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PLEASE USE SEPARATE FORM FOR EACH PUBLIC INPUT

To:  Secretary, Standards Council National Fire Protection Association
     1 Batterymarch Park · Quincy, MA 02169-7471 OR
     Fax to: (617) 770-3500 OR Email to: proposals_comments@nfpa.org

1/19/2012
Committee Scope: This Committee shall have primary responsibility for documents that address commissioning and integrated system testing activities and tasks for fire protection and life safety systems. This includes the requirements for planning, organization, coordination, responsibility, implementation, and documentation of commissioning and integrated system testing of active and passive systems and features that serve a fire protection or life safety purpose.

Chapter 1  Administration

1.1 Scope.

1.1.1 The standard shall provide the minimum requirements for testing of integrated fire protection and life safety systems where such testing is required by governing laws, codes, regulations, or standards.

1.1.2 This standard shall not provide requirements for testing of individual systems.

1.1.3 The requirements of this standard shall apply to new and existing systems.

1.2 Purpose. The purpose of this standard shall be to provide a testing protocol that will ensure integrated fire protection and life safety systems perform as intended.

1.3 Application.

1.3.1 This standard shall apply to integrated passive and active fire protection and life safety equipment and systems.

1.3.2 Integrated systems testing shall verify and document the following:

1.3.2.1 Performance in accordance with applicable codes and standards

1.3.2.2 Sequence of operation

1.3.2.3 Performance in accordance with manufacturers’ published instructions

1.3.2.4 Accuracy of Record Documents

1.4 Equivalency.
1.4.1 Nothing in this Standard shall prevent the use of systems, methods, devices, or appliances of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety over those prescribed by this Standard.

1.4.2 Technical documentation shall be submitted to the authority having jurisdiction to demonstrate equivalency.

1.4.3 The systems, methods, devices, or appliances that are found equivalent shall be approved.

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Chapter 2  Referenced Publications

2.1 General. The documents or portions thereof listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document.

2.2 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

   *NFPA 72®, National Fire Alarm and Signaling Code, 2010 edition.*
   *NFPA 731, Standard for the Installation of Electronic Premises Security Systems,*

2.3 Other Publications.


2.4 References for Extracts in Mandatory Sections. (RESERVED)

Chapter 3  Definitions

3.1 General. The definitions contained in this chapter apply to the terms used in this standard. Where terms are not defined in this chapter or within another chapter, they shall be defined using their ordinarily accepted meanings within the context in which they are used. *Merriam-Webster’s Collegiate Dictionary, 11th edition,* is the source for the ordinarily accepted meaning.

3.2 NFPA Official Definitions.

3.2.1* Approved. Acceptable to the authority having jurisdiction.
3.2.2* Authority Having Jurisdiction (AHJ). An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

3.2.3* Listed. Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been tested and found suitable for a specified purpose.

3.2.4 Standard. A document, the main text of which contains only mandatory provisions using the word “shall” to indicate requirements and which is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions shall be located in an appendix or annex, footnote, or fine-print note and are not to be considered a part of the requirements of a standard.

3.2.5 Shall. Indicates a mandatory requirement.

3.2.6 Should. Indicates a recommendation or that which is advised but not required.

3.3 General Definitions.

3.3.1* Basis of Design (BOD). A document that shows the concepts and decisions used to meet the owner’s project requirements and the requirements of governing laws, codes, regulations and standards.

3.3.2* Building. Any structure used or intended for supporting or sheltering any use or occupancy. [101, 2012]

3.3.3 Commissioning.

3.3.3.1 Commissioning (Cx). A systematic process that provides documented confirmation that building systems function according to the intended design criteria set forth in the project documents and satisfy the owner’s operational needs, including compliance with applicable laws, regulations, codes, and standards.

3.3.3.2* Commissioning Authority (CxA). The qualified person, company, or agency that plans, coordinates, and oversees the entire commissioning process.

3.3.3.3* Commissioning Plan. The document prepared for each project that identifies the processes and procedures necessary for a successful commissioning process.

3.3.3.4 Commissioning Record. The complete set of commissioning documentation for the project that is turned over to the owner at the end of the construction phase.
3.3.3.5* Fire and Life Safety Commissioning (Cx). A systematic process that provides documented confirmation that fire and life safety systems function according to the intended design criteria set forth in the project documents and satisfy the owner’s operational needs, including compliance with requirements of any applicable laws, regulations, codes, and standards requiring fire and life safety systems.

3.3.3.6 Fire Commissioning Agent. (FCxA). A person or entity identified by the owner, who leads, plans, schedules, documents, coordinates the fire protection and life safety commissioning team, and implements the commissioning process and integrated testing of fire and life safety systems.

3.3.3.7* Re-commissioning (Re-Cx). The process of verifying the performance of existing fire protection and life safety systems that have been previously commissioned to ensure that the systems continue to operate according to the design intent or current operating needs.

3.3.3.8* Retro-commissioning (RCx). The process of commissioning existing fire protection and life safety systems that were not commissioned when originally installed.

3.3.4 Component. A part of an architectural, electrical, or mechanical system. [5000, 2012]

3.3.5 Construction Documents. Plans, specifications and other documents that describe the construction project.

3.3.6 Drawings.

3.3.6.1* Coordination Drawing. A drawing used to show and coordinate the placement and interaction of multiple individual systems or components.

3.3.6.2* Record (Plan) Drawing. A drawing that is submitted as the final record of documentation for the project.

3.3.6.3 Shop Drawing. Scaled working drawings, equipment cutsheets, and design calculations. [1031, 2009]

3.3.6.4 Working (Plan) Drawing. Approved plans and drawings that are used for construction of the project.

3.3.7 Individual System. See System.

3.3.8* Inspection. A visual examination of a system or portion thereof.

3.3.9* Installation Contractor. A person or entity that provides labor and materials to install systems and equipment.

3.3.10 Integrated System. See System.
3.3.11 Integrated Testing Agent (ITa). A person or entity identified by the owner, who, plans, schedules, documents, coordinates, and implements the integrated testing of individual fire protection and life safety systems and their associated subsystems.

3.3.12 Interface. That place at which individual systems meet and act on or communicate with each other.

3.3.13* Interface Device. A component that connects an individual system to one or more other individual systems.

3.3.14 Issues Log. A formal and ongoing record of failures, deficiencies, or concerns, as well as associated priorities, implications, and resolutions.

3.3.15* Manufacturer’s Published Instructions. Published installation and operating documentation provided for each product or component. [72, 2013]

3.3.16* Narrative. A written summary description of the property and all applicable fire protection and life safety systems and related integrated operational features.

3.3.17 Operation and Maintenance Manual. A document that includes operation and maintenance requirements.

3.3.18* Owner’s Project Requirements (OPR). Documentation of the Owner’s goals and requirements for the project.

3.3.19 Phase.

3.3.19.1 Construction Phase. The phase during which the systems and materials are fabricated and installed, tested, and accepted.

3.3.19.2 Design Phase. The phase during which the basis of design is produced, and drawings and calculations are produced and testing procedures are developed.

