

September 16, 2022

Bulletin 2022–002- FI

Standpipe System Testing

Standpipe design requirements in Vancouver have varied throughout the city's history (see Appendix A). This bulletin provides a summary of expectations for inspection, testing, and maintenance of existing standpipe systems based on historical design requirements.

The Fire By-law refers to NFPA 25 (2014 to 2020 editions) "Standard for the Inspection, Testing, and Maintenance of Water-based Fire Protection Systems" which, in part, states:

6.3.1 Flow Tests.

6.3.1.1* A flow test shall be conducted every 5 years on all automatic standpipe systems to verify that the required flow and pressure are available at the hydraulically most remote hose valve outlet(s) while flowing the standpipe system demand.

6.3.2 Hydrostatic Tests.

6.3.2.1* Hydrostatic tests of not less than 200 psi (13.8 bar) pressure for 2 hours, or at 50 psi (3.4 bar) in excess of the maximum pressure, where maximum pressure is in excess of 150 psi (10.3 bar), shall be conducted every 5 years on manual standpipe systems and semiautomatic dry standpipe systems, including piping in the fire department connection.

Hydrostatic pressure and flow tests are to be conducted in accordance with NFPA 25 and the following procedures:

1. Where a standpipe system includes a fire pump, the fire pump should be inspected, tested, and maintained at the same time.
2. Determine if any standpipe hose connection will be exposed to pressures above 175 psi during a flow test. If exposed, an approved pressure-regulating hose valve must be installed and installed under a sprinkler permit. (Note a pressure-"restricting" and a pressure-"reducing" are two types of "pressure-regulating" valves).
3. At each pressure-regulating hose valve, the inlet and outlet pressures must be recorded during hydrostatic and flow tests.
4. Where a master pressure-reducing valve is used in a standpipe system, the inlet and outlet pressures must be recorded during hydrostatic and flow tests.
5. All hose valves are to be tested by fully opening and closing the valves, and then attaching a test coupling to test the threads. Hose valves that do not operate smoothly or open fully shall be lubricated, repaired or replaced. Hose valves that do not conform to the BC hose thread pattern shall be replaced. Hose valves include "courtyard standpipe connections", roof hydrants, as well as wall hydrants.

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6. The fire department connection couplings or swivels are to be tested to verify they rotate smoothly, and hose threads tested by attaching a test coupling.
7. For all standpipes, the piping from the fire department connection to the fire department check valve shall be hydrostatically tested at 200 psi, or working pressure plus 50 psi, whichever is greater, for 2 hours at least once every 5 years. Where multiple fire department connections are provided, especially for high buildings, all the fire department connection piping shall be tested.
8. Where a manual dry standpipe system is installed, conduct an air test prior to introducing water into the system.
9. Where an automatic dry, or manual dry standpipe system is installed, the hydrostatic test pressure must be calculated in accordance with the fire ground formula used by and in consultation with the fire department (see Appendix B).

Testing Summary

Year built	Hydrostatic Test ⁽¹⁾⁽²⁾	Flow Tests
Pre-1979	200 psi plus ⁽³⁾	Full flow under city water pressure from the topmost 65 mm (2.5 inch) hose connection. Record static, flow and residual pressures
1979 - 1999	<ul style="list-style-type: none"> ▪ manual dry and automatic dry standpipes only 	65 psi minimum with 475 gpm (30 L/s) flowing from topmost 2 hose connections
Post-1999	<ul style="list-style-type: none"> ▪ for all standpipes, the piping in the fire department connection 	100 psi minimum with 475 gpm (30 L/s) flowing from top 2 hose connections 65 psi minimum at topmost hose stations

Notes:

1. Conduct air test prior to using water, to prevent water damage
2. Automatic wet standpipes do not require hydrostatic tests - only flow tests [NFPA 25 -2017, 6.3.2.]
3. "200 psi plus" means 200 psi, or working pressure plus 50 psi, whichever is greater

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Additional Procedures

1. Placards or signs should be permanently mounted at each fire department connection for a standpipe or combined standpipe/sprinkler system to identify the minimum pumping pressures at the connection to deliver the system demand. The minimum pressures should be determined by reviewing the building records, or having the system reviewed by a professional engineer.
2. All hydrostatic and flow testing and maintenance or repair work of fire sprinklers, fire pumps, and standpipe systems must be performed by qualified personnel.
3. Consider testing for microbiologically influenced corrosion (MIC) in the pipe.
4. All water must be discharged safely and contained within the building property lines. Consider the use of water tanker trucks or portable bladder tanks to minimize water damage to property. A permit from the City Engineering Department will be required if water is to be discharged onto city property.
5. If a fire hydrant is to be used for hydrostatic or flow testing a standpipe system, a permit from the City Engineering Department will be required.
6. Completed test reports (see Appendix C) are to be provided to the building owner or representative, and a copy placed in the fire safety plan for inspection by the fire department.

Signed,

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Assistant Chief Fire Protection Engineer

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Deputy Chief Community Safety

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Assistant Chief Community Safety

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Appendix A – Historical Design Requirements

Standpipe design and installation is governed by the Vancouver Building By-law (VBBL), through one of the following methods:

1. Within the text of the VBBL,
2. By reference to NFPA 14,
3. By reference to the British Columbia Building Code, which may in turn reference NFPA 14
4. By reference to the National Building Code, which may in turn reference NFPA 14.

