CAN/ULC-S1001-11
Integrated Systems Testing of Fire Protection and Life Safety Systems
OUTLINE

- Codes
- What is “CAN/ULC-S1001-11”? 
- Application to Codes
- Integrated Testing Plan
- Implementation
- Reports and Documentation
- Testing Types & Frequency
“Where life safety and fire protection systems are installed to comply with the provisions of this Code or the NBC/NFC, the commissioning of these integrated systems must be performed as a whole to ensure the proper operation and inter-relationship between the systems.”
The 2015 National Building and Fire Codes have been updated to reference a new document which provides much more detail around what is required for integrated systems testing:

CAN/ULC-S1001-11
This Standard outlines the procedures that are required for fire protection and life safety functions.
CAN/ULC-S1001-11-R2018
(Reaffirmed 2018)

STANDARD FOR INTEGRATED SYSTEMS TESTING OF FIRE PROTECTION AND LIFE SAFETY SYSTEMS
Life safety and fire protection systems must be tested to make sure all the systems work together.
When commissioning a building, the owner must ensure that the life safety systems and their components are functioning according to the intent of their design.
Building and Fire Officials will be asking for documentation to show that integrated systems testing has been done.
The commissioning of the building provides the documented confirmation that building systems satisfy the intent of the Code.
Who Does the Tests?

• Persons conducting tests of systems shall be knowledgeable and experienced.
• The Testing Coordinator must be knowledgeable and experienced:
  ✓ Applicable codes and standards;
  ✓ Required operation of all related systems; and,
  ✓ Required methods to test functionality of all types of systems.
National Building Code of Canada 2015

Two references in the National Building Code of Canada 2015 are significant:

• 3.2.9.1. Testing

• 9.10.1.2. Testing of Integrated Fire Protection and Life Safety Systems
National Fire Code of Canada 2015

Two references in the National Fire Code of Canada 2015 are significant:

• 2.1.3.7. Integrated Life Safety and Fire Protection Systems

• 6.8.1.1. Testing and Maintenance
What Documents are Required for compliance?

- **Integrated Testing Plan**
  Outlines the required tests and necessary functional results to conduct the systems testing.

- **Integrated Testing Report**
  Documents the implementation of the testing plan.

These documents are prepared by the “Integrated Testing Coordinator”. This is a person with qualifications and a background in life safety systems.
INTEGRATED SYSTEMS TESTING PHASES:

1. PLANNING

2. IMPLEMENTATION
Integrated Testing Plan

An Integrated Testing Plan is a document prepared PRIOR to the tests by the Integrated Testing Coordinator outlining the required tests and necessary functional results to conduct integrated fire protection and life safety systems testing.
The Plan would include in part:

- An introduction (functional objections of system integration);
- Sequence of operation;
- Test protocols and procedures;
- Procedure for notifying building occupants;
- Personnel safety;
- Phased occupancies;
- Pre-testing documentation;
- Testing forms, and;
- Ongoing integrated systems testing.
The level of detail provided in the Integrated Testing Plan is expected to correspond with the complexities of the building and/or facility undergoing testing.
## Project Contact (sample form)

<table>
<thead>
<tr>
<th>Role</th>
<th>Contact Name</th>
<th>Contact Details</th>
<th>Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner:</td>
<td></td>
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<tr>
<td>Owner’s Representative:</td>
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<tr>
<td>Architect:</td>
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<tr>
<td>Structural Engineer:</td>
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<tr>
<td>Electrical Engineer:</td>
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<td></td>
<td></td>
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<tr>
<td>Mechanical Engineer:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fire Protection Engineer:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Integrated Testing Coordinator:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Contractor:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical Contractor:</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Mechanical Contractor:</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Elevator Contractor:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fire Alarm Contractor:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sprinkler Contractor:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Building Department:</td>
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<td></td>
<td></td>
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<tr>
<td>Fire Department:</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Electrical Authority:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elevator Authority:</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
• Where required, the testing coordinator shall provide testing plan to the AHJ for review

• When a change impacts the testing plan, revisions of the testing plan shall be submitted to the design professional(s) and, where required, the AHJ for review.
PRE-TESTING

✓ Written confirmation from designers;
✓ Written confirmation from installers;
✓ Documentation confirming that systems have been installed in accordance with the design;
✓ Inspection confirmation: CSA C22.1, Canadian Electrical Code;
✓ Inspection confirmation: ASME A17.1/CSA B44, Safety Code for Elevators and Escalators;
✓ Confirmation of occupant notification; and
✓ Confirmation of alternate measures.
**Sample pre-test document**

<table>
<thead>
<tr>
<th>Pre-Integrated Testing Documents Checklist</th>
<th>Document Received</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Document Description</strong></td>
<td><strong>YES □</strong></td>
</tr>
<tr>
<td>Written Confirmation from Design professionals that they have conducted acceptance testing and that the fire protection and life safety systems have been installed in accordance with the design and are ready for Integrated Systems Testing.</td>
<td></td>
</tr>
<tr>
<td>Sprinkler System Design Professional</td>
<td>YES □</td>
</tr>
<tr>
<td>Standpipe System Design Professional</td>
<td>YES □</td>
</tr>
<tr>
<td>Fire Alarm System Design Professional</td>
<td>YES □</td>
</tr>
<tr>
<td>Fire Pump Design Professional</td>
<td>YES □</td>
</tr>
<tr>
<td>Emergency Generator Design Professional</td>
<td>YES □</td>
</tr>
<tr>
<td>Written confirmation from the installing contractors that the fire protection and life safety systems, or parts thereof, have been installed in accordance with the design and are ready for Integrated Systems Testing.</td>
<td></td>
</tr>
<tr>
<td>Sprinkler System Contractor</td>
<td>YES □</td>
</tr>
<tr>
<td>Standpipe System Contractor</td>
<td>YES □</td>
</tr>
<tr>
<td>Fire Alarm System Contractor</td>
<td>YES □</td>
</tr>
<tr>
<td>Fire Pump Contractor</td>
<td>YES □</td>
</tr>
<tr>
<td>Emergency Generator Contractor</td>
<td>YES □</td>
</tr>
</tbody>
</table>
Tests required by Integrated Systems Testing Requirements, shall include a functional operation of the device or system.