3.3.19.3 Occupancy Phase. The phase during which the training and periodic inspection, testing, and maintenance are scheduled and performed.

3.3.19.4 Planning Phase. The phase during which initial project requirements are developed.

3.3.20 Registered Design Professional (RDP). An individual who is registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws of the jurisdiction in which the project is to be constructed, or other professional with qualifications or credentials acceptable to the jurisdiction in which the project is to be constructed.

3.3.21* Sequence of Operation. A matrix, narrative, or table of system inputs and outputs or responses that illustrate the interactions of interconnected fire protection and life safety systems.

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3.3.22 **Stakeholder.** Any individual, group, or organization that is involved in or affected by the project.

3.3.23 **System.**

3.3.23.1* **Active Fire Protection System.** A system that uses moving mechanical or electrical components to achieve a fire protection goal.

3.3.23.2 **Fire Protection Systems.** Systems, devices, and equipment used to detect a fire and its by-products, actuate an alarm, or suppress or control a fire and its by-products, or any combination thereof. [1031, 2009]

3.3.23.3* **Individual System.** Components or equipment that are assembled, grouped, or otherwise interconnected, or procedures used to accomplish a purpose or function.

3.3.23.4* **Integrated System.** A combination of individual systems that are required to operate together as a whole to achieve an overall objective.

3.3.23.5* **Interconnected System.** An integrated system that has component systems or devices physically connected to achieve fire protection and life safety objectives.

3.3.23.6* **Life Safety Systems.** Those systems that enhance or facilitate evacuation, smoke control, compartmentalization, and/or isolation. [1031, 2009]

3.3.23.7* **Passive Fire Protection System.** Any portion of a building or structure that provides protection from fire or smoke without any type of system activation or movement.

3.3.24 **System Connection.**

3.3.24.1* **Switch Connection.** A connection between multiple individual systems using a device for making or breaking the connection in an electric circuit.

3.3.24.2* **Data Sharing Connection.** A connection between multiple individual systems in which data streams are transferred.

3.3.24.3* **Interconnection.** The physical connections between interconnected systems.

3.3.25 **Systems Manual.** A compilation of all operational and maintenance manuals and description of the integrated fire protection and life safety systems.

3.3.26 **Test.**

3.3.26.1 **Test.** A procedure intended to establish the operational status, or performance a system.
3.3.26.2 Acceptance Test. Tests performed at the completion of installation to confirm compliance with applicable manufacturers’ installation specifications, applicable codes and standards, and the project Basis of Design and Owners Project Requirements.

3.3.26.3 Control Group Test. An integrated system test that verifies the response of one or more individual systems by examining software programming and by testing only one or more initiating devices of another individual system.

3.3.26.4 End-to-End Integrated System Test. A test of the response of one or more individual systems to an input on another individual system.

3.3.26.5* Integrated System Test. A test of integrated fire protection and life safety systems.

3.3.26.6* Interface Test. Any test of the interface between two individual systems that are part of an integrated system.

3.3.26.7 Periodic Test [RESERVED.]

3.3.26.8* Pre-Functional Test. Tests performed prior to acceptance testing to confirm compliance with manufacturers’ specification, applicable codes and standards, and the project Basis of Design and Owners Project Requirements.

3.3.27 Qualified. A competent and capable person or entity that has met the requirements and training for a given field acceptable to the authority having jurisdiction.

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Chapter 4 General Requirements

4.1 Conducting Integrated Tests

4.1.1 This chapter shall apply to the testing of integrated systems provided for fire protection or life safety.

4.1.2 Personnel responsible for integrated testing shall meet the qualifications listed in 4.3.

4.1.3 Where required by codes, standards or regulations, integrated testing of new or existing fire protection and life safety systems shall occur.

4.2 Initial Integrated Test

4.2.1 Initial integrated test shall be performed where required by a commissioning plan or integrated test plan.

4.2.1.1 Initial Integrated Test shall verify the proper operation all interconnected systems and functions in accordance with either the:

(a)* Commissioning plan or,
(b) Integrated Testing Plan

4.3 Periodic Integrated Testing

4.3.1 Integrated fire protection and life safety systems shall have periodic system testing.

4.3.2* Where periodic tests are not performed in accordance with 4.3.3 or 4.3.4, the periodic test interval shall not exceed five years.

4.3.3 Integrated systems that were commissioned upon installation shall have periodic integrated testing at the interval specified in the commissioning plan.

4.3.4 For integrated systems that were not commissioned, an integrated testing plan shall be developed to identify the appropriate extent and frequency of periodic integrated system testing.

4.3.5* In addition to periodic integrated testing, integrated system testing should be done when any of the following events occurs:

(1) New fire protection or life safety systems are installed and interconnected to existing fire protection and life safety systems.

(2) Existing fire protection or life safety systems are modified to become part of interconnected systems.

(3) Interconnections or sequence of operations of existing integrated fire protection and life safety systems are modified.

(4) Whenever failures of an individual system interfaces occur during routine operation or testing of an interconnected fire protection and life safety system.

4.4 Integrated System Testing Team.

4.4.1 This chapter applies to the testing of integrated systems provided for fire protection or life safety.

4.4.2 Personnel responsible for integrated system testing shall meet the qualifications listed in 4.5.

4.4.3 The integrated system testing team shall include an Integrated Testing Agent.

4.4.3.1 The integrated system testing team shall be identified and documented.

4.4.3.2 The exact size and members of the integrated system testing team shall be dependent upon project type, size, and complexity.

4.5* Qualifications.

4.5.1 Personnel involved in integrated system testing shall meet the requirements of this chapter. Team members shall provide evidence of their qualifications and/or certifications when requested by the authority having jurisdiction.
4.5.1.1 Documentation of these qualifications shall be provided to the Owner.

4.5.2 The Integrated Testing Team members shall be knowledgeable and experienced in the proper application of the integrated system testing requirements of this standard and general industry practices.

4.5.3.* The Integrated Testing Agent shall have an understanding of the design, installation, operation and maintenance of the type of fire protection and life safety systems installed.

4.6 Testing Responsibilities.
4.6.1 The owner shall be responsible for integrated system testing of fire and life safety systems.
4.6.2 The owner shall be permitted to delegate the authority and responsibility for integrated system testing of the fire protection and life safety systems to the management firm or managing individual through specific provisions in the lease, written use agreement, or management contract.

4.6.3* The Integrated Testing Agent shall be responsible for planning, scheduling, documenting, coordinating, and implementing the integrated system testing of the fire protection and life safety systems.

4.6.4 Where a commissioning plan does not exist, the Integrated Testing Agent shall prepare a test plan providing, but not limited to, the following information:
(1) A comprehensive functional matrix depicting all system inputs and associated output functions
(2) The extent of systems to be tested under the direct supervision of the Integrated Testing Agent
(3) The testing of component systems required by associated NFPA standards
(4) Test processes to be incorporated
(5) Test scenarios developed to verify appropriate system responses to the functional matrix
(6) A test event schedule with the applicable stakeholders

4.7 Test Plan
4.7.1 Integrated testing shall begin by performing the test scenario tasks described in the Integrated Testing Plan.

