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# STANDATA bulletin 19-BCB-008/19-FCB-008

## Building/Fire

### CAN/ULC-S1001 Integrated system testing report (sample)

Date Issued: June 2022

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#### Purpose

To provide access to the CAN/ULC-S1001 Appendix C sample form for integrated system testing (IST) reports.

#### Discussion

When fire protection and life safety systems are integrated with each other, the National Building Code – 2019 Alberta Edition (NBC(AE)) and National Fire Code – 2019 Alberta Edition (NFC(AE)) require IST in accordance with the CAN/ULC-S1001 “Integrated Systems Testing of Fire Protection and Life Safety Systems” standard.

The NBC(AE), NFC(AE) and CAN/ULC-S1001 standard do not prescribe the format for the IST reports. The format of the IST reports may vary between individual integrated testing coordinators (ITC) causing difficulties for the Authority Having Jurisdiction (AHJ) in reviewing the submitted IST reports.

CAN/ULC-S1001-11-REV1, Standard for Integrated Systems Testing of Fire Protection and Life Safety Systems, now includes an informative Appendix C which contains a “Sample Integrated Testing Plan”.

ULC Standards is in the process of developing and updating the Appendix C forms to be available online for the users of CAN/ULC-S1001. In the interim ULC Standards has granted permission for the Appendix C forms to be available via the Standata process.

Unless stated otherwise, all Code references in this STANDATA are to Division B of the National Building Code – 2019 Alberta Edition

Issued by the Provincial Building and Fire Administrators	
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**Code References****Sentence 3.2.9.1.(1) states:**

## 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. (See Note A-3.2.9.1.(1))

**Sentence 9.10.1.2.(1) states:**

## 9.10.1.2. Testing of Integrated Fire Protection and Life Safety Systems

1) Where life safety and fire protection 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. (See Note A-3.2.9.1.(1).)

**NFC(AE) Sentence 6.8.1.1.(1) of Division B states:**

## 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).)

See Appendix A

Appendix A

CAN/ULC-S1001-11-REV1, Standard for Integrated Systems Testing of Fire Protection and Life Safety Systems - Appendix C (Sample Integrated Testing Plan).....20 pages

## APPENDIX C (INFORMATIVE) SAMPLE INTEGRATED TESTING PLAN

### C1 GENERAL

The CAN/ULC-S1001 Standard does not dictate the format or configuration of Integrated Testing Plans and Reports. This is due to the unique testing plan required to be developed and implemented for each building or facility, and the requirement for the report to be in a format that can be updated and revised, as necessary, over the life of the building.

However, to assist users in the application of this Standard, a sample project and Integrated Testing Plan was prepared to show what a completed plan could look like. The sample Integrated Testing Plan in this appendix is a simple Integrated Testing Plan provided as a guide only and is not intended to be used verbatim or as an all-inclusive list of integrated testing. This sample Integrated Testing Plan would be implemented at the time of Integrated Systems Testing for the project and used to prepare the final Integrated Testing Report.

As Integrated Testing Plans are required to methodically test each integrated between fire protection and life safety systems in a building, the more complex the integrations are the more complex the Integrated Testing Plan will be. The below sample Integrated Testing Plan provides high level information on the fire protection and life safety systems for example purposes. It is not intended to be a complete plan noting all testing required. Rather, it is intended as a guide to assist in the development on Integrated Testing Plans.

### C2 PROJECT DESCRIPTION

For the development of this sample Integrated Testing Plan, a sample project was developed for which integrated testing is to be applied. The project is the construction of a new four storey office building with a building area of 1 200 m<sup>2</sup> and served by two elevators. Fixed fire protection and life safety systems installed in the building include automatic sprinklers, fire alarm, and standpipe and hose system. The facility is also provided with a fire pump and emergency generator.

#### SAMPLE PROJECT

### C3 INTRODUCTION

This Integrated Testing Plan provides the results of the implementation of CAN/ULC-S1001-11, *Integrated Systems Testing of Fire Protection and Life Safety Systems* for the office building located at 123 Main Street in Anytown, Alberta.

#### C3.1 Building Description

<b>Building Name:</b>	The S1001 Building
<b>Address:</b>	123 Main Street, Anytown, Alberta
<b>No. of Storeys:</b>	Four Above-Grade, No Below-Grade
<b>Construction Type:</b>	Noncombustible
<b>Occupancy:</b>	Group D, Business and Personal Services

### C3.2 Project Contacts

Role	Contact Name	Contact Details	Responsibilities
<b>Owner:</b>			
<b>Owner's Representative:</b>			
<b>Architect:</b>			
<b>Structural Engineer:</b>			
<b>Electrical Engineer:</b>			
<b>Mechanical Engineer:</b>			
<b>Fire Protection Engineer:</b>			
<b>Integrated Testing Coordinator:</b>			
<b>General Contractor:</b>			
<b>Electrical Contractor:</b>			
<b>Mechanical Contractor:</b>			
<b>Elevator Contractor:</b>			
<b>Fire Alarm Contractor:</b>			
<b>Sprinkler Contractor:</b>			
<b>Building Department:</b>			
<b>Fire Department:</b>			
<b>Electrical Authority:</b>			
<b>Elevator Authority:</b>			

**NOTE:** Integrated systems testing participants shall comply with all federal, provincial, territorial or other applicable regulations governing the licensing and/or certification of individuals.

### C3.3 Integrated Systems

#### C3.3.1 Fire Alarm System

##### System Overview Description

The building is protected by a single-stage fire alarm system. The fire alarm control unit is located in the Ground Floor Electrical Room with a fire alarm annunciator panel located at the Ground Floor Main Entrance.

Fire alarm initiating devices include manual stations at exits, smoke detectors in electrical closets, at the top of the elevator shafts, in the elevator machine room, and in exit stairs, duct smoke detectors for the main air handling unit, heat detectors in the elevator shaft pits, and water-flow devices serving the building sprinkler system.

