

PART 7 - TESTING & DISINFECTION OF WATER MAINS & APPURTENANCES

700-1 General

All water mains and appurtenances shall be tested for pressure and leakage and shall be cleaned and disinfected prior to acceptance by the City for domestic use.

Testing and disinfection of water mains and appurtenances shall be in accordance with the applicable AWWA Standards except as herein modified.

All testing and disinfection shall be made in the presence of the Engineer. The Contractor shall notify the Engineer not less than forty eight (48) hours in advance of the actual time of testing and/or disinfection so that the Engineer may observe the procedure.

When the pressure test, leakage test, chlorination or bacteriological and plate count tests fail to meet the requirement of the Specifications, the Contractor shall make necessary repairs, replacements or repetition of procedures to conform to the specified requirements at contractor's own expense.

Adequate backflow protection and proper metering of all potable water shall be provided by the Contractor and approved by the City of Riverside Public Utilities prior to commencement of any procedure(s) hereinafter.

700-2 Pressure Test

All water mains and appurtenances shall be tested as described herein. The pressure test shall not be performed until the following conditions have been met:

- (1) In areas where a pavement surfacing is to be constructed, the pressure test shall be made only after other utilities such as, storm sewers, and sanitary sewers have been installed;
- (2) Curbs and gutters have been installed and the subgrade materials portion of the pavement area have been constructed to proper grade and all compaction tests including for water trenches have been approved by the City;
- (3) All services, fire hydrants, meter boxes and other appurtenances have been installed and adjusted to final grade and location;
- (4) All concrete anchor and thrust blocks shall have cured at least three (3) days.
- (5) Submittal of as-built drawings and all affidavits and certificates of compliance to the Inspector.

- (6) A mechanical separation between the backflow device and pipe sections undergoing pressure test has been provided by means of a blind flange as to not allow any pressure to be exerted against the backflow device check valves or OS&Y/NRS valves.

The pressure test shall be maintained on the test section not less than two (2) hours. The Contractor shall conduct a preliminary pressure test after items (1) through (5) of this section (700-2) above are completed prior to the City's pressure test. The results of the preliminary test will not be considered by the City.

The test pressure shall be 200 psi as measured at the highest elevation of the water main under test, but not less than 150 psi at the highest point unless otherwise noted.

The length of water main footage to be tested at one time shall be determined by the Engineer or his designee.

Each section of the water main to be tested shall be slowly filled with water from the nearest source by a means approved by the Engineer. The pipelines shall be filled with water and placed under a slight pressure for at least twenty-four (24) hours before the pressure test.

All air shall be vented from high spots in the water main, fire hydrants and services before making and pressure test. If hydrants or other outlets are not available, taps shall be made at the high points to expel the air by the Contractor at Contractor's expense. The locations shall be reviewed and approved by RPU Inspector prior to installation. These taps shall be capped by the Contractor after testing.

The pressure test shall be applied by means of a pump connected to the pipeline in a manner approved by the Engineer. The pump, pipe connections, bulkheads, pressure gages and other equipment, labor and materials required to perform the test shall be furnished by the Contractor.

The Engineer may check the test pressure by installing City pressure gages in place of the Contractor's gage. In case of a difference in pressure readings between gages, the City's gage reading shall govern.

All appurtenant facilities shall be tested at the same pressure and for the same duration as the mainline pipe.

All valves shall be tested for leak-proof tightness after the mainline pressure test with the test pressure on one side of the valve and atmospheric pressure on the other side.

Wet tap valve sleeves shall be hydrostatically pressure tested for a period of 1 hour at a test pressure of pipe class plus 50 psi. During and at the end of test, a solution of soapy water shall be applied at all joints to test for leakage. No pressure loss or leakage will be permitted.

700-3 Allowable Leakage

All water mains and appurtenances shall be tested as described herein.

The test pressure applied to the water main for the leakage test shall be maintained as constant as possible for not less than two (2) hours. The leakage test shall be held concurrently with the pressure test. For C-900 PVC pipe (Class 150), the test pressure shall be 225 psi and the test duration shall be four (4) hours.

The length of fire hydrant laterals and service lines are not included in the overall length of pipe in determining the allowable leakage.

All noticeable leaks shall be stopped regardless of the results of the test and defective pipe, fittings, valves, and other appurtenances discovered during the test shall be removed and replaced. Repair clamps of any kind or type are not allowed. The Engineer is to be notified of any repair work performed. The test shall be repeated until satisfactory results are obtained. All gaskets to be used only once.

The allowable leakage volume shall not exceed the following:

- (1) C-900 Pipe
14.1 gal/in. dia/mile/24 hours
- (2) Ductile Iron Pipe and CML&C Steel Pipe
15 gal/in. dia./mile/24 hours
- (3) CML&C Welded Steel Pipe – no allowable.

It is the Contractor's responsibility for locating leaks and restoring the bedding and pipe zone material in accordance with the Standard Plans and these Specifications. Damage to pipe bedding and backfill resulting from leaks discovered during the pressure leakage test need to be restored in compliance with the specification.