4.7.2 The test shall verify that required responses have occurred in accordance with the integrated testing plan.

4.7.3 Unless otherwise permitted in section 4.x, integrated system testing shall test all of the responses and interactions found on integrated fire protection and life safety systems.

4.7.4* The test shall begin with each initiating device and end with the actions and responses identified in the integrated testing plan.
4.7.5 Where all of the following conditions and tests are verified, it shall not be required to test all devices on one individual system used to initiate a common response on other individual systems:

1. Two or more individual systems are interfaced using an interface device.
2. The integration of the systems is through a single interface.
3. The interface is programmed to deliver notification whenever any initiating device in a defined control group changes state.
4. At least one test is conducted by activating each of the initiating devices listed in the control group and observing the response of the interconnected systems (end-to-end test).
5. At least one test is conducted by activating an initiating device that is not listed in the control group and observing the response of the interconnected systems (end-to-end test).
6. The control group initiating devices have been verified by testing of the individual system in accordance with the applicable system standard for inspection, testing and maintenance.

Chapter 5 Test Methods

5.1 General.

5.1.1 This chapter applies to the testing of integrated systems provided for fire protection or life safety.

5.2 Test Method.

5.2.1* Integrated testing shall demonstrate that the final integrated system installation complies with the specific design objectives for the project and applicable codes and standards

5.2.2 Test scenarios shall include events and combination of events, including but not limited to:
1. Loss of normal power
2. Water flow
3. Presence of smoke

5.2.2.1* Where approved, test scenarios with a combination of events shall be permitted to include simulated events to initiate activation devices.

5.2.3 Test scenario events shall demonstrate all annunciation, supervision, notification and integration between systems occurs, at locations specified by the individual systems.

5.2.4* Test scenario events shall verify that all required building functions occur.

5.2.5 Verify the wiring methods required for supply and interlocking life safety systems meets the survivability requirements as specified by the applicable codes to include but not limited to:
1. Generator start circuits
2. Emergency feeder circuits including wiring tests to the device
3. Emergency fire alarm circuits
4. Fire pump feeders

5.2.6* Integrated testing of fire protection and life safety systems shall verify the interconnections function properly.

5.2.7* During integrated testing, equipment shall be tested in accordance with the applicable system standard to verify systems perform according to their design function.

5.2.8 Written documentation of the testing shall be provided in accordance with Chapter 6.

5.2.9* Testing shall be repeated if changes or corrections are made to systems during testing that could affect the overall functionality of the systems.

5.2.10 Switch connections to fire alarm systems shall be tested in accordance with NFPA 72, National Fire Alarm and Signaling Code.

5.2.11 Control circuits requiring electrical power shall be tested for presence of operating voltage.

5.2.12 Loss of power to monitored circuits shall be tested to confirm signal receipt at one of the following:

(1) A constantly attended location at the premises
(2) A monitoring station as described in NFPA 731, Standard for the Installation of Electronic Premises Security Systems, Chapter 9
(3) A supervising station as described in NFPA 72, National Fire Alarm and Signaling Code

5.2.13 Integrated testing of data sharing systems shall document the following:

(1) Completion of acceptance testing for each component system
(2) Verification of data transfer between component systems
(3) Test of visual and audible signal upon loss of communication
(4) Test of degrade mode for each component system
(5) Proper function of integrated data sharing systems

5.3 Issues Logs and Corrective Action Reports

5.3.1 The issues log shall list each separate finding and its corresponding resolution, including dates of discovery and resolution.
5.3.1.1 Corrective action reports shall provide a specific and detailed description of actions taken to remediate faults, failures, and discrepancies discovered during the testing process.

5.3.1.2 Upon completion of testing, the Integrated Testing Agent shall submit a final test report to the owner and other stakeholders as requested.

5.3.1.3 The final test report shall summarize the results of the integrated testing and shall include issues logs and corrective action reports.

### Chapter 6 Documentation

**6.1 Application**

6.1.1 Documentation of integrated system testing shall comply with the minimum requirements of this Chapter.

6.1.2 Documentation required by other approved installation standards referenced in the Basis of Design for the individual systems that make up the integrated system shall be used as required by those standards.

6.1.3 This Chapter outlines documentation requirements, but does not prohibit additional documentation from being provided.

6.1.4 Where required by any design documents or by other governing laws, codes, standards, or authority having jurisdiction, the Integrated Testing Agent shall furnish documentation stating that the integrated system has been tested in accordance with the approved test plan and this standard.

**6.2 Minimum Required Test Documentation**

6.2.1 The final test report shall summarize the results of the integrated testing.

6.2.2 The test report shall include a narrative or matrix describing each test and the response of the integrated system and individual systems.

6.2.2.1 The test report shall include a description of the status of each individual system for each test.

6.2.2.2 The report detail for each test shall identify the individual system where a condition was simulated or where a device state change was initiated.

6.2.2.3 The report detail for each test shall identify each individual system where a response occurred as the result of a simulated condition or a change in state for an initiating device.

6.2.3 The test report shall include a statement that all input and output functions of the integrated system have been tested and operate as intended.
6.2.3.1 Where any test result does not comply with the intended design, a description of the fault shall be made in an issues log.

6.2.3.2 Where any test result does not comply with the intended design, corrective action report shall be prepared.

6.2.4 The Integrated Testing Agent shall maintain a record of faults, failures, and discrepancies discovered through the testing process in the issues log.

6.2.5 The issues log shall list each separate finding and its corresponding resolution, including dates of discovery and resolution.

6.2.6 Corrective action reports shall be prepared and shall provide a specific and detailed description of actions taken to remediate faults, failures, and discrepancies discovered during the testing process.

6.3 Completion Documents

6.3.1 Upon completion of testing and after all issues and discrepancies have been resolved, the Integrated Testing Agent shall submit Completion Documents to the owner and, where requested, to other stakeholders.

6.3.2 All documents required by section 6.2 of this standard shall be included in the Completion Documents.

6.3.3 A copy of the Test Plan required by 4.3 shall be included in the Completion Documents.

6.3.4 The Completion Documents shall include all documentation required by the integrated system design documents or by other governing laws, codes or standards.

6.4 Record Retention, and Record Maintenance

6.4.1 The property or building or system owner or the owner’s designated representative shall be responsible for records retention.

6.4.2 Records shall be on a medium that will survive the retention period. Paper or electronic media shall be permitted.

6.4.3 All records required by this chapter shall be available for examination by the authority having jurisdiction.

6.4.4 Archiving of records by any means shall be permitted if hard copies of the records can be provided promptly when requested.

6.4.5 All documents required by this chapter shall be retained as follows:

6.4.5.1 *Documentation of the Initial Integrated System Test shall be retained until a new initial integrated system test report has been provided to the owner.

6.4.5.2 Documentation of the Periodic Integrated System Test shall be retained until the next Periodic Integrated System Test has been completed and the documentation provided to the Owner.
6.4.6 All records required by this chapter shall be kept in one location.

6.4.7 The location of the documentations shall be identified at the fire alarm control unit.

6.4.8 The records shall be accessible by authorized personnel only.

6.4.9 * Security for documentation shall be determined by the stakeholders.