The fire alarm system supervises various fire protection systems in the building. Supervisory devices include monitoring movement of valves controlling the water supply on sprinkler systems and the standpipe and hose system, monitoring fire pump running, fire pump loss of power, fire pump trouble conditions, monitoring fire pump room temperature, and monitoring generator running, generator trouble, and low fuel conditions.

Occupant notification of a fire alarm condition in the building is provided via horns installed throughout the building. Audible notification is supplemented by visual signals in the Ground Floor Fire Pump Room and Ground Floor Generator Room.

This material is not the complete and official position of ULC Standards on the referenced subject, which is represented only by the ULC Standard in its entirety.

The fire alarm controls the building air handling unit to shut down air recirculation on any fire alarm. The fire alarm system is monitored by a fire signal receiving centre, via a fire signal transmitting unit installed adjacent to the fire alarm control unit located in the Ground Floor Electrical Room.

### **System Integrations & Functional Objectives**

The fire alarm is integrated with the automatic sprinkler system, standpipe and hose system, fire pump, emergency generator, and elevators for supervision and control functions. Refer to individual systems for detailed description of integration of fire alarm to each system.

Additionally, the fire alarm system is integrated to a fire signal receiving centre for remote monitoring of alarm, trouble, and supervisory conditions on the fire alarm system. The fire signal receiving centre connection is also monitored for integrity.

### **C3.3.2 Sprinkler System**

#### **System Overview Description**

The building is protected throughout by wet-pipe automatic sprinkler systems. Sprinkler systems serving the office occupancies are designed for light hazard occupancies. The sprinkler system serving the Ground Floor Fire Pump Room and Ground Floor Generator Room are designed for Ordinary Hazard, Group 1 occupancies in these rooms.

#### **System Integrations & Functional Objectives**

The automatic sprinkler system is interconnected to the fire alarm for monitoring of water flow via flow switches and for movement of valves controlling water supply via tamper switches.

### **C3.3.3 Standpipe and Hose System**

#### **System Overview Description**

The standpipe and hose system consists of 1.5" fire hose connections installed within exit stair shafts at each floor landing.

#### **System Integrations & Functional Objectives**

The standpipe and hose system is interconnected to the fire alarm for monitoring of water flow via flow switches and for movement of valves controlling water supplies via tamper switches.

### **C3.3.4 Fire Pump**

#### **System Overview Description**

An electric fire pump is located within the Ground Floor Fire Pump Room. The fire pump serves the building sprinkler systems and standpipe and hose system.

#### **System Integrations & Functional Objectives**

The electric fire pump is interconnected to the fire alarm for monitoring of the following conditions Fire Pump Running, Fire Pump Loss of Power, and Fire Pump Trouble via monitoring output contacts on the fire pump controller. Additionally, the fire pump is interconnected to the fire alarm for monitoring of the temperature within the fire pump room via a temperature switch.

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### C3.3.5 Emergency Generator

#### System Overview Description

Emergency power for the building is provided via a diesel generator located in the Ground Floor Generator Room. This system serves the fire alarm system (supplemented by batteries in the fire alarm control unit), the fire pump, emergency lighting, and elevators.

#### System Integrations & Functional Objectives

The emergency generator is interconnected to the fire alarm for monitoring of the following conditions Generator Running and Generator Trouble via monitoring output contacts on the emergency generator controller. Additionally, the emergency generator fuel supply monitored for low fuel condition via a fuel level switch.

### C3.3.6 Elevators

#### System Overview Description

Two passenger elevators are provided, located within a common elevator shaft. Each elevator serves all four floors of the building. Phase 1 firefighters recall of the elevators is provided. The Primary Recall Level is the Ground Floor and the Alternate Recall Level is the Second Floor.

#### System Integrations & Functional Objectives

The elevator is interconnected to the fire alarm for monitoring of emergency elevator recall control functions. Five relays are provided for the following inputs to the elevator system:

Relay	Operation
Primary Recall	Initiated for automatic fire detector activation on floor areas other than the primary recall level or as outlined below.
Alternate Recall	Initiated for automatic fire detector activation on the primary recall level, except as outlined below.
Top of Shaft Alarm	Initiated for automatic fire detector activation at the top of the elevator shaft.
Elevator Pit Alarm	Initiated for automatic fire detector activation in the elevator shaft pit.
Machine Room Alarm	Initiated for automatic fire detector activation in the elevator machine room.

### C3.3.7 Air Handling Unit

#### System Overview Description

A common air handling unit provides tempered air to the building via a common air shaft. The air handling unit is located on the roof of the building.

#### System Integrations & Functional Objectives

The air handling unit is interconnected to the fire alarm for shutdown on any fire alarm to prevent the recirculation of air in the building.

