

1.0 GENERAL

1.1 Scope

1.1.1 This section refers to the hydrostatic testing of all new and modified watermains.

1.2 Related Sections

1.2.1 Section 02511 – Watermains.

1.2.2 Section 02516 - Water and Sewer Service Connections.

1.2.3 Section 02519 – Disinfection and Flushing.

1.2 Definitions

1.2.1 Leakage is defined as the amount of water required to maintain the test pressure in the mains over the duration of the test period.

1.2.2 Pressure test is the process to locate defects in material or workmanship, thereby permitting proper repair.

1.2.3 Leakage test is to establish that the section of line tested, including all joints, fittings and other appurtenances will not leak or that leakage is within the limits of the applicable allowance.

2.0 PRODUCTS

2.1 Supply all necessary labour, materials and equipment for the tests.

2.2 Provide evidence that pressure gauges used for watermain tests have been calibrated within current calendar year prior to undertaking the tests.

3.0 EXECUTION

3.1 Water used for disinfection of watermains may be used for leakage test.

3.2 Complete watermain leakage test prior to the installation of service connections.

3.3 Notify the Engineer at least twenty-four (24) hours in advance of all proposed tests. Perform tests in the presence of the Engineer.

3.4 When testing is done during freezing weather, protect hydrants, valves, joints and fittings from freezing.

3.5 Control rate of filling of pipes to a velocity of less than 0.45 m/sec (1.5 ft/sec).

3.6 Prior to pressure testing ensure that thrust blocks attain a minimum 15 MPa compressive strength.

3.7 Ensure that all air is purged from the watermain before performing leakage or pressure tests on the system.

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- 3.8 For pipe materials other than PVC or HDPE, calculate leakage from formulas in the appropriate sections of AWWA Standards for that type of pipe.
- 3.9 If the leakage exceeds the allowable, locate and repair leaks and defects. Repeat the test after repairs until the leakage does not exceed the allowable. Visible leaks must be repaired even when the leakage is below the allowable limits.
- 3.10 Where new watermain sections cannot be isolated from existing mains, the Contractor may apply to the Engineer to establish an alternate test pressure or have the leakage-testing requirement waived. Warranty obligations of the Contractor remain fully in effect in either event.
- 3.11 Disinfection and coliform bacteria test requirements are covered in Section 02519 - Disinfection and Flushing of Watermains.
- 3.12 Testing
- 3.12.1 Leakage Test - PVC Pipe
- .1 After backfilling is completed, carry out leakage test on all PVC watermains at an initial test pressure of 692 kPa (100 psi).
 - .2 Maintain test pressure for at least one hour. At the end of one hour, re-pressurize the main to 692 kPa with water pumped from a tank. Measure the amount of water used to re-pressurize the main to the initial test pressure to determine the leakage in the test section. The test will not be accepted if the leakage exceeds the quantity determined by the following formula from the latest edition of AWWA C605.
- $$\text{For PVC Pipe } L = \frac{ND\sqrt{P}}{130,400}$$
- L = the allowable leakage (litres per hour)
N = number of joints in the pipeline tested
D = nominal diameter of the pipe (mm)
P = the average test pressure during leakage tests in kilopascals (kPa)
- 3.12.2 Pressure Testing - High Density Polyethylene (HDPE) Pipe
- .1 Pressure test all HDPE pipes, couplings, joints and other appurtenances under a hydrostatic pressure in compliance with ANSI/AWWA C906 latest edition.
 - .1 Test pressure shall be 692 kPa (100 psi).
 - .2 Testing with compressed air is strictly forbidden.

- .3 Begin test after completion of backfilling and at least 7 days after the last concrete bearing pad has been cast.
- .4 Expose all mechanical joints for visual inspection during testing.
- .2 The test shall consist of two parts:
 - .1 Initial Expansion Phase
 - .1 After the initial pressurization of the pipe add sufficient make-up water at hourly intervals to return the pipe to the original test pressure.
 - .2 Repeat pressurization a maximum of three times after the original pressurization of the pipe.
 - .3 Test Period
 - .1 After completion of the expansion phase (3 hours after initial pressurization) begin the pressure test.
 - .2 Test period shall not exceed three hours.
 - .3 The total time under test shall not exceed 8 hours at 692 kPa. If the test is not completed within this time frame, the test section shall be permitted to "relax" for an additional 8-hour period prior to starting the next test sequence.
 - .4 At the end of the test period re-pressurize the pipe to the original test pressure. Measure the amount of water required to re-pressurize the system. The amount of water shall not exceed the allowance shown in the following table for the size of pipe being tested.

ALLOWANCE FOR EXPANSION (litres per 30.5 m of pipe @ 23°C) HIGH DENSITY POLYETHYLENE PIPE			
Nominal Pipe Size (mm)	1 Hour Test	2 Hour Test	3 Hour Test
150	1.14	2.27	3.40
125	0.81	1.61	2.46
200	1.89	3.78	5.68
250	2.65	4.92	7.94
300	4.16	8.70	12.87
350	5.30	10.22	15.88
400	10.22	12.49	18.92