6.4.10 Where documents cannot be protected from public access, it shall be permitted to remove sensitive information from record documents provided that the owner retains complete documentation that will be made accessible to the authority having jurisdiction at an owner designated location.

6.5 Forms

6.5.1 Approved documents and forms shall be used to record integrated testing of fire and life safety systems.

6.5.2 Forms required by other governing laws, codes or standards or by project specifications or drawings, shall be permitted to be used in place of forms required by this section provided that the minimum required content is included.

6.5.3 Custom forms shall be permitted to be used in place of forms required by this section provided that the minimum required content is included.

6.5.4 Where no form or checklist exists, specific forms or checklists shall be developed to document testing of the integrated system and individual systems.

6.5.5 Unless otherwise permitted or required in 6.5.1 through 6.5.4, Figure 6.5.5(a) shall be used as the issues log form and 6.5.5(b) shall be used as the corrective action report form.
# COMMISSIONING ISSUES LOG

Project: ______________________________ Prepared by: ______________________________ Page __ of __

Attach additional pages as necessary for issues requiring more explanation and tracking.

<table>
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<th>#</th>
<th>Issue</th>
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(Use)

FIGURE 6.5.5(a) Issues Log
FIGURE 6.5.5(b) Corrective Action Report
This annex is not a part of the requirements of this NFPA document but is included for informational purposes only.

A.1.1.1 These requirements include protocol for testing procedures, responsibilities for various parties, methods and documentation for verifying the operational readiness and sequence of integrated systems. The standard is designed to ensure that interconnected active and passive fire protection and life safety systems operate as intended. It is not the intent of this standard to require implementation of emergency response procedures, evacuation drills or other exercises that require facility staff or fire department response. However, when integrated systems tests are being conducted, it may be an appropriate opportunity to practice emergency procedures or drills.

This standard does not prohibit the owner of the property, building or individual system, or the owner’s designated representative from requiring integrated system testing by design or contract documents.

A.1.1.2 Individual systems should be tested in accordance with the requirements of the appropriate installation standard.

A.1.3.1 These systems and equipment can include, but are not limited to, the following:

1. Infrastructure supporting the building fire protection and life safety systems within the boundaries of the project. Project infrastructure should include those systems and utilities necessary for the support and operation of the fire protection and life safety systems of the proposed project. These infrastructure items can include the following:
   
   (a) Access roadways for general ingress and egress and those necessary for fire department access in accordance with local codes, standards, and policies
   
   (b) Utility systems for the provisions of electric power, fuel gas, water, and waste water; communication systems; and any other utility system deemed essential for the support of project operations
   
   (c) On-site combined heat and power generation systems, electric power generation plants or systems, fuel gas storage facilities, water supply and storage facilities, and environmental or waste management systems

2. Fixed fire suppression and control systems

3. Fire alarm systems

4. Emergency communications systems (ECS)

5. Smoke control systems

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(6) Normal and emergency standby power systems including, but not limited, to those powering the following:
   (a) Smoke control systems
   (b) Stair pressurization systems
   (c) Smoke-proof enclosure ventilation systems
   (d) Electric driven fire pumps
   (e) Elevator systems
   (f) Fire suppression system controllers
(7) Explosion prevention and control systems
(8) Fire-resistant and smoke-resistant assemblies. Examples include, but are not limited to, floor ceilings and roof decks, doors, windows, barriers, and walls protected by a firestop system or device for through-penetrations and membrane penetrations, and other fire and smoke control assemblies.
(9) Systems associated with commercial cooking operations
(10) Elevator systems
(11) Means of egress systems and components including, but not limited to, the following:
   (a) Emergency lighting and exit signs
   (b) Major egress components, such as corridors, stairs, ramps, and so forth
   (c) Exit path marking systems
(12) Other systems or installations integrated or connected to a fire or life safety system, such as, but not limited to, access control, critical processes, and hazardous operations

A.1.3.2 Where integrated systems testing is performed as part of a commissioning process, compliance with the Basis of Design and Owners Project Requirements should be verified.

A.1.3.2(2) See Figure A.3.3.21 for a sample sequence of operation

A.3.2.1 Approved. The National Fire Protection Association does not approve, inspect, or certify any installations, procedures, equipment, or materials; nor does it approve or evaluate testing laboratories. In determining the acceptability of installations, procedures, equipment, or materials, the authority having jurisdiction may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure, or use. The authority having jurisdiction may also refer to the listings or labeling practices of an organization that is concerned with product
evaluations and is thus in a position to determine compliance with appropriate standards for the current production of listed items.

A.3.2.2 Authority Having Jurisdiction (AHJ). The phrase “authority having jurisdiction,” or its acronym AHJ, is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

A.3.2.3 Listed. The means for identifying listed equipment may vary for each organization concerned with product evaluation; some organizations do not recognize equipment as listed unless it is also labeled. The authority having jurisdiction should utilize the system employed by the listing organization to identify a listed product.

A.3.3.1 Basis of Design (BOD). The Basis of Design is normally used to assist in the plan review, inspection, and acceptance process.

A.3.3.2 Building. The term building is to be understood as if followed by the words “or portions thereof.” The intent is to also apply this standard to structures such as roadway and transit tunnels, bridges, towers, fuel storage facilities, and other structures insofar as this document applies.

A.3.3.3.2 Commissioning Authority (CxA). A commissioning authority is typically provided and leads the overall fire protection and life safety commissioning team when the commissioning process is applied to more than one building system — that is, building commissioning. When the commissioning process is only applied to fire and life safety systems, the FCxA can assume the role of the commissioning authority.

A.3.3.3.3 Commissioning Plan. The commissioning plan establishes the framework for how commissioning will be handled and managed on a given project.

A.3.3.3.5 Fire and Life Safety Commissioning (Cx). Commissioning is achieved in the design phase by documenting the design intent and continuing throughout construction, acceptance, and the warranty period with actual verification of performance, O&M documentation verification, and the training of operating personnel.

A.3.3.3.7 Re-commissioning (Re-Cx). Re-commissioning can be initiated periodically or in response to building renovation or a change in building use.

A.3.3.3.8 Retro-commissioning (RCx). Retro-commissioning is a process that ensures that building systems perform interactively according to the design intent and/or to meet the owner’s current operational needs. This is achieved by documenting the design intent where possible and
the current operational needs, measuring the existing performance, and implementing necessary operational and/or system modifications, followed by actual verification of performance, verification of O&M documentation, and training of operating personnel.

Retro-commissioning explains the analogy and methodology used by the designers in the design of the systems for the protection of the building, occupants, and emergency response personnel.

A.3.3.6.1 Coordination Drawing. Coordination drawings include information such as horizontal and vertical dimensions to avoid interference with structural framing, ceilings, partitions, equipment, lights, mechanical, electrical, conveying systems, and other property components or systems.

A. 3.3.6.2* Record (Plan) Drawing A drawing is also referred to as a plan. A record drawing might also be referred to as an as-built drawing or working drawing.

A.3.3.8 Inspection. One purpose for inspections is to verify that systems and components appear to be in operating condition and is free of physical damage.