## C4 INTEGRATIONS MATRIX

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Integrations Matrix				
System A	System B	Integration Type	Normal Mode	Off-Normal / Fire Mode
Fire Alarm	Fire Signal Receiving Centre	Alarm Condition	No alarm condition on the fire alarm system, no signal at fire signal receiving centre	Alarm condition on the fire alarm system, alarm signal transmitted to and received by fire signal receiving centre
		Supervisory Condition	No supervisory condition on the fire alarm system, no signal at fire signal receiving centre	Supervisory condition on the fire alarm system, supervisory signal transmitted to and received by fire signal receiving centre
		Trouble Condition	No trouble condition on the fire alarm system, no signal at fire signal receiving centre	Trouble condition on the fire alarm system, trouble signal transmitted to and received by fire signal receiving centre
		Connection Integrity	Signal Receiving Centre disconnect not activated, no signal at fire signal receiving centre	Signal Receiving Centre disconnect activated, trouble transmission signal at fire signal receiving centre
Fire Alarm	Sprinkler System	Water Flow	No water flowing through sprinkler system, no off-normal condition on fire alarm.	Water flowing through sprinkler system activates water flow switch, unique alarm condition on fire alarm.
		Valve Supervision	Valve in the open position, no off-normal condition on fire alarm.	Valve closed (two turns of valve handle or 10% of valve stem), unique supervisory condition on fire alarm.
Fire Alarm	Standpipe System	Water Flow	No water flowing through standpipe system, no off-normal condition on fire alarm.	Water flowing through standpipe system activates water flow switch, unique alarm condition on fire alarm.
		Valve Supervision	Valve in the open position, no off-normal condition on fire alarm.	Valve closed (two turns of valve handle or 10% of valve stem), unique supervisory condition on fire alarm.
Fire Alarm	Fire Pump (Electric)	Fire Pump Running	Fire pump not running, no off-normal condition on fire alarm.	Fire pump running, unique non-latching supervisory condition on fire alarm.
		Fire Pump Loss of Power	Fire pump power supply normal, no off-normal condition on fire alarm.	Fire pump power supply off-normal, unique non-latching supervisory condition on fire alarm.
		Fire Pump Trouble	Fire pump in normal operating condition, no off-normal condition on fire alarm.	Fire pump in trouble condition, unique non-latching supervisory condition on fire alarm.
		Pump Room Temperature	Enclosure temperature within specified range, no off-normal condition on fire alarm.	Enclosure temperature below specified range, unique supervisory condition on fire alarm.
Fire Alarm	Emergency Generator	Generator Running	Emergency generator not running, no off-normal condition on fire alarm.	Emergency generator running, unique non-latching supervisory condition on fire alarm.
		Generator Trouble	Emergency generator in normal condition, no off-normal condition on fire alarm.	Emergency generator in off-normal condition, unique non-latching supervisory condition on fire alarm.
		Low Fuel	Fuel level within specified range, no off-normal condition on fire alarm.	Fuel level below specified range, unique supervisory condition on fire alarm.
Emergency Generator	Elevator	Emergency Power	Diesel Emergency Generator in normal mode, elevators supplied through primary (normal) power.	Primary (normal) power supply failed, Diesel Emergency Generator, elevators supplied through secondary (generator) power.

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Integrations Matrix				
System A	System B	Integration Type	Normal Mode	Off-Normal / Fire Mode
	Fire Pump	Emergency Power	Diesel Emergency Generator in normal mode, fire pump supplied through primary (normal) power.	Primary (normal) power supply failed, Diesel Emergency Generator, fire pump supplied through secondary (generator) power.
Fire Alarm	Elevator	Primary Recall	Relay Normal	Relay activated for associated fire alarm conditions.
		Alternate Recall	Relay Normal	Relay activated for associated fire alarm conditions.
		Top of Shaft	Relay Normal	Relay activated for associated fire alarm conditions.
		Elevator Pit	Relay Normal	Relay activated for associated fire alarm conditions.
		Elevator Machine Room	Relay Normal	Relay activated for associated fire alarm conditions.
Fire Alarm	HVAC	Shutdown	No alarm condition on fire alarm, air handling unit not in fire mode shutdown.	Alarm condition on fire alarm, air handling unit in fire mode shutdown.

**C5 TEST PROTOCOLS AND PROCEDURES**

**C5.1 Fire Alarm / Fire Signal Receiving Centre Integrations**

**Alarm Condition Test Procedure**

<b>Normal Mode</b>	<ul style="list-style-type: none"> <li>Review fire signal transmitting unit installation and connection to fire alarm system.</li> <li>Confirm fire alarm reset and clear of any off-normal conditions.</li> </ul>
<b>Fire Mode</b>	<ul style="list-style-type: none"> <li>Cause an alarm condition on the fire alarm system.</li> <li>Via telephone or receipt of date/time stamped report, confirm receipt of the alarm condition signal by the fire signal receiving centre.</li> <li>Return fire alarm system to normal condition.</li> </ul>

**Supervisory Condition Test Procedure**

<b>Normal Mode</b>	<ul style="list-style-type: none"> <li>Review fire signal transmitting unit installation and connection to fire alarm system.</li> <li>Confirm fire alarm reset and clear of any off-normal conditions.</li> </ul>
<b>Fire Mode</b>	<ul style="list-style-type: none"> <li>Cause a supervisory condition on the fire alarm system.</li> <li>Via telephone or receipt of date/time stamped report, confirm receipt of the supervisory condition signal by the fire signal receiving centre.</li> <li>Return fire alarm system to normal condition.</li> </ul>

**Trouble Condition Test Procedure**

<b>Normal Mode</b>	<ul style="list-style-type: none"> <li>Review fire signal transmitting unit installation and connection to fire alarm system.</li> <li>Confirm fire alarm reset and clear of any off-normal conditions.</li> </ul>
<b>Fire Mode</b>	<ul style="list-style-type: none"> <li>Cause a trouble condition on the fire alarm system.</li> <li>Via telephone or receipt of date/time stamped report, confirm receipt of the trouble condition signal by the fire signal receiving centre.</li> <li>Return fire alarm system to normal condition.</li> </ul>

**Connection Integrity Condition Test Procedure**

<b>Normal Mode</b>	<ul style="list-style-type: none"> <li>Review fire signal transmitting unit installation and connection to fire alarm system.</li> <li>Confirm fire alarm reset and clear of any off-normal conditions.</li> </ul>
<b>Fire Mode</b>	<ul style="list-style-type: none"> <li>Disconnect the alarm signal connection circuit between the fire alarm control unit and the fire signal transmitting unit.</li> <li>Via telephone or receipt of date/time stamped report, confirm receipt of the trouble transmission signal by the fire signal receiving centre.</li> <li>Return alarm signal connection circuit between the fire alarm control unit and the fire signal transmitting unit to normal condition.</li> </ul>

