundelein Water Division.
5. In the process of chlorinating newly laid pipe, all valves, fire hydrants, or other appurtenances shall be operated while the pipe line is filled with the chlorinating agent and under normal operating pressures.

Disinfection of Water Services (Larger Than Two (2)-Inches)

For the purpose of clarifying this section, water service in this section refers to one (1) or more of the following installations that terminate inside of a building under construction.

- The service line being installed is for the purpose of a combination domestic and fire protection use.
- The service line being installed is for the purpose of branching into multiple domestic services inside of a meter room.
- The service line is the section of main being tested from the Village of Mundelein right-of-way valve to a location inside of the building.
- There are no fire hydrants installed on the service line.

A. Meter Rooms/Building Installations

1. The service line will be disinfected to the inside valve of the meter room prior to any branch service being connected.
2. The meter room will have a permanent heating system installed and in working condition prior to the disinfection.
3. One (1) sample point will be provided at the source and one (1) sample point will be provided at the inside valve provided the length of pipe does not exceed 1,000-feet.
4. The contractor will supply a copper tube gooseneck assembly at each of the sample points.
5. The Village of Mundelein in Water Division personnel must witness the disinfection process. An appointment with 24 hours prior notice must be scheduled with Village of Mundelein Water Division.

B. Domestic/Fire Service Mains/Meter Room

1. The service line will be disinfected up to the inside valve on both the fire branch and the domestic branch.

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2. The Fire Service Main Branch will have a valve of equal size to the riser section installed prior to chlorination.
3. The building, meter room, or location of the incoming service line will have a permanent heating system installed and in working condition prior to the disinfection.
4. One (1) sample point will be provided at the source and one (1) sample point will be provided at the inside valve provided the length of pipe does not exceed 1,000-feet.
5. The contractor will supply a copper tube goose neck assembly at each of the sample points.
6. The Village of Mundelein Water Division personnel must witness the disinfection process. An appointment with 24 hours prior notice must be scheduled with Village of Mundelein Water Division.

Dechlorination Requirements

Following chlorination, all treated water shall be thoroughly flushed from the newly laid pipe using the fire hydrant(s) and/or all the copper gooseneck assemblies. The flushing shall replace the highly chlorinated water with water that has a chlorine residual of less than 1mg/1 or equal to the residual from the supply service.

- The discharging of chlorinated water must be expelled to the surrounding ground surface.
- The contractor/developer must comply with all of the I.E.P.A. Rules, Regulations, and Standards for dechlorinating water as part of the discharging.
- The contractor/developer is responsible for the equipment and materials to dechlorinate the water at each point it is discharging.
- The Village of Mundelein Water Division personnel are the only individuals authorized to operate the valves.
- The Village of Mundelein Water Division personnel must witness the dechlorination procedures when flushing the water mains. An appointment with 24-hour prior notice must be scheduled with Village of Mundelein Water Division.

Sampling and Testing

Sample collection for bacterial testing will start immediately after flushing the highly chlorinated water from the system and prior to any portion of the water main being placed into service. Samples will be collected at all sample points designated by the Village of Mundelein Water Superintendent. Sampling procedures must follow the I.E.P.A. Standards for construction of new water mains.

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A. Locations and Spacing

1. Samples will be collected from each dead end, branch lateral, or section of pipe that has a closed valve. Samples will be collected from the copper tube with gooseneck assembly at these points.
2. Samples will be collected from fire hydrants at points not to exceed 1,000-feet of linear water main.
3. A sample will be collected from the copper goose-neck assembly point that is located no further than five (5)-feet downstream from the beginning of the new water main.

B. Collection Requirements

1. The contractor is required to collect all samples at the location(s) designated by the Village of Mundelein Water Superintendent.
2. Village of Mundelein Water Division personnel are the only individuals authorized to operate any water valves and must witness all samples at time of collection. 24-hour prior notice must be scheduled with the Village of Mundelein Water Division.
3. The contractor is required to take the collected samples to a certified laboratory approved by the Village of Mundelein Water Superintendent.
4. The Village of Mundelein Water Division has the right to collect quality control samples at the same time contractor collects samples. The charges for the quality control samples will be charged to the contractor.
5. Samples will be collected on consecutive days with at least 24-hours of separation between the collection times.
6. Each sample collected will be tested for quality and must show the absence of coliform organisms.

C. Satisfactory Sample Results

If all the samples tested meet the Bacterial Quality Standards and are certified as satisfactory by the testing lab:

1. The contractor may have the lab fax the results directly to the Village of Mundelein Water Division;
2. The contractor must provide original copies of the certified results to the Village of Mundelein Water Superintendent within seven (7) business days of the date on the test results; and



3. The contractor must contact the Village of Mundelein Water Division to schedule an appointment to have the water main placed into service within 72 hours of the satisfactory test results being certified and only as approved by the Water Superintendent.

Unsatisfactory Sample Results

If any one (1) of the samples tested fails to meet the Bacterial Quality Standards and is deemed unsatisfactory, then all the samples collected on the same date for the tested section of pipe, will be considered unsatisfactory.

1. Unsatisfactory samples from the first day of collection will be discarded. A new first day collection must be scheduled with the second day to be consecutive.
2. Unsatisfactory samples from the second day of collection will be discarded. First day samples will also be discarded and the contractor must schedule new first and second day samples.

The contractor will have up to three (3) chances of first day and two (2) chances of second day bacterial testing to obtain satisfactory results on all the samples collected and tested.

3. Should the contractor fail to obtain satisfactory results after the allotted attempts, the water main section being tested is to have the original disinfection procedures repeated until satisfactory results are obtained.

Meter Room Requirements

(Future Section) Contact Public Works Department in the interim.