A.3.3.9 Installation Contractor. Installation contractors often provide shop drawings, working plans, and other related documents.

A. 3.3.13 Interface Device. Examples of interface devices include switches and data sharing as defined under System Connections.

A.3.3.15 The manufacturer’s published instructions include directions and information necessary for the intended installation, maintenance, and operation of the product or component.

A.3.3.16 Narrative. The narrative is written to assist and expedite the plan review and inspection process by the AHJ. The narrative is a written description of an individual or integrated system. The narrative for an integrated system includes details on how individual systems are integrated to meet the overall fire protection and life safety system objectives. It is maintained on file for use at the time of final inspection and for periodic reviews during future field inspections. It is referenced by the building owner and authority having jurisdiction to ensure that all future modifications, alterations, additions, or deletions to the original systems are current and that the original system’s protection and required system performance are not compromised or have not been altered without building or fire official prior review. The narrative should be recognized by all entities that it is one of the key documents associated with the commissioning process.

Building owners benefit by knowing how their building’s fire protection and life safety systems work. The narrative provides a procedure including methods for testing and maintenance. A copy of the narrative report should be kept on the premises and should be available for review prior to testing and proposed modifications to any portion of the building’s fire protection and life safety systems.

Development Format. The narrative is prepared by a qualified, identified individual who has “taken charge” in the development of an entire coordinated narrative that includes all information regarding the design basis, sequence of operation, and testing criteria associated with
all required or non-required fire protection systems set forth by applicable laws, codes, regulations, and local ordinances of the jurisdiction and applicable national and/or international standards.

The narrative should be submitted with plans and specifications for review and approval by the AHJ prior to the issuance of a building permit. The narrative should be written in a clear conversational format. The construction specifications should not be considered a narrative; however, some applicable portions of the construction specifications could be included to support or clarify the intent of the narrative. The narrative is a stand-alone document, it should be 8½ in. × 11 in. for filing and ease of use by the AHJ and building owners, and it should include an administrative cover page identifying the project name, building address, and name, address, and phone number of the individual who has “taken charge” in the preparation of the narrative.

Commentary. Codes and standards are written in a way to require uniformity in design and construction for all buildings and structures. The codes and standards can be subjective and are subject to interpretation by building owners, designers, and the AHJ; uniformity is not always necessarily achieved. The narrative should attempt to clarify to the AHJ the designer’s intent and interpretation of the code and standards. The AHJ can agree or disagree with the designer’s interpretation. Historically, the requirements for fire protection and life safety systems have become site-specific, and building code requirements are not uniformly enforced. The size of the community, fire department staffing, fire department equipment availability, and suppression tactics established by the local fire department have affected the uniformity of enforcement. Site-specific requirements more or less than that of the building code can have reasonable intent; however, this type of enforcement in some cases has proven to be controversial in the applicability of code uniformity. The narrative can be and should be a valuable instrument when accurately prepared, and it will establish a line of communication between the designer and the authority having jurisdiction, resulting in what the building codes and standards mandate, which is uniformity and consensus in the interpretation of the codes and standards. The narrative should be written in a three-sectional format with subsections as necessary (methodology, sequence of operation, and testing criteria sections) for clarity and should be limited to a summary. A sample narrative outline can be found in Annex B.

A.3.3.18 Owner’s Project Requirements (OPR). The Owner’s Project Requirements document the owner’s goals for the project, their expectations for how individual systems will be integrated and how the individual systems and the integrated systems will be used and operated. The Owners Project Requirements also establishes benchmarks and criteria for performance.

A.3.3.21 Sequence of Operation. See Figure A.3.3.21(a) and Figure A.3.3.21(b). The matrix and the sequence of operations form are examples only, and they might need to be modified based on the actual installation requirements. The system outputs on the sequence of operations matrix correspond to the system outputs on the sequence of operation form.
FIGURE A.3.3.21(a)  Sequence of Operation.
## FIGURE A.3.3.21(b)  Sequence of Operation Form.

<table>
<thead>
<tr>
<th>Building Information</th>
<th>Installing Contractor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building name:</td>
<td>Company name:</td>
</tr>
<tr>
<td>Building address:</td>
<td>Address:</td>
</tr>
<tr>
<td>Owner's name:</td>
<td>Contact person:</td>
</tr>
<tr>
<td>Owners address:</td>
<td>Phone/fax/e-mail:</td>
</tr>
<tr>
<td>Owner's phone/fax/e-mail:</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>System Input</th>
<th>System Output</th>
<th>Test Results</th>
<th>Date</th>
<th>Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Typical manual pull station (by device) floors 1–5</td>
<td>A. Actuate common alarm signal indicator</td>
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<td></td>
<td>B. Actuate audible alarm signal</td>
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<td></td>
<td>G. Display and print change of status and time of initiating event</td>
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<td></td>
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<tr>
<td></td>
<td>H. Transmit alarm to FD and central station masterbox</td>
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<tr>
<td></td>
<td>J. Actuate associated exterior fire alarm beacon</td>
<td></td>
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<tr>
<td></td>
<td>K. Actuate all evacuation signals for the building</td>
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<tr>
<td></td>
<td>L. Release all magnetically held doors</td>
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<tr>
<td>2. Typical elevator recall smoke detector (by device) by floor (lobby)</td>
<td>A. Actuate common alarm signal indicator</td>
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<td></td>
<td>B. Actuate audible alarm signal</td>
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<td>G. Display and print change of status and time of initiating event</td>
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<td></td>
<td>H. Transmit alarm to FD and central station masterbox</td>
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<tr>
<td></td>
<td>J. Actuate associated exterior fire alarm beacon</td>
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<td></td>
<td>K. Actuate all evacuation signals for the building</td>
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<tr>
<td></td>
<td>L. Release all magnetically held doors</td>
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<td></td>
<td>M. Recall associated elevator in accordance with recall sequence</td>
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<td></td>
<td>P. Elevator hoistway open</td>
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<tr>
<td>3. Elevator machine room smoke detector</td>
<td>A. Actuate common alarm signal indicator</td>
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<td></td>
<td>B. Actuate audible alarm signal</td>
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<td></td>
<td>G. Display and print change of status and time of initiating event</td>
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<td>H. Transmit alarm to FD and central station masterbox</td>
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<td></td>
<td>I. Illuminate associated detector LED indicator</td>
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</table>