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## C5.2 Fire Alarm / Sprinkler System Integrations

### Water-Flow Condition Test Procedure

<b>Normal Mode</b>	<ul style="list-style-type: none"> <li>Review flow switch installation</li> <li>Confirm fire alarm reset and clear of any off-normal conditions.</li> </ul>
<b>Fire Mode</b>	<ul style="list-style-type: none"> <li>Flow water from the Inspectors Test Connection of the sprinkler system associated with the flow switch being tested.</li> <li>Record time between operation of Inspectors Test Connection and activation of alarm signal at the fire alarm system. Time to be 90 seconds or less.</li> <li>Close Inspectors Test Connection upon activation of fire alarm system.</li> <li>Confirm correct fire alarm annunciation.</li> <li>Return sprinkler system and fire alarm system to normal condition.</li> </ul>

### Valve Supervision Condition Test Procedure

<b>Normal Mode</b>	<ul style="list-style-type: none"> <li>Review valve and valve supervision installation.</li> <li>Confirm fire alarm reset and clear of any off-normal conditions.</li> </ul>
<b>Fire Mode</b>	<ul style="list-style-type: none"> <li>Operate the valve being tested by operating the handle two full turns for butterfly style valves or closing at least 10% of valve stem for OS&amp;Y style valves.</li> <li>Confirm correct fire alarm annunciation.</li> <li>Return valve and fire alarm system to normal condition.</li> </ul>

## C5.3 Fire Alarm / Standpipe System Integrations

### Water-Flow Condition Test Procedure

<b>Normal Mode</b>	<ul style="list-style-type: none"> <li>Review flow switch installation.</li> <li>Confirm fire alarm reset and clear of any off-normal conditions.</li> </ul>
<b>Fire Mode</b>	<ul style="list-style-type: none"> <li>Flow water from a hose valve associated with the flow switch being tested.</li> <li>Record time between operation of hose valve and activation of alarm signal at the fire alarm system.</li> <li>Close hose valve upon activation of fire alarm system.</li> <li>Confirm correct fire alarm annunciation.</li> <li>Return standpipe system and fire alarm system to normal condition.</li> </ul>

### Valve Supervision Condition Test Procedure

<b>Normal Mode</b>	<ul style="list-style-type: none"> <li>Review valve and valve supervision installation.</li> <li>Confirm fire alarm reset and clear of any off-normal conditions.</li> </ul>
<b>Fire Mode</b>	<ul style="list-style-type: none"> <li>Operate the valve being tested by operating the handle two full turns for butterfly style valves or closing at least 10% of valve stem for OS&amp;Y style valves.</li> <li>Confirm correct fire alarm annunciation.</li> <li>Return valve and fire alarm system to normal condition.</li> </ul>

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**C5.4 Fire Alarm / Fire Pump Integrations**

**Fire Pump Running Condition Test Procedure**

<b>Normal Mode</b>	<ul style="list-style-type: none"> <li>• Review fire pump installation and connection to fire alarm system.</li> <li>• Confirm fire alarm reset and clear of any off-normal conditions.</li> </ul>
<b>Fire Mode</b>	<ul style="list-style-type: none"> <li>• Start fire pump for non-flow condition.</li> <li>• Confirm correct fire alarm annunciation.</li> <li>• Return fire pump and fire alarm system to normal condition.</li> </ul>

**Fire Pump Loss of Power Condition Test Procedure**

<b>Normal Mode</b>	<ul style="list-style-type: none"> <li>• Review fire pump installation and connection to fire alarm system.</li> <li>• Confirm fire alarm reset and clear of any off-normal conditions.</li> </ul>
<b>Fire Mode</b>	<ul style="list-style-type: none"> <li>• Turn fire pump circuit breaker to off / open position.</li> <li>• Confirm correct fire alarm annunciation.</li> <li>• Return fire pump circuit breaker and fire alarm system to normal condition.</li> </ul>

**Fire Pump Trouble Condition Test Procedure**

<b>Normal Mode</b>	<ul style="list-style-type: none"> <li>• Review fire pump installation and connection to fire alarm system.</li> <li>• Confirm fire alarm reset and clear of any off-normal conditions.</li> </ul>
<b>Fire Mode</b>	<ul style="list-style-type: none"> <li>• Create trouble condition on fire pump.</li> <li>• Confirm correct fire alarm annunciation.</li> <li>• Return fire pump and fire alarm system to normal condition.</li> </ul>

**Fire Pump Room Temperature Condition Test Procedure**

<b>Normal Mode</b>	<ul style="list-style-type: none"> <li>• Review temperature monitor installation.</li> <li>• Confirm fire alarm reset and clear of any off-normal conditions.</li> </ul>
<b>Fire Mode</b>	<ul style="list-style-type: none"> <li>• Simulate temperature of 4°C.</li> <li>• Confirm correct fire alarm annunciation.</li> <li>• Return fire alarm system to normal condition.</li> </ul>

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## C5.5 Fire Alarm / Diesel Emergency Generator Integrations

### Generator Running Condition Test Procedure

<b>Normal Mode</b>	<ul style="list-style-type: none"> <li>Review generator installation and connection to fire alarm system.</li> <li>Confirm fire alarm reset and clear of any off-normal conditions.</li> </ul>
<b>Fire Mode</b>	<ul style="list-style-type: none"> <li>Start emergency generator.</li> <li>Confirm correct fire alarm annunciation.</li> <li>Return generator and fire alarm system to normal condition.</li> </ul>