Over the last 100 years, standpipes were required to be designed with water supply pressure at the topmost hose connection that varied between 0 psi to 100 psi minimum.

The following table summarizes the minimum pressures required at the most remote hose connection and hose stations, and the maximum pressures the standpipe must withstand.

Year Built *	Min Pressure at Most Remote Hose Connection	Min Pressure at Most Remote Hose Station	Maximum Pressure to Withstand**
Pre-1923	-	-	Per Fire Chief
1923 - 1965	-	-	300 psi
1966 - 1973	20 psi at 500 gpm	12 psi at 70 gpm	300 psi
1974 - 1975	45 psi at 70 gpm	45 psi at 70 gpm	200 psi plus
1976 - 1978	50 psi at 500 gpm	50 psi at 70 gpm	200 psi plus
1979 - 1999	65 psi at 500 gpm	65 psi at 100 gpm	200 psi plus
2000 - present	100 psi at 500 gpm	65 psi at 100 gpm	200 psi plus

* Year of building permit issuance – actual year of completion may vary

** “200 psi plus” means 200 psi, or working pressure plus 50 psi, whichever is greater

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Appendix B – Fire Ground Formula

The Hydrostatic Test Pressure Formula for VFRS, which is a modified fire ground hydraulic formula, assumes a required 185 gpm flowing through 200 feet of 1-3/4 inch hose using a 1 inch smooth bore nozzle.

$$\text{HTP} = \text{NP} + \text{FLH} + (5 \times \text{STOR}) + \text{APP}$$

Where HTP = Hydrostatic test pressure, minimum, psi

NP = Nozzle pressure at 50 psi

FLH = Friction loss through hose at 30 psi

STOR = Number of storeys above ground

APP = Appliance loss of 25 psi regardless of height

Example: a building in Vancouver 21 storeys in height (22 floors minus 1 omitted floor number “13”) contains a manual dry standpipe. The pressure that is to be used for the hydrostatic test of the standpipe is calculated to be:

$$\text{HTP} = 50 + 30 + (5 * 21) + 25 = 210 \text{ psi}$$

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VANCOUVER FIRE RESCUE SERVICES
Community Safety & Risk Reduction Division
Fire Prevention, Investigations, and Public Education

Appendix C – Report Forms

(See the following pages)

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Sep 2022

Tel: 3-1-1, Outside Vancouver 604.873.7000
Fax: 604.873.7872 Website: vancouver.ca/fire

Page 6 of 10

[Insert Contractor Logo]

TEST REPORT TEMPLATE			
Property Name	Property Address		Date
Type of System (use separate form for each type)	<input type="checkbox"/> Automatic dry <input type="checkbox"/> Automatic wet <input type="checkbox"/> Semiautomatic dry <input type="checkbox"/> Manual dry <input type="checkbox"/> Manual wet	<input type="checkbox"/> Combination standpipe/sprinkler	
Fire Pump Data	Manufacturer _____ Model _____ <input type="checkbox"/> Electric <input type="checkbox"/> Diesel	Rated GPM _____ Rated psi _____ Shutoff psi _____	
	<input type="checkbox"/> Public waterworks system <input type="checkbox"/> Storage tank <input type="checkbox"/> Gravity tank <input type="checkbox"/> Open reservoir <input type="checkbox"/> Other (explain)		
If public waterworks system	Static psi _____	Residual psi _____ Flow, gpm _____	
Backflow preventer	<input type="checkbox"/> Double check assembly <input type="checkbox"/> Reduced pressure device	Size _____	Make and model _____

HOSE VALVES and DUAL PRESSURE REGULATING DEVICES

Tag #	Location & Floor	Type Hose Valve			Opens and closes smoothly	Nonflowing (psi) Inlet	Nonflowing (psi) Outlet	Flowing (psi) Inlet	Flowing (psi) Outlet	GPM
		Pressure-reducing	Pressure-restricting	Standard						
1		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
2		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
3		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
4		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
5		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
6		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
7		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
8		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
9		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
10		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
11		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
12		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
(add extra pages if necessary)										

All hose valves on system operated properly?
 Yes
 No, explain _____

TESTS		
<p>Hydrostatic Test - Pressure at top of Standpipe(s)</p> <p>STP#___pressure ___psi</p> <p>STP#___pressure ___psi</p> <p>STP#___ pressure ___psi</p>	<p>Drain Test</p> <p>Reading of gauge located near water supply test connection ___psi</p> <p>Residual pressure with valve in test connection open wide ___psi</p>	<p>Flow Test</p> <p>Flow water from the hydraulically most remote standpipe outlet(s)</p> <p>Record: Static pressure ___psi</p> <p>Residual pressure ___psi</p> <p>Nozzle diam ___ in Pitot pressure ___psi</p> <p>Total Flow _____ gpm</p>
<p>Piping in FDC and all piping hydrostatically tested at ___psi for ___hrs</p> <p>Dry piping pneumatically tested?</p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No, explain _____</p>		
	<p>Date left in service with all control valves open:</p>	

	Next Flow or Hydrostatic Testing Due Date:_____
CONTRACTOR INFORMATION	
	Name of contractor_____ Address _____ Sprinkler fitter or technician (name)_____ TQ number or RFPT Licence _____ Signature_____ Date_____
SYSTEM TESTS WITNESSED BY	
	Property Owner Representative (name)_____ Title _____ Signature_____ Date _____