© 2011 National Fire Protection Association
<table>
<thead>
<tr>
<th>System Input</th>
<th>System Output</th>
<th>Test Results</th>
<th>Date</th>
<th>Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Elevator machine room smoke detector (continued)</td>
<td>J. Actuate associated exterior fire alarm beacons</td>
<td></td>
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<tr>
<td></td>
<td>K. Actuate all evacuation signals for the building</td>
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<td></td>
<td>L. Release all magnetically held doors</td>
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<td></td>
<td>P. Elevator hoistway open</td>
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<tr>
<td>4. Typical smoke detector (by device) computer room (3rd floor) preaction system</td>
<td>A. Actuate common alarm signal indicator</td>
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<td></td>
<td>B. Actuate audible alarm signal</td>
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<td></td>
<td>C. Display and print change of status and time of initiating event</td>
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<td></td>
<td>H. Transmit alarm to FD and central station masterbox</td>
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<td></td>
<td>J. Actuate associated exterior fire alarm beacons</td>
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<td></td>
<td>K. Actuate all evacuation signals for the building</td>
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<td></td>
<td>L. Release all magnetically held doors</td>
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<td></td>
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<tr>
<td></td>
<td>M. Recall associated elevator in accordance with recall sequence</td>
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<tr>
<td>5. Typical wet sprinkler system flow control valve assembly flow switch — by floor</td>
<td>A. Actuate common alarm signal indicator</td>
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<td></td>
<td>B. Actuate audible alarm signal</td>
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<td></td>
<td>C. Actuate audible trouble signal</td>
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<td></td>
<td>G. Display and print change of status and time of initiating event</td>
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<td></td>
<td>H. Transmit alarm to FD and central station masterbox</td>
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<tr>
<td></td>
<td>J. Actuate associated exterior fire alarm beacons</td>
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<td></td>
<td>K. Actuate all evacuation signals for the building</td>
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<td></td>
<td>L. Release all magnetically held doors</td>
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<tr>
<td>6. Typical wet sprinkler system flow control valve assembly tamper switch — by floor</td>
<td>C. Actuate common supervisory signal indicator</td>
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<td></td>
<td>D. Actuate audible supervisory signal</td>
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<td></td>
<td>G. Display and print change of status and time of initiating event</td>
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<tr>
<td>7. Typical preaction sprinkler system flow control valve assembly flow switch — by floor</td>
<td>A. Actuate common alarm signal indicator</td>
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<td></td>
<td>B. Actuate audible alarm signal</td>
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<td></td>
<td>F. Actuate audible trouble signal</td>
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<td></td>
<td>G. Display and print change of status and time of initiating event</td>
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<td></td>
<td>H. Transmit alarm to FD and central station masterbox</td>
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<td></td>
<td>K. Actuate all evacuation signals for the building</td>
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<td></td>
<td>L. Release all magnetically held doors</td>
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<tr>
<td>8. Typical preaction sprinkler system flow control valve assembly tamper switch — by floor</td>
<td>C. Actuate common supervisory signal indicator</td>
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<td></td>
<td>D. Actuate audible supervisory signal</td>
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<td></td>
<td>G. Display and print change of status and time of initiating event</td>
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</tbody>
</table>
### Sequence of Operation Test Form (continued)

<table>
<thead>
<tr>
<th>System Input</th>
<th>System Output</th>
<th>Test Results</th>
<th>Date</th>
<th>Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td>9. Kitchen cafeteria wet chemical system — 1st floor</td>
<td>A. Actuate common alarm signal indicator</td>
<td></td>
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<td></td>
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<td></td>
<td>B. Actuate audible alarm signal</td>
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<td></td>
<td>G. Display and print change of status and time of initiating event</td>
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<td></td>
<td>H. Transmit alarm to FD and central station masterbox</td>
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<td></td>
<td>L. Release all magnetically held doors</td>
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<td></td>
<td>P. Elevator hoistway open</td>
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<tr>
<td>10. Typical duct smoke detector (by device) — by floor</td>
<td>G. Display and print change of status and time of initiating event</td>
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<tr>
<td></td>
<td>N. Shutdown associated mechanical equipment</td>
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<tr>
<td>11. Fire pump running</td>
<td>C. Actuate common supervisory signal indicator</td>
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<td></td>
<td>D. Actuate audible supervisory signal</td>
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<td></td>
<td>G. Display and print change of status and time of initiating event</td>
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<tr>
<td>12. Fire pump power failure</td>
<td>C. Actuate common supervisory signal indicator</td>
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<td></td>
<td>D. Actuate audible supervisory signal</td>
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<td></td>
<td>G. Display and print change of status and time of initiating event</td>
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<tr>
<td>13. Fire pump phase reversal</td>
<td>C. Actuate common supervisory signal indicator</td>
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<td></td>
<td>D. Actuate audible supervisory signal</td>
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<td></td>
<td>G. Display and print change of status and time of initiating event</td>
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<tr>
<td>14. Fire pump connected to emergency power</td>
<td>C. Actuate common supervisory signal indicator</td>
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<td></td>
<td>D. Actuate audible supervisory signal</td>
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<td></td>
<td>G. Display and print change of status and time of initiating event</td>
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<tr>
<td>15. Fire pump circuit breaker at generator output</td>
<td>C. Actuate common supervisory signal indicator</td>
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<td></td>
<td>D. Actuate audible supervisory signal</td>
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<td></td>
<td>G. Display and print change of status and time of initiating event</td>
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<tr>
<td>16. Fire alarm system open circuit</td>
<td>E. Actuate common trouble signal indicator</td>
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<td></td>
<td>F. Actuate audible trouble signal</td>
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<td></td>
<td>G. Display and print change of status and time of initiating event</td>
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<tr>
<td>17. Fire alarm system ground fault</td>
<td>E. Actuate common trouble signal indicator</td>
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<td></td>
<td>F. Actuate audible trouble signal</td>
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<td></td>
<td>G. Display and print change of status and time of initiating event</td>
<td></td>
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</tr>
</tbody>
</table>

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FIGURE A.3.3.21(b)  Continued
A.3.3.23.1 Active Fire Protection System. Examples of active systems include, but are not limited to, gaseous extinguishing systems, sprinklers, standpipes, dampers, or fire alarm systems.

A.3.3.23.3* Individual System. Individual systems might be made up various hardware and software components and assemblies. For example, see the list in A.5.2.6. Other systems might...
include building architectural features such as ceiling and walls that might affect voice messaging, alarm audibility or smoke migration. Some individual systems that are a critical part of a successful integrated system might be composed of procedures rather than just hardware and software.

**A.3.3.23.4** Integrated System. Integrated systems are made up of individual systems that are each covered by other specifications, governing laws, codes, or standards. Individual systems that make up an integrated system might be physically connected or might require manual operation by a person to achieve integrated operation. An example of an integrated system is a fire alarm system, sprinkler system and elevator system that are interconnected to respond in specific ways to specific conditions. Several different standards, codes, designers, authorities and installers are involved in the different individual systems that make up the integrated system.

An integrated system contains individual systems that are physically connected and others that are not. An integrated system can contain a combination of individual fire protection and life safety systems and individual non–fire protection and life safety systems (i.e., building systems such as elevators, HVAC systems, and automatic door closures) that might or might not be physically connected, but that are required to operate together as a whole to achieve overall fire protection and life safety objectives.

For example, a smoke control system is often activated by water flow in a sprinkler system but the sprinkler system is not physically connected to the HVAC system. The physical connection might be is from the sprinkler system to the fire alarm system and then to the building automation system. Further examples of integrated systems include the need for wall integrity when using total flooding suppression agents or automatic door closers that are to close upon activation of smoke control systems or stair pressurization systems. See Figure A.3.3.23.4 for examples of integrated systems.
A.3.3.23.5 Interconnected System. An example of two interconnected, individual systems that interface using an interface device is a fire alarm system that uses a relay as an interface device to connect to an elevator controller. Another example would be an energy management systems that is interconnected to a fire alarm system using a network data connection and a communications software protocol.