### Generator Trouble Condition Test Procedure

<b>Normal Mode</b>	<ul style="list-style-type: none"> <li>Review generator installation and connection to fire alarm system.</li> <li>Confirm fire alarm reset and clear of any off-normal conditions.</li> </ul>
<b>Fire Mode</b>	<ul style="list-style-type: none"> <li>Create trouble condition on generator (e.g., disconnect batteries).</li> <li>Confirm correct fire alarm annunciation.</li> <li>Return generator and fire alarm system to normal condition.</li> </ul>

### Generator Low Fuel Condition Test Procedure

<b>Normal Mode</b>	<ul style="list-style-type: none"> <li>Review generator fuel tank installation and connection to fire alarm system.</li> <li>Confirm fire alarm reset and clear of any off-normal conditions.</li> </ul>
<b>Fire Mode</b>	<ul style="list-style-type: none"> <li>Simulate low fuel condition for generator fuel tank (e.g., by raising the fuel level float, if possible). If not possible to simulate the low fuel condition, test fuel level float mechanically.</li> <li>Confirm correct fire alarm annunciation.</li> <li>Return generator fuel tank and fire alarm system to normal condition.</li> </ul>

## C5.6 Emergency Generator Power Integrations

### Generator Running Condition Test Procedure

<b>Normal Mode</b>	<ul style="list-style-type: none"> <li>Review generator installation and connection to following systems: <ul style="list-style-type: none"> <li>Elevators</li> <li>Fire Pump</li> </ul> </li> <li>Confirm elevators operating under Normal Mode.</li> <li>Confirm fire pump in Normal (Standby) Mode.</li> </ul>
<b>Fire Mode</b>	<ul style="list-style-type: none"> <li>Operate Elevators under Primary Power.</li> <li>Operate Fire Pump under Primary Power.</li> <li>Simulate Primary Power Failure by Opening Main Incoming Circuit Breaker.</li> <li>Confirm Diesel Generator Startup within 15 seconds.</li> <li>Confirm Elevators operating under Secondary Power.</li> <li>Confirm Fire Pump operating under Secondary Power.</li> </ul>

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**C5.7 Fire Alarm / Elevator Integrations**

**Elevator Primary Recall Test Procedure**

<b>Normal Mode</b>	<ul style="list-style-type: none"> <li>• Review installation of fire alarm elevator relay connection to elevator system.</li> <li>• Confirm fire alarm reset and clear of any off-normal conditions.</li> <li>• Confirm elevators on a floor other than the Primary Recall level (Ground Floor).</li> </ul>
<b>Fire Mode</b>	<ul style="list-style-type: none"> <li>• Activate a fire detector located on a floor other than the Ground Floor.</li> <li>• Confirm correct fire alarm annunciation.</li> <li>• Confirm elevators recall to the Ground Floor and remain at the Elevator Lobby.</li> <li>• Confirm In-Car Buttons do not operate in each elevator car.</li> <li>• Confirm the In-Car Recall light is illuminated steady in each elevator car.</li> <li>• Return the elevator system and fire alarm system to normal condition.</li> </ul>

**Elevator Alternate Recall Test Procedure**

<b>Normal Mode</b>	<ul style="list-style-type: none"> <li>• Review installation of fire alarm elevator relay connection to elevator system.</li> <li>• Confirm fire alarm reset and clear of any off-normal conditions.</li> <li>• Confirm elevators on a floor other than the Alternate Recall level (Second Floor).</li> </ul>
<b>Fire Mode</b>	<ul style="list-style-type: none"> <li>• Activate a fire detector located on the Ground Floor.</li> <li>• Confirm correct fire alarm annunciation.</li> <li>• Confirm elevators recall to the Second Floor and remain at the Elevator Lobby.</li> <li>• Confirm In-Car Buttons do not operate in each elevator car.</li> <li>• Confirm the In-Car Recall light is illuminated steady in each elevator car.</li> <li>• Return the elevator system and fire alarm system to normal condition</li> </ul>

**Elevator Top of Shaft Recall Test Procedure**

<b>Normal Mode</b>	<ul style="list-style-type: none"> <li>• Review installation of fire alarm elevator relay connection to elevator system.</li> <li>• Confirm fire alarm reset and clear of any off-normal conditions.</li> <li>• Confirm elevators on a floor other than the Primary Recall level (Ground Floor).</li> </ul>
<b>Fire Mode</b>	<ul style="list-style-type: none"> <li>• Activate a smoke detector located at the top of the elevator shaft.</li> <li>• Confirm correct fire alarm annunciation.</li> <li>• Confirm elevators recall to the Ground Floor and remain at the Elevator Lobby.</li> <li>• Confirm In-Car Buttons do not operate in each elevator car.</li> <li>• Confirm the In-Car Recall light is illuminated and flashing in each elevator car.</li> <li>• Return the elevator system and fire alarm system to normal condition.</li> </ul>

**Elevator Pit Recall Test Procedure**

<b>Normal Mode</b>	<ul style="list-style-type: none"> <li>• Review installation of fire alarm elevator relay connection to elevator system.</li> <li>• Confirm fire alarm reset and clear of any off-normal conditions.</li> <li>• Confirm elevators on a floor other than the Alternate Recall level (Second Floor).</li> </ul>
<b>Fire Mode</b>	<ul style="list-style-type: none"> <li>• Activate a heat detector located in the elevator shaft pit.</li> <li>• Confirm correct fire alarm annunciation.</li> <li>• Confirm elevators recall to the Second Floor and remain at the Elevator Lobby.</li> <li>• Confirm In-Car Buttons do not operate in each elevator car.</li> <li>• Confirm the In-Car Recall light is illuminated and flashing in each elevator car.</li> </ul>

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**Elevator Machine Room Recall Test Procedure**

