

## SECTION 4 – TESTING AND DISINFECTION

### 1. GENERAL

Upon completion of the construction work the Contractor shall conduct the necessary pressure and leakage tests, and shall disinfect the completed water mains and appurtenances. The Contractor shall furnish all labor, tools, equipment and materials for making the tests. In the event that the pressure or leakage test is unsatisfactory, or bacteriological tests indicate that disinfection is incomplete, the Contractor shall take corrective measures and shall repeat the tests until satisfactory results are obtained. Tests shall be made in the presence of an authorized representative of the Department of Public Works.

Note: No connections to the existing water system will be permitted until after satisfactory testing and disinfection of the new lines. In addition the lines must be inspected and approved for connection by the City Engineering Department.

### 2. PRESSURE AND LEAKAGE TESTS

Each section of the completed water main extensions shall be subjected to a pressure test. The section to be tested shall be valved off after having been filled with water, and a positive displacement test pump shall be used to pump clean water into the section to build up a test pressure equal to normal system pressure plus 50 psi, but in no case less than 150 psi. The test pump shall then be valved off from the system and the pressure shall be observed over a period of one hour. A drop in pressure of 5 psi or more during the one-hour test shall be taken as an indication of leakage. In the event leaks are found and corrected, the Contractor shall repeat the pressure test using the same procedure described above. Should the Contractor be unable to obtain a satisfactory pressure test over a duration of one hour, he shall then be required to perform a leakage test using a water tap and standard water meter to measure the leakage in the test section at system pressure over a period of 24 hours. Leakage during the 24 hour period must not exceed the allowable leakage for mechanical or push-on joints as shown in Table 7 of ANSI/AWWA C600-77 Publication and reproduced on Page W-25. Should the system fail to pass the leakage test, the Contractor will be required to locate and correct the leaks and to retest the system until satisfactory results can be obtained.

The Contractor shall provide suitable first quality pressure gauges with 5 lb. or smaller graduations and a standard 5/8" x 3/4" water meter in the event the meter is required for the leakage test. Pressure gauges and water meter shall be in good condition and shall be subject to such tests for proof of accuracy as the Engineer or the Department of Public Works may require.

Allowable Leak per 1000 ft. (305 m) of Pipeline\* - gph †

Avg. Test Pressure psi (Bar)	Nominal Pipe Diameter - inches															
	3	4	6	8	10	12	14	16	18	20	24	30	36	42	48	54
450 (31)	0.48	0.64	0.95	1.27	1.59	1.91	2.23	2.55	2.87	3.18	3.82	4.78	5.73	6.69	7.64	8.60
400 (28)	0.45	0.60	0.90	1.20	1.50	1.80	2.10	2.40	2.70	3.00	3.60	4.50	5.41	6.31	7.21	8.11
350 (24)	0.42	0.56	0.84	1.12	1.40	1.69	1.97	2.25	2.53	2.81	3.37	4.21	5.06	5.90	6.74	7.58
300 (21)	0.39	0.52	0.78	1.04	1.30	1.56	1.82	2.08	2.34	2.60	3.12	3.90	4.68	5.46	6.24	7.02
275 (19)	0.37	0.50	0.75	1.00	1.24	1.49	1.74	1.99	2.24	2.49	2.99	3.73	4.48	5.23	5.98	6.72
250 (17)	0.36	0.47	0.71	0.95	1.19	1.42	1.66	1.90	2.14	2.37	2.85	3.56	4.27	4.99	5.70	6.41
225 (16)	0.34	0.45	0.68	0.90	1.13	1.35	1.58	1.80	2.03	2.25	2.70	3.38	4.05	4.73	5.41	6.03
200 (14)	0.32	0.43	0.64	0.85	1.06	1.28	1.48	1.70	1.91	2.12	2.55	3.19	3.82	4.46	5.09	5.73
175 (12)	0.30	0.40	0.59	0.80	0.99	1.19	1.39	1.59	1.79	1.98	2.38	2.98	3.58	4.17	4.77	5.36
150 (10)	0.28	0.37	0.55	0.74	0.92	1.10	1.29	1.47	1.66	1.84	2.21	2.76	3.31	3.86	4.41	4.97
125 (9)	0.25	0.34	0.50	0.67	0.84	1.01	1.18	1.34	1.51	1.68	2.01	2.52	3.02	3.53	4.03	4.53
100 (7)	0.23	0.30	0.45	0.60	0.75	0.90	1.05	1.20	1.35	1.50	1.80	2.25	2.70	3.15	3.60	4.05

\*If the pipeline under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each size.

† To obtain leakage in litres/hour, multiply the values in the tables by 3.785

### 3. DISINFECTION

All water main extensions and appurtenances shall be disinfected upon completion, and after the system has been flushed to remove dirt or foreign objects which may have been accidentally introduced into the line, disinfection shall be accomplished by use of a main sterilizer for applying chlorine gas or a hypochlorinator for application of a hypochlorite solution.

The chlorine shall be introduced into the main as water is being added so that adequate mixing will occur. Chlorine shall be added until a concentration of not less than 50 parts per million of available chlorine is observed at checkpoints throughout the section being disinfected. The chlorine solution shall be left in the mains for a period of 24 hours after which the mains shall be flushed until only the normal residual chlorine found in tap water is present. Samples of water shall then be taken by methods and personnel approved by the Engineer and the City Engineering Department and shall be submitted to the bacteriological laboratory of the State Regulatory Authority or the City Engineering Department, as the City Engineering Department may direct. In the event any of the bacteriological samples show the presence of coliform organisms or an excessive total count, the disinfection procedure shall be repeated until samples of satisfactory bacteriological quality can be obtained.

The Contractor shall furnish the chlorine for main disinfection and shall furnish all labor, tools and equipment for the disinfection and sampling, but the sample bottles will be furnished at no cost by the City Engineering Department.

Disinfection procedures shall generally be in accordance with the AWWA Standard for Disinfection Water Mains, AWWA C651, latest revision.

Chlorine required to produce 50 mg/l  
concentration in 100 ft. of pipe by diameter

<u>Pipe Size (In.)</u>	<u>100% Chlorine (lb.)</u>
3	0.016
4	0.027
6	0.061
8	0.109
10	0.170
12	0.245
14	0.333
16	0.435
18	0.551
20	0.681
24	0.98
30	1.53

4. TESTING OF VALVES

Upon completion of the work, the Contractor/Developer shall operate all buried valves in the presence of the Engineer/City Engineering Department Representative to verify proper operation of each valve.

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