Some integrated systems may rely on individual systems that are not interconnected. In a prison, a fire alarm and emergency communications system might present information to an operator who in turn must make decisions and manually control a separate door locking system. The door locking system is an individual system that is not interconnected to the fire alarm system. The door system, the fire alarm system and the operations personnel are all part of an integrated fire and life safety system.

A.3.3.23.6 Life Safety Systems. Life safety systems can include both active and passive fire protection systems, devices, or assemblies. These systems are comprised of several items of equipment, processes, actions, or behaviors, grouped or interconnected so as to reduce injuries or death from fire or other life-threatening event.

A.3.3.23.7 Passive Fire Protection System. Examples of passive systems include, but are not limited to, floor-ceilings and roof, door, window, and wall assemblies, spray-applied fire-
resistant materials, and other fire and smoke control assemblies. Passive fire protection systems can include active components and can be impacted by active systems, such as fire dampers.

A.3.3.24.1 **Switch Connection.** For purposes of this definition, a relay is an electrically controlled switch. An example of a monitored switch is a waterflow switch that is either open or closed (normal/not-normal output), which when connected to the input of a fire alarm system can cause multiple outputs in the fire alarm system including sounding the waterflow bell and notification appliances, starting smoke control systems, and so forth. An example of a relay as a switch connection is for elevator control when a fire alarm relay controls when the fire fighters’ recall occurs through the elevator control monitoring the status of the fire alarm relay.

A.3.3.24.2 **Data Sharing Connection.** Data sharing systems are connected such that data from one component system is shared with other component systems, which then make independent decisions to achieve a desired result. The communication can be one-way or two-way, serial or parallel. A data sharing system can have components that are switch connections too.

A.3.3.24.3 **Interconnection.** Interconnections could consist of electrical binary connections (switches) or data sharing connections transfer protocols. Example of data transfers are BACnet or other data exchange protocols.

A.3.3.26.1 **Test Examples.** Tests include waterflow tests, fire pump tests, alarm tests, trip tests of dry, preaction, or deluge valves.

A.3.3.26.5 **Integrated System Testing.** Integrated testing can include other building systems integrated to fire and life safety systems such as elevator recall or HVAC control. Integrated tests might also be referred to as end-to-end tests. An integrated test might include activation of all individual system inputs and observation of all individual system responses or outputs, or it might only test specific inputs and outputs or responses.

An integrated system test might not be an end-to-end test. For example consider an integrated system consisting of a fire alarm system and an elevator system. An end-to-end test would require that the fire alarm smoke detector be activated and the elevator be observed to respond to the signal by returning to a specific location, parking properly and opening the elevator doors. However, another integrated test might only test the interface between the two systems by using a menu command on the fire alarm system to activate the interface device – a relay powered by the fire alarm system and interfaced to the elevator controller. The elevator might be observed to return, but the test did not originate at the fire alarm initiating device. Therefore, the test is not an end-to-end integrated system test.

A.3.3.26.6 **Interface Test.** A test of an interface between two individual systems might be accomplished by conducting an end-to-end test by activating an input on one individual system and observing the response of the second, interfaced system. An interface test might also be done by directly activating an interface device controlled by one individual system to confirm signal receipt on the second individual system. That test would be an interface test, but not an end-to-end test.
A.3.3.26.8 Pre-Functional Testing. Pre-functional testing is conducted in preparation for other types of testing, including integrated testing and acceptance testing. This testing is typically conducted according to a checklist developed by the FCxA that incorporates manufacturers’ requirements and ensures that equipment and components are functioning as intended prior to final acceptance testing. These tests can be complete or partial. In many cases, such as with fire pumps per NFPA 20, Standard for the Installation of Stationary Pumps for Fire Protection, this is required prior to acceptance testing, as the coordination of attendance by multiple members of the commissioning team may be required. Pre-functional testing is synonymous with the term preliminary testing.

A.4.1.1.1 (a) An Initial Integrated Test as part of the Commissioning Plan can be developed utilizing NFPA 3, Recommended Practice for Commissioning and Integrated Testing of Fire Protection and Life Safety Systems.

A.4.3.2 Intervals other than 5 years should be determined based upon a risk analysis. The risk analysis to determine the frequency should be based on the life safety implications of the building such as a highrise or large area building, the complexity of the interconnected systems and the property protection implications based on the hazards contained in the building such as flammable liquid storage etc. Case studies of similar occupancies and component failure rates should also be considered when determining the periodic integrated testing frequency. The number of design and construction modifications following initial commissioning should also be a factor in the determination of periodic integrated testing. Other factors that should be considered include the environment in which the system and equipment is expected to operate. Harsh environments such as corrosive atmospheres or areas subject to wide temperature variations, should require more aggressive testing programs.

A.4.3.5 It is not the intent of this standard to require complete testing of the entire integrated system when only a portion of the facility undergoes modification, remodel, refurbishment or tenant improvement work. When only a portion of the facility or integrated system has been modified, only those areas or portions of the integrated system that has been impacted shall be tested.

A.4.4.3.2* The integrated system testing team may include the following members:

1. Owner’s technical support personnel
2. Facility manager or operations personnel
3. Installation contractor(s) responsible for the systems involved
4. AHJ
5. RDP(s)
6. Construction manager/general contractor
7. Manufacturer’s representatives
8. Insurance representative
9. Third-party test entity
Entities not included as part of the project are not required to be part of the integrated system testing team.

A.4.5 The following descriptions are provided for various team members and can be used to determine that team members are qualified

**Third Party Test Entities**
The Third Party Test Entity shall be individually identified in the Integrated System Plan specifications or other enabling documentation.
The Third Party Test Entity shall provide an objective and unbiased point of view.

**Requisite Knowledge.** A qualified Third Party Test Entity shall have an advanced understanding of the installation, operation, and maintenance of all fire protection and life safety systems proposed to be installed, with particular emphasis on system integrated system testing.

**Requisite Skills.** A Third Party Test Entity shall have the ability to do the following:
(1) Read and interpret drawings and specifications for the purpose of understanding system installation, testing, operation, and maintenance.
(2) Analyze and facilitate resolution of issues related to failures in fire protection and life safety systems.
(3) Provide clear, concise written reports and verbal communication, and have the ability to resolve conflicts.

**Installation Contractor.**
Each installation contractor shall submit evidence of required license or certification to the Integrated Testing Agent.
System installation personnel shall be qualified or shall be supervised by persons who are qualified in the installation and testing of the systems.
State or local licensure regulations shall be followed to determine qualified personnel.
Depending on state or local licensure regulations, qualified personnel shall include, but not be limited to, one or more of the following:
(1) Personnel who are registered, licensed, or certified by a state or local authority
(2) Personnel who are certified by a nationally recognized certification organization acceptable to the authority having jurisdiction
(3) Personnel who are factory trained and certified for the specific type and brand of system and who are acceptable to the authority having jurisdiction

**Registered Design Professional (RDP).**
The RDP shall be individually identified in the Integrated system testing Plan.