<b>Normal Mode</b>	<ul style="list-style-type: none"> <li>Review installation of fire alarm elevator relay connection to elevator system.</li> <li>Confirm fire alarm reset and clear of any off-normal conditions.</li> <li>Confirm elevators on a floor other than the Primary Recall level (Ground Floor).</li> </ul>
<b>Fire Mode</b>	<ul style="list-style-type: none"> <li>Activate a smoke detector located in the Elevator Machine Room.</li> <li>Confirm correct fire alarm annunciation.</li> <li>Confirm elevators recall to the Ground Floor and remain at the Elevator Lobby.</li> <li>Confirm In-Car Buttons do not operate in each elevator car.</li> <li>Confirm the In-Car Recall light is illuminated and flashing in each elevator car.</li> <li>Return the elevator system and fire alarm system to normal condition.</li> </ul>

**C5.8 Fire Alarm / Air Handling Unit Integrations**

**Elevator Primary Recall Test Procedure**

<b>Normal Mode</b>	<ul style="list-style-type: none"> <li>Review installation of fire alarm relay connection to air handling unit.</li> <li>Confirm fire alarm reset and clear of any off-normal conditions.</li> <li>Confirm air handling unit operating normally.</li> </ul>
<b>Fire Mode</b>	<ul style="list-style-type: none"> <li>Activate a fire detector.</li> <li>Confirm correct fire alarm annunciation.</li> <li>Confirm air handling unit shuts down.</li> <li>Return air handling unit and fire alarm system to normal condition.</li> </ul>

**C6 NOTIFICATIONS**

**C6.1 Notification to Integrated Testing Participants**

Integrated Testing Participants shall be provided one (1) week notice of the date and time for the implementation of the Integrated Testing Plan. Notification shall be via confirmed email to the following participants:

Participant	Email Address

**C6.2 Notification to Building Occupants**

Building occupants shall be provided with 48 hours notice of the implementation of integrated testing. Notification shall be provided via written notices posted at each building entrance and each elevator lobby. Notices shall also be posted in the building cafeteria.

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Posted notices shall state:

*Testing of the Fire Protection and Life Safety systems will be occurring on \_\_\_\_\_. During this time, the fire alarm system will sound and the fire protection and safety systems will operate. Please disregard the fire alarm system during this time. In the event of an actual emergency, you will be notified via personnel using portable bull horns.*

## **C7 PERSONNEL SAFETY**

### **C7.1 Safety Protocols**

Integrated Systems Testing will be implemented for this project during the construction phase. As such, the following personnel protective equipment will be required for all participants:

- Head Protection
- Eye Protection
- Ear Protection
- Safety Footwear
- Safety Vent

The general contractor has implemented a construction safety training and orientation requirement for all personnel who will be on-site. As such, all integrated testing participants shall successfully complete the safety orientation prior to the implementation of the Integrated Testing Plan. Record of completion shall be provided to the Integrated Testing Coordinator prior to ITP implementation.

During implementation of the Integrated Testing Plan, no participant shall assume the system testing will function as expected. Safe work practices and safe distances shall be maintained from all equipment when operated. Personnel operating systems shall hold federal, provincial and territorial certifications as required.

In the event of the unexpected operation of a system, which could harm a testing participant, a building occupant, or the system, the testing shall be immediately suspended by the testing participant. Refer to Section [C7.3](#) for team communication protocols.

In the event of the discovery of an actual emergency during testing, emergency procedures shall be immediately implemented by the testing participant. Refer to Section [C7.3](#) for team communication protocols and Section [C7.4](#) for emergency procedures.

### **C7.2 Special Hazards**

No special hazards are expected for this project.

### **C7.3 Team Communications**

Integrated Testing participants will be located throughout the facility, as required to review and confirm the test protocols being implemented. The Integrated Testing Coordinator will be in communication with the Integrated Testing participants via two-way radio.

The Integrated Testing Coordinator will instruct and direct the implementation of test protocols. Only the Integrated Testing Coordinator shall provide direction and instruction to the test participants. It is expected that field observers report observed conditions by first identifying their location and then the observed events and/or conditions.

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In the event of the unexpected operation of a system, which could harm a testing participant, a building occupant, or the system, the testing shall be immediately suspended by the testing participant. This shall be achieved by stopping equipment, as possible and as safe to do so from the participant's location, then broadcasting the words "STAND DOWN, STAND DOWN, STAND DOWN" over the radio system followed by a description of the concern.

In the event of the discovery of an actual emergency during testing by an Integrated Testing participant, the emergency condition shall be identified to the Integrated Testing Team broadcasting the words "STAND DOWN, STAND DOWN, STAND DOWN" over the radio system followed by a description of the emergency.

Integrated Testing participants shall stop all testing activities and equipment, as safe to do so, upon hearing "STAND DOWN, STAND DOWN, STAND DOWN" over the radio system.

In the case of an actual emergency, the General Contractor shall implement the site emergency procedures. For unexpected operation of equipment, the Integrated Testing Coordinator shall review the situation and determine the next testing steps, as appropriate to the situation.

#### **C7.4 Occupant Notification of Emergencies**

In the event of an actual emergency during implementation of the Integrated Testing Procedures, the General Contractor shall implement the Site Emergency Procedures. Refer to these procedures for additional information.

### **C8 PHASED OCCUPANCIES**

This facility will be occupied upon completion of the entire building. As such, phased occupancy is not proposed for this project.

### **C9 PRE-TESTING DOCUMENTATION**

#### **C9.1 Documentation for Integrated Systems Testing**

Obtain the following Documentation for the building fire protection and life safety systems prior to initiating Integrated Systems Testing. For each piece of Documentation received, identify the document the Checklist below and include a copy of all Documentation in the project Integrated Testing Report.