The pump, pipe connection, measuring devices, gages and all other equipment, labor and materials necessary for performing the leakage test shall be furnished by Contractor. The Engineer may, however, use City's measuring device in place of Contractor's equipment. In case of a difference in the measured leakage rate between the measuring devices, the City's measured leakage shall govern.

700-4 Flushing

The new mains shall be flushed prior to chlorination. The flushing velocity to be obtained for pipes 12 inches and smaller in diameter shall not be less than 2.5 ft/sec. The Contractor shall make necessary arrangements to attain the minimum velocity. The Contractor shall take due precaution in providing for adequate drainage from the site. The minimum volume of water to be flushed, at required velocity, shall be not less than the 1.5 times the volume of the pipe line from the point of filling to the point of blow-off. The

Contractor should verify that proposed hydrants to be used have adequate pressure.

Flushing is no substitute for preventive measures. If, in the opinion of the Engineer, dirt which enters the pipe, the interior of the pipe shall be cleaned and swabbed as necessary with five (5) percent hypochlorite disinfecting solution and may require additional bacteria samples.

It is the responsibility of the Contractor to remove the flushing water or the chlorinated water from the project area. The Contractor is responsible for any damage as a result of flushing operations.

The flushed water shall have a residual chlorine content not to exceed 0.10 mg/L prior to discharging into the storm drain system. The flushing operation shall be in accordance with the California Regional Water Quality Control Board requirements.

The Contractor is hereby informed that hydrant meters and backflow devices rented from the City have the following limitations:

The Contractor is hereby informed that the hydrant backflow meter devices rented from the City have the following limitations:

3 inch meter / backflow devices: 450 gpm continuous
650 gpm max peak

There will no longer be separate meter/ and or Backflow devices available for rental use. New units are integrated combo units.

700-5 Disinfection

All newly laid water mains and appurtenances shall be disinfected in accordance with AWWA C-651, Disinfecting Water Mains, except as modified herein.

Disinfection shall be done after the pressure and leakage tests have been performed and accepted. Contractor must use a qualified company to chlorinate. Here is the list of the qualified companies who are licensed to perform chlorination the RPU approved: Matchlor, Inc; Southwest Chlorination, Inc; Aqua Backflow; Spencor Inc; Morr-is Tested; Peirce Chlorine; If contractor wants to use a different company which is equal will need to get approval from RPU before using the company.

Chlorine used for disinfection must be a liquid chlorine solution by directly feeding hypo (sodium hypochlorite less than or equal 15%; typically 12.5%) or by mixing Cal-hypo (calcium hypochlorite 65-70%) granular or tablets into a liquid solution by pre-dissolving or using a feeder. Either product sodium hypo or calcium hypo shall be NSF 61 approved for potable water use. Tablets inserted (glued) inside each pipe length shall not be used. Safe handling practices contained in A.W.W.A. Manual M-20 shall be followed by the Contractor. The chlorine solution shall be applied by the continuous feed method as outlined in Sub-section 5.2 of AWWA C-651-05 except as may be modified by the Engineer. Contractor must keep Material Safety Data Sheet (MSDS) onsite.

The chlorine solution shall be applied at the beginning of the water main to be disinfected through a corporation stop installed for this purpose, through curb stop or through any other opening as may be allowed or required by the Engineer. Fire hydrants and air valves shall not be used for this purpose. However, an air valve riser pipe with the air valve removed may be an appropriate chlorine solution feed point.

Water used to convey the chlorine solution throughout the water main shall be obtained from the existing distribution system. The rate of flow shall be so controlled that water will flow slowly into the undisinfected main during the application of chlorine.

The end of the main being chlorinated shall be kept open and running during the application of chlorine and until the desired chlorine concentration is reached, after which each curb stop, fire hydrant, air valve line or any other connection to the water main shall be individually opened and flushed with the chlorine solution. After the water main and all appurtenances thereto have been loaded with chlorine to the proper concentration, the water source, chlorine feeder and all other openings to the water main shall be closed. The initial minimum concentration shall not be less than fifty (50) milligrams per liter (Mg/L) of chlorine, but not greater than 150 (Mg/L).

The chlorine solution shall remain in the water main for not less than twenty-four (24) hours after which the treated water through the length of the main shall contain not less than twenty-five (25) Mg/L of chlorine.

The chlorine content of the water shall be tested by the Engineer and if found to be less than twenty-five (25) Mg/L after twenty-four (24) hours contact, the water main and appurtenances shall be rechlorinated and held for another minimum twenty-four (24) hour period. No chlorination shall be started unless it can be completed by 2 p.m. on a Thursday.

During the period of chlorination, all main line valves and blow-off valves shall be operated to insure that the discs and seats are fully open to chlorinated water. Air valves, when removed, shall be chlorinated separately under the direction of the Engineer.