**Requisite Knowledge.** A qualified RDP shall have comprehensive knowledge of the following:
(1) The design, installation, operation, and maintenance of the fire protection and life safety systems
(2) How individual and integrated systems operate during a fire or other emergency
State or local licensure regulations shall be followed to determine qualified personnel. Depending on state or local licensure regulations, qualified personnel shall include, but not be limited to, one or more of the following:

1. Personnel who are registered, licensed, or certified by a state or local authority
2. Personnel who are certified by a nationally recognized certification organization acceptable to the authority having jurisdiction
3. Personnel who are factory trained and certified for the specific type and brand of system and who are acceptable to the authority having jurisdiction

**Construction Manager and General Contractor.** Construction managers and general contractors shall be knowledgeable and experienced in the field of construction project management and the operation of integrated fire protection and life safety systems. State or local licensure regulations shall be followed to determine qualified personnel. Depending on state or local licensure regulations, qualified personnel shall include, but not be limited to, one or more of the following:

1. Personnel who are registered, licensed, or certified by a state or local authority
2. Personnel who are certified by a nationally recognized certification organization acceptable to the authority having jurisdiction

**Facilities Management Personnel.** Facilities management personnel shall include building maintenance and service personnel, building engineering personnel, service contractors hired by the building owner or his representative and similar job functions. Facilities management personnel shall have the ability to perform the following:

1. Assess a facility’s need for building systems and recommend building systems.
2. Oversee the operation of building systems.
3. Establish practices and procedures.
4. Administer the allocation of building systems resources.
5. Monitor and evaluate how well building systems perform.
6. Manage corrective, preventative, and predictive maintenance of building systems.
7. Develop and implement emergency procedures and disaster recovery plans.

Facilities management personnel shall be knowledgeable and qualified in the operation and maintenance of the fire protection and life safety systems installed in their facility.

Facilities management personnel who perform the ongoing system operation, inspection, testing, and maintenance shall be thoroughly familiar with the required and recommended operation and maintenance tasks.

Facilities management personnel who will be responsible for management of a contract for system operation, inspection, testing, and maintenance shall be thoroughly familiar with the tasks to be performed and the frequency of such tasks, but not necessarily the implementation of those tasks.

**Authority Having Jurisdiction (AHJ).**
The AHJ shall be knowledgeable in the applicable codes, ordinances, and standards as they relate to the fire protection and life safety systems installed. The AHJ shall have the ability to determine the operational readiness of the fire protection and life safety systems installed. The AHJ shall have the ability to verify completion of integrated system testing for the purpose of system acceptance.

**Insurance Representative.** The insurance representative shall be knowledgeable and experienced in property loss prevention and life safety to mitigate possible risk.

A.4.5.3 Larger projects may require a more qualified integrated testing team based upon the level of fire protection and life safety system installed. {Examples to be provided} The Integrated Testing Agent shall demonstrate experience and knowledge of performance verification methods to validate functionality of integrated systems and components. The Integrated Testing Agent shall demonstrate knowledge, experience, and understanding of the operating components of all systems and subsystems to the extent they affect the installation and operation of the fire protection and life safety systems in accordance with the approved design. The Integrated Testing Agent shall provide an objective and unbiased point of view. Whenever required by the owner or by an AHJ, the Integrated Testing Agent can be a Third Party Entity. When the Integrated Testing Agent is a third party entity, qualifications in section 6.2.7 should be considered.

A.4.6.3 Examples of the responsibilities of an Integrated Testing Agent are as follows:

(1) Review the installation contractor requirements.

(2) Review the design and construction documents and specifications for each fire protection and life safety system and their associated subsystems.

(3) Develop the integrated systems testing plan.


(5) Coordinate the scheduling of trades to perform integrated system testing of systems and subsystems.

A.4.7.4 The integrated test should be considered a test of the entire system or process that begins at the integrated system’s activation device (an end point) and continue through to the desired response, function, result or action. This test intended to be an “end-to-end” test to show that integrated systems perform effectively together to achieve the fire protection and life safety goals.

A.5.2.1 The goal of integrated testing is to verify that fire protection and life safety systems operate as designed and as required by codes and standards. The scope of work can include, but is not limited to, the following:

(1) Review of building plans and specifications.

(2) Review of applicable codes and standards.
(3) Review of one line riser diagram of smoke control and exhaust systems, schedules for ducts, fans, dampers, and submittals for damper operators and sequence of operation. Each piece of equipment should be numbered and identified.

(4) Review of system testing matrices and as-built drawings.

(5) Review of testing matrix checklist of integrated systems.

(6) Review of final individual testing reports (including TAB).

(7) Review of one line riser diagrams of normal and emergency electric system (EPSS).

(8) Review of equipment software submittals.

(9) Establishment of a team of testing participants and assignment of duties.

(10) Coordination of pre-test meetings with stakeholders.

(11) Implementation of integrated testing by appropriate methods and verification and documentation of operation of interface equipment under normal and emergency power after all trades complete their work.

(12) Correction of problems and retest.

(13) Submission of final report and documentation.

A.5.2.2.1 Where required ITM has been performed in accordance with NFPA standards, simulating the function of initiating devices shall be permitted for periodic integrated system testing.

A.5.2.4 These functions shall include but not be limited to:

(1) Sprinkler System Alarms and Notification

(2) Egress lighting

(3) Smoke control

(4) Elevator control and operation

(5) Fire alarm signaling

(6) Fire pump operation

(7) Security Systems

(8) HVAC Control and Operation

(9) Suppression

A.5.2.6 The following are examples of systems that can be interconnected:
(1) Fire alarm system
(2) Emergency Communication Systems
(3) Building automation management system
(4) Means of egress systems and components
(5) Heating, ventilating, and air conditioning (HVAC) system
(6) Gas detection system
(7) Normal, emergency, and standby power systems
(8) Automatic sprinkler system
(9) Fixed fire suppression and control systems
(10) Automatic operating doors and closures
(11) Smoke control and management systems
(12) Explosion prevention and control systems
(13) Elevator and pedestrian movement systems
(14) Security systems
(15) Commercial cooking operations

A.5.2.7 Fire protection or life safety systems can operate equipment that is not necessarily part of the fire protection or life safety system. One such example is shunt trip breakers that should be tested for proper operation.

A.5.2.9 Additions, modifications, or alterations to systems can cause unintended consequences of operation to the interactions of integrated systems. The testing procedure should be re-evaluated to ensure repeat testing is adequate to determine the correctness of the revision.

A.6.2.2.1 The status of an individual system might be “all normal”. For some tests, the status might be “operating on secondary power” or “operating with an open circuit condition on SLC#2 between device 102 and 103”. It is important to document the system status so that test results can be properly interpreted.

A.6.4.5.1 RESERVED ANNEX NOTE

A.6.4.9 Document security should consider both physical security of the information that they contain and security against hazards such as fire and flood.
Annex B  Sample Integrated Test Plan

This annex is not a part of the requirements of this NFPA document but is included for informational purposes only.

B.1 RESERVED