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Pre-Integrated Testing Documents Checklist		
Document Description	Document Received	
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.		
Sprinkler System Design Professional	YES	NO
Standpipe System Design Professional	YES	NO
Fire Alarm System Design Professional	YES	NO
Fire Pump Design Professional	YES	NO
Emergency Generator Design Professional	YES	NO
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.		
Sprinkler System Contractor	YES	NO
Standpipe System Contractor	YES	NO
Fire Alarm System Contractor	YES	NO
Fire Pump Contractor	YES	NO
Emergency Generator Contractor	YES	NO
Documentation from the verifying parties confirming that the fire protection and life safety systems, or parts thereof, have been installed in accordance with the design.		
Contractors' Material and Test Certificate for Under Ground Piping – Sprinklers	YES	NO
Contractors' Material and Test Certificate for Under Ground Piping – Standpipe	YES	NO
Contractors' Material and Test Certificate for Above Ground Piping – Sprinklers	YES	NO
Contractors' Material and Test Certificate for Above Ground Piping – Standpipe	YES	NO
Fire Alarm System Verification Report per CAN/ULC-S537	YES	NO
Fire Signal Receiving Centre Certificate	YES	NO
Contractors' Material and Test Certificate for Fire Pump Systems	YES	NO
Emergency Generator Performance Test Report per CSA C282	YES	NO
Confirmation on inspection by the local authority responsible for the system.		
Electrical Authority Certificate	YES	NO
Elevating Devices Authority Certificate	YES	NO

### C9.2 Documentation for Pre-Completed Test Results

The following pre-completed tests were accepted by the Integrated Testing Coordinator as satisfying part of the integrated systems testing.

Integration	Integration Type	Pre-Completed Test Documentation	Comments

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**C10 TESTING FORMS**

A Master Integrated Testing Checklist was prepared for 123 Main Street to record the Integrated Testing of fire protection and life safety systems, as outlined in the Integrated Testing Plan. This Master Integrated Testing Checklist has been included as Attachment A to the Integrated Testing Plan.

The Integrated Testing Checklist will be completed during the implementation of the Integrated Testing Plan at 123 Main Street. The initial completed Integrated Testing Checklists, and Checklists completed for any testing deficiencies, will be included in the Integrated Testing Report.

**C11 ONGOING INTEGRATED SYSTEMS TESTING**

As required by CAN/ULC-S1001:2011 (R2017), the Integrated Testing Plan for 123 Main Street will be completed one year after completion of the initial Integrated Systems Testing and at five year intervals after that. Additionally, where modifications to the fire protection and life safety systems are made which affect system integrations, Integrated Systems Testing of the affected integrations shall be conducted.

This Integrated Systems Testing shall be tracked in the following table and copies of the testing documentation included as part of the Integrated Testing Report.

Date	Test Type	Description / Comments	Test Records

*Add Additional Pages as Necessary*

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**MASTER INTEGRATED TESTING CHECKLIST**

Integrated Testing Checklist 123 Main Street, Anytown, Alberta			
Date:			
Participants	Role	Company	Name
	Integrated Testing Coordinator		
	Owner's Rep.		
	Electrical Contractor		
	Mechanical Contractor		
	Sprinkler Contractor		
	Standpipe Contractor		
	Fire Alarm Contractor		
	Fire Pump Contractor		
	Emergency Generator Contractor		

Integrated Systems Testing Protocols and Procedures					
No.	System Integration	Record of Tests		Notes	Initials
<b>ITP Section C5.1: Fire Alarm / Fire Signal Receiving Centre Integrations:</b>					
Normal Mode: review fire signal receiving centre installation and confirm correct fire alarm system status.					
Fire Mode: cause associated condition on fire alarm system and confirm receipt of correct signal at fire signal receiving centre.					
1.	Alarm Condition	Normal Mode:	PASS	FAIL	
		Fire Mode:	PASS	FAIL	
2.	Supervisory Condition	Normal Mode:	PASS	FAIL	
		Fire Mode:	PASS	FAIL	
3.	Trouble Condition	Normal Mode:	PASS	FAIL	
		Fire Mode:	PASS	FAIL	
4.	Connection Integrity	Normal Mode:	PASS	FAIL	
		Fire Mode:	PASS	FAIL	

Integrated Systems Testing Protocols and Procedures					
No.	System Integration	Record of Tests		Notes	Initials
<b>ITP Section 5.2: Sprinkler System / Fire Alarm Integrations:</b>					
Normal Mode: review device installation and confirm correct fire alarm system status.					
Fire Mode: open valve (two turns or 10% of valve stem) or test flow switch (flow water) and confirm correct operation and fire alarm annunciation.					
5.	Main Incoming Valve In	SV No.:			
		Normal Mode:	PASS	FAIL	
		Fire Mode:	PASS	FAIL	
6.	Main Incoming Valve Out	SV No.:			
		Normal Mode:	PASS	FAIL	
		Fire Mode:	PASS	FAIL	
7.	Ground Floor	SV No.:			
		Normal Mode:	PASS	FAIL	
		Fire Mode:	PASS	FAIL	
		FS No.:			
		Normal Mode:	PASS	FAIL	
		Fire Mode:	PASS	FAIL	
8.	Second Floor	SV No.:			
		Normal Mode:	PASS	FAIL	
		Fire Mode:	PASS	FAIL	
		FS No.:			
		Normal Mode:			

