

Integrated Testing of Fire and Life Safety Systems

The 2019 Vancouver Building By-law, Division B, Article 3.2.9.1. and Fire By-law, Division B, Article 9.10.1.2. requires integrated testing of fire and life safety systems. The purpose of this bulletin is to clarify the intent and administrative requirements of this testing which includes the qualifications of the integrated test coordinator.

Background

Integrated testing is essentially a formal codified practice that has been taking place in British Columbia since 1998. Prior to the 2019 VBBL and since the 1999 VBBL, integrated testing was known as “Coordinated Fire and Life Safety Systems” testing.

The person responsible for providing assurance that the various fire and life safety systems were coordinated in design and functions as designed was the Coordinating Registered Professional¹ (CRP) who submitted their Letter of Assurance Schedule A to the authority having jurisdiction. The CRP is required to be a professional engineer or architect registered in British Columbia. In many cases, the CRP might rely on the Certified Professional, or another registered professional to carry out the demonstration tests of the integrated systems.

The 2019 Vancouver Building By-law, Division B, Article 3.2.9.1., requires acceptance testing of the integration of systems in accordance with CAN/ULC-S1001.

3.2.9.1. Testing

1) Where fire protection and life safety systems and systems with fire protection and life safety functions are integrated with each other, they shall be tested as a whole in accordance with CAN/ULC-S1001, “Integrated Systems Testing of Fire Protection and Life Safety Systems,” to verify that they have been properly integrated.

A similar requirement exists under Article 9.10.1.2. for smaller buildings.

The essential purpose of this testing is to verify that the life safety systems of the building function in accordance with the intended design and that interconnections with supporting systems operate as intended. This should not be confused with the commissioning of fire and life safety systems, which is an owner driven process, and which generally involves a commissioning agent to test, adjust or modify, then retest, and repeat as often as necessary to verify the system performance meets the owner’s specifications.

In the S1001 standard, one person must be designated as the “integrated test coordinator” (ITC) who is responsible for preparing the test plan and the test reports. The qualifications of the ITC is an administrative issue which is beyond the scope of the standard.

General Requirements

The CAN/ULC-S1001 “Integrated Systems Testing of Fire Protection and Life Safety Systems,” is the reference standard providing the general methodology for verifying and documenting that the applicable building systems satisfy the intent of their design and function as intended by the By-law.

Integrated testing of fire protection and life safety systems is required for all buildings large or small, simple or complex. Any building that has more than one fire protection system that must work with another system must have a test for their integration.

A building could be as simple as a house with fire sprinklers designed to NFPA 13D with connection to the interconnected smoke alarms. The activation of sprinklers triggering the smoke alarm system to sound would need to be tested as an integrated system. Or a building could be as complex as a hospital with multiple fire and life safety systems such as emergency generators, emergency lighting, sprinklers, smoke control system, air supply to operating rooms, etc. Hence the integrated test requirements and procedures will vary from being very simple to very complex; and similarly the qualifications of the Integrated Testing Coordinator could range from any person with sufficient knowledge of the systems, to a person registered in British Columbia as a professional engineer or architect.

A plan for the demonstration of the integrated tests must be prepared by the ITC and submitted to the City building inspector prior to final inspection or occupancy approval. For building projects involving more than one registered professional, the ITC is usually the CRP.

Also prior to occupancy approval, a copy of the integrated test plan must be included in the fire safety plan that must be prepared and submitted separately to the fire department.

Existing Buildings and Alterations to Existing Systems

The VBBL and the referenced CAN/ULC-S1001 standard do not provide specific guidance to existing buildings or the alteration of existing building systems. The Chief Building Official does not generally require integrated testing to be applied retroactively to existing buildings that have not previously been subject to integrated testing, except where significant alteration to existing fire or life safety systems has occurred. If it is unclear, owners should discuss significant changes to fire and life safety system with the Chief Building Official to determine if integrated testing of fire and life safety systems in accordance with CAN/ULC-S1001 is required.

Significant changes to fire or life safety could include, but are not limited to:

- the introduction of new fire detection or suppress systems,
- fundamental changes to the intended operation of fire or life safety systems to support a major addition to a building, reconstruction, or
- complete replacements of fundamental fire or life safety systems including major changes in their operating sequence.

The Vancouver Fire By-law (and BC Fire Code) reference the S1001 standard in the following sentences and notes of Division B:

2.1.3.7. Integrated Life Safety and Fire Protection Systems

1) Where life safety and fire protection systems are installed, they shall be tested in accordance with the British Columbia Building Code.

6.8.1.1. Testing and Maintenance

1) Interconnections between fire protection and life safety systems shall be tested and maintained in conformance with CAN/ULC-S1001, "Integrated Systems Testing of Fire Protection and Life Safety Systems."
(See Note A-6.8.1.1.(1).)

A-6.8.1.1.(1) Building owners must ensure that fire protection and life safety systems and their components (i.e. fire alarm systems, sprinklers, standpipes, smoke control, ventilation, pressurization, door hold-open devices, elevator recalls, smoke and

fire shutters and dampers, emergency power, emergency lighting, fire pumps, generators, etc.), including their interconnections with other building systems, are functioning according to the intent of their design. CAN/ULC-S1001, "Integrated Systems Testing of Fire Protection and Life Safety Systems," provides the methodology for verifying and documenting that interconnections between building systems satisfy the intent of their design and that the systems function as intended by the Code. Clause 6.1.5 of CAN/ULC-S1001 allows the Integrated Testing Coordinator to accept documented evidence of any tests that have been performed on a system as part of its acceptance testing for the purpose of demonstrating compliance with the integrated testing requirements of that standard, so as to avoid duplication of work.

It is not the intent of the Fire By-law that an existing building must have an integrated test performed and documented in accordance with S1001 if the building had not had an integrated test performed originally at the time of construction or alteration. Only those existing buildings which had an initial integrated test performed and documented for their final inspections will require their subsequent integrated tests one year after their final inspection, and every 5 years thereafter. The integrated test plan and test reports must be included in the building's fire safety plan where a fire safety plan is required for the building (see VFRS Bulletin 2020-003-FI).

The integrated test coordinator (ITC) for existing buildings are required to be knowledgeable of the various fire and life safety systems in the building, but is not required to be a registered professional. For most buildings with a fire alarm system, the fire alarm service technician can be, but not necessarily be, the ITC.

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