Upon approval of the chlorine residual at twenty-four (24) hours by the Engineer, the chlorine solution shall be flushed from the water main through each service, fire hydrant and blow-off. Flushing shall continue until the chlorine residual is not more than five-tenths (0.5) Mg/L as determined by the Engineer using a digital instrument.

In no case shall a chlorine solution of over five-tenths (0.5) Mg/L be held in the main or appurtenances for more than five (5) days from the initial injection to the final flushing.

It is the responsibility of the Contractor to dispose of the chlorinated water from the project area.

The chlorinated water shall have a residual chlorine content not to exceed 0.10 Mg/L prior to discharging into the storm drain system. The flushing operation shall be in accordance with the California Regional Water Quality Control Board requirements.

The Contractor has two options for disposing of the chlorinated water from the project site.

Option 1. The Contractor can treat the chlorinated water with chemicals. This treatment shall neutralize any chlorine residual from the water. After treatment the dechlorinated water can be discharged into the street storm drain system.

Option 2. The Contractor shall dispose of the chlorinated water at a State of California approved treatment disposal plant.

The Contractor is responsible for any damage as a result of the disinfection operation and shall provide adequate drainage from the project site.

700-6 Bacteriological Tests

A twenty-four (24) hour period between the final flushing and the taking of bacteriological samples is required. No flushing or any movement of water in pipe is allowed during sampling phase. Following the 24 hour period, the Contractor shall have a representative of employee of California Department of Public Health (CDPH) certified laboratory take water samples for bacteriological tests. All sampling shall be done in the presence of the Inspector. Contractor shall notify the Engineer 48 hours in advance of sampling procedures.

Samples will be taken in the field by a state certified laboratory technician using a digital colorimeter and transported to the laboratory for testing. Such tests shall meet CDPH requirements for drinking water standards. The number and location of such samples will be as directed by the Engineer; however, a minimum of one bacteriological test sample per 500 feet of main and a minimum of 2 samples per day, per test section, are required. **One set of samples are required for two consecutive days, 24 hours apart. All samples, each day, must indicate absent for total coliform and have a heterotrophic plate count (HPC) of less than 200 CFU/mL. Failure of any sample will require complete retesting, under these procedures, for two consecutive days.** It is very important that all test results be submitted in writing to the Water Inspector as soon as available. Chain of Custody to be given to inspector at time samples are taken.

All laboratory testing shall be at the Contractor's expense. Original report of the test results shall be given directly to the Engineer. Emailing the results to the Engineer is preferable. It is the responsibility of the Contractor to accomplish this task. System connections cannot be scheduled until this report is submitted to the Engineer. All results must be submitted to RPU Engineer or his designee no later than three calendar days of sample date or risk resampling all samples.

Upon successful completion of bacteriological testing, the pipeline will be accepted for use in the City potable water system; however, standard policy is to accept the water mains for use upon the City giving written Notice of Final Acceptance.

700-7 Contractor's Responsibility for Testing and Disinfection

It is the sole responsibility of Contractor to construct a water main capable of passing the pressure and leakage test and to effect a disinfection of the water main. The fact that City provides inspection during the construction and testing of the water facilities and receives laboratory testing results does not relieve Contractor's responsibility in this regard.

It's the responsibility of Contractor to prevent the consumption of water for any and all uses from undisinfected mains whether by their workmen, subcontractors or any other person who may come in contact with the water from the undisinfected main.

Contractor shall indemnify and save the City harmless from any suits, claims, or actions brought by any person or persons for, or on account of, any sickness or death sustained or arising out of the consumption of water from the main until final acceptance by the City.

700-8 Connections to Existing City Water Lines

Under no circumstances shall a connection be made, permanent or otherwise, between any existing water main, hydrant or other source to any unapproved contractor installed water main regardless of size.

No permanent connection between any Contractor installed water main and existing water mains shall be made by the Contractor, except for wet tapped water services larger than 2 inches and fire services. All wet taps require full time City inspection.

Wet tapped connections with mechanical joint tapping sleeves shall be cleaned and disinfected in accordance with AWWA C-651, Sections 9 and 10. The Work shall include treating trench with a hypochlorite solution, as deemed necessary by the Engineer; thoroughly cleaning the main to be tapped, and the interiors of the sleeve and tapping gate; and swabbing the tapping sleeve interior with a 1 percent hypochlorite solution.

Water required for the initial filling, pressure testing, leakage testing, flushing and chlorination may be obtained from an existing City main or fire hydrant by use of a City hydrant backflow meter device.

All water must be measured through a City **hydrant backflow meter device**. If in a case where greater volume is required, the Contractor may use his own Approved Backflow Prevention Device of larger size, **however, the Contractor shall provide to the City of Riverside water inspector, a certificate of approval from the City of Riverside Backflow Program Specialist before use**. The Contractor shall not operate any gate valve on any existing main.

The Contractor shall pay all rental and deposit fees for hydrant backflow meter devices checked out from the City plus charges for water used.