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Integrated Systems Testing Protocols and Procedures						
No.	System Integration	Record of Tests			Notes	Initials
9.	Third Floor	SV No.:				
		Normal Mode:	PASS	FAIL		
		Fire Mode:	PASS	FAIL		
		FS No.:				
		Normal Mode:	PASS	FAIL		
		Fire Mode:	PASS	FAIL		
10.	Fourth Floor	SV No.:				
		Normal Mode:	PASS	FAIL		
		Fire Mode:	PASS	FAIL		
		FS No.:				
		Normal Mode:	PASS	FAIL		
		Fire Mode:	PASS	FAIL		
Integrated Systems Testing Protocols and Procedures						
No.	System Integration	Record of Tests			Notes	Initials
<b>ITP Section C5.3: Standpipe System / Fire Alarm Integrations:</b>						
Normal Mode: review device installation and confirm correct fire alarm system status.						
Fire Mode: open valve (two turns or 10% of valve stem) or test flow switch (flow water) and confirm correct operation and fire alarm annunciation.						
11.	Main Shutoff Valve	SV No.:				
		Normal Mode:	PASS	FAIL		
		Fire Mode:	PASS	FAIL		
		FS No.:				
		Normal Mode:	PASS	FAIL		
		Fire Mode:	PASS	FAIL		
12.	East Riser Shutoff Valve	SV No.:				
		Normal Mode:	PASS	FAIL		
		Fire Mode:	PASS	FAIL		
13.	West Riser Shutoff Valve	SV No.:				
		Normal Mode:	PASS	FAIL		
		Fire Mode:	PASS	FAIL		
<b>ITP Section C5.4: Fire Pump / Fire Alarm Integrations:</b>						
Normal Mode: review device installation and confirm correct fire alarm system status.						
Fire Mode: operate device (run pump, simulate loss of power, trouble, low temperature) and confirm correct operation and fire alarm annunciation.						
14.	Fire Pump Running	Normal Mode:	PASS	FAIL		
		Fire Mode:	PASS	FAIL		
15.	Fire Pump Loss of Power	Normal Mode:	PASS	FAIL		
		Fire Mode:	PASS	FAIL		
16.	Fire Pump Trouble	Normal Mode:	PASS	FAIL		
		Fire Mode:	PASS	FAIL		
17.	Pump Room Temperature	Normal Mode:	PASS	FAIL		
		Fire Mode:	PASS	FAIL		
<b>ITP Section C5.5: Emergency Generator / Fire Alarm Integrations:</b>						
Normal Mode: review device installation and confirm correct fire alarm system status.						
Fire Mode: operate device (run generator, simulate failure, low fuel) and confirm correct operation and fire alarm annunciation.						
18.	Generator Running	Normal Mode:	PASS	FAIL		
		Fire Mode:	PASS	FAIL		
19.	Generator Trouble	Normal Mode:	PASS	FAIL		
		Fire Mode:	PASS	FAIL		
20.	Low Fuel	Normal Mode:	PASS	FAIL		
		Fire Mode:	PASS	FAIL		
<b>ITP Section C5.6: Emergency Generator Power Integrations:</b>						
Normal Mode: review generator installation and power feeds.						
Fire Mode: run elevators and fire pump, simulate power failure, confirm generator starts within 15 seconds, confirm elevator and fire pump operation.						
21.	Generator Start-up	Normal Mode:	PASS	FAIL		
		Fire Mode:	PASS	FAIL		
22.	Elevator Secondary Power	Normal Mode:	PASS	FAIL		
		Fire Mode:				
23.	Fire Pump Secondary Power	Fire Mode:	PASS	FAIL		
			PASS	FAIL		

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Integrated Systems Testing Protocols and Procedures						
No.	System Integration	Record of Tests			Notes	Initials
<b>ITP Section C5.7: Fire Alarm / Elevator Integrations:</b> 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.						
24.	Primary Recall Test	Normal Mode:	PASS	FAIL		
		Fire Mode:				
		Recall Car	PASS	FAIL		
		Control Car	PASS	FAIL		
		Indicator	PASS	FAIL		
25.	Alternate Recall Test	Normal Mode:	PASS	FAIL		
		Fire Mode:				
		Recall Car	PASS	FAIL		
		Control Car	PASS	FAIL		
		Indicator	PASS	FAIL		
26.	Top of Shaft Recall Test	Normal Mode:	PASS	FAIL		
		Fire Mode:				
		Recall Car	PASS	FAIL		
		Control Car	PASS	FAIL		
		Indicator	PASS	FAIL		
27.	Elevator Pit Recall Test	Normal Mode:	PASS	FAIL		
		Fire Mode:				
		Recall Car	PASS	FAIL		
		Control Car	PASS	FAIL		
		Indicator	PASS	FAIL		
28.	Machine Room Recall Test	Normal Mode:	PASS	FAIL		
		Fire Mode:				
		Recall Car	PASS	FAIL		
		Control Car	PASS	FAIL		
		Indicator	PASS	FAIL		
<b>ITP Section C5.8: Fire Alarm / Air Handling Unit Integrations:</b> Normal Mode: review air handling unit installation and running. Fire Mode: activate fire detector, confirm air handling unit shutdown.						
29.	AHU Shutdown Test	Normal Mode:	PASS	FAIL		
		Fire Mode:	PASS	FAIL		

Integrated Systems Testing Completion			
<b>Testing Record Signatures:</b> As per Section C9.2 of CAN/ULC-S1001:2011 (R2017), Integrated Testing Forms shall be signed upon completion of the test protocol and procedures confirming that the participants in the Integrated Systems Testing concur with the results of the tests. Signed forms are to be included in the final report.			
<b>Integrated Testing Coordinator:</b>	Company:		
	Name:		
	Signature:		Date:
<b>Owner or Owner's Representative:</b>	Company:		
	Name:		
	Signature:		Date:
<b>Electrical Contractor:</b>	Company:		
	Name:		
	Signature:		Date:
<b>Mechanical Contractor:</b>	Company:		
	Name:		
	Signature:		Date:
<b>Sprinkler Contractor:</b>	Company:		
	Name:		
	Signature:		Date:

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Integrated Systems Testing Completion			
<b>Standpipe Contractor:</b>	Company:		
	Name:		
	Signature:		Date:
<b>Fire Alarm Contractor:</b>	Company:		
	Name:		
	Signature:		Date:
<b>Fire Pump Contractor:</b>	Company:		
	Name:		
	Signature:		Date:
Emergency Generator Contractor:	Company:		
	Name:		
	Signature:		Date:

Integrated Testing Notes

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