Testing by simulation shall be permitted where:

a) Non-restorable devices or systems are required to be activated to demonstrate an integrated function; or

b) Tests may result in harm to persons, or damage to a device, system, or building.
• Design professional(s), installing contractor(s), and verifying party’s shall take part as required.

• Once testing is complete and verified, systems shall be returned to their regular operating condition.

• Upon successful testing, documentation shall be provided to:
  • Building owner
  • AHJ
  • Maintained on site
There is a minimum level of required testing to be incorporated into the ‘Integrated Systems Testing’.
Tests are the **minimum** level of required testing.

Tests include a **functional operation** of device or system.

Simulation testing permitted where:

- Non-restorable devices or systems are required to be activated, or
- Tests may result in harm to persons, or damage to a device, system or building.
INTEGRATED SYSTEMS TESTING FORMS

• Documentation provides the results of the implementation of the integrated testing plan
• Integrated testing forms are developed by the coordinator.
• Forms shall be signed by each participant
### Sample of Test Report

**Master Integrated Testing Checklist**

123 Main Street, Anytown, Alberta

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#### Integrated Systems Testing Protocols and Procedures

<table>
<thead>
<tr>
<th>No.</th>
<th>System Integration</th>
<th>Record of Tests</th>
<th>Notes</th>
<th>Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td>ITP Section 3.6: Emergency Generator Power Integrations:</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Normal Mode: review generator installation and power feeds.</td>
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</tr>
<tr>
<td>Fire Mode: run elevators and fire pump, simulate power failure, confirm generator starts within 15 seconds, confirm elevator and fire pump operation.</td>
<td></td>
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</tr>
<tr>
<td>21. Generator Start-up</td>
<td>Normal Mode:</td>
<td>☐ PASS ☐ FAIL</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fire Mode:</td>
<td>☐ PASS ☐ FAIL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22. Elevator Secondary Power</td>
<td>Normal Mode:</td>
<td>☐ PASS ☐ FAIL</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fire Mode:</td>
<td>☐ PASS ☐ FAIL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23. Fire Pump Secondary Power</td>
<td>Normal Mode:</td>
<td>☐ PASS ☐ FAIL</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fire Mode:</td>
<td>☐ PASS ☐ FAIL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ITP Section 3.7: Fire Alarm / Elevator Integrations:</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Normal Mode: review elevator installation and confirm correct fire alarm system status. Confirm elevators not at recall level. Fire Mode: operate appropriate fire detector and confirm correct elevator operation.</td>
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</tr>
<tr>
<td>24. Primary Recall Test</td>
<td>Normal Mode:</td>
<td>☐ PASS ☐ FAIL</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fire Mode:</td>
<td>☐ PASS ☐ FAIL</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Recall Car Control Car Indicator</td>
<td>☐ PASS ☐ FAIL</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ADDITIONAL NOTES

• Failure must result in correction and re-test of affected systems.

• Upon successful completion of systems testing documentation is to be provided to the:
  • Building owner
  • AHJ (where required)
  • Maintained on site as per Fire Code
Following the Integrated Plan and Testing, the Coordinator prepares the Report.

The report will be used both for ongoing testing and as a reference. It provides results of the Integrated Testing Plan.

The Plan and the Report may be combined into a single document.
The Integrated Testing Report should include:

1. Integrated Testing Plan.
2. Initial Integrated Testing Forms.
3. Any Re-tests.
4. Documentation from Verifying Parties.
5. Coordinators Qualifications.

Let’s take a closer look...
1. Integrated Testing Plan
Prepared prior to tests outlining the required tests and necessary functional results to conduct integrated fire protection and life safety systems testing.

2. Initial Integrated Testing Forms
Forms based on the test protocol and procedures as outlined in the testing plan. Signed by participants confirming the tests were successful.
3. **Re-tests**

Necessary re-tests must be documented.

4. **Coordinators Qualifications**

Include qualifications, experience and background of the person taking responsibility should be included with the Report.
Reminder...

- Integrated Systems Testing Documentation shall be provided to the building owner, AHJ where required, and maintained on site as specified in the Fire Code.
What Type of Test may be Required for the Building?

The test required for a building depends on which category under which the building meets:

- Integrated Systems Testing Implementation Phase.
- Retro-Integrated Systems Testing.
- Integrated Systems Testing for Modifications.

Let’s take a closer look ...
Integrated Systems Testing
Implementation Phase

New Build or Occupancy
Retro-Integrated Systems Testing

For buildings pre-2015 Code
Integrated Systems Testing for Modifications

Systems that have undergone a modification
How Often is Testing Required for a Building?

5

Not less than every five years unless it is a new building or occupancy.

1

A new building or occupancy requires a test approximately one year after the initial test.
FINAL NOTE

The one year test should allow sufficient time for the use and occupancy of the building and is not required to take place on the one year anniversary date of the initial test but should be ‘around that time’.

When a building is occupied in phases, the one year test is to be conducted one year after the completion of the initial integrated test.
Questions?