

NFPA®

3

Standard for Commissioning of Fire Protection and Life Safety Systems

2018



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NFPA® 3

Standard for

Commissioning of Fire Protection and Life Safety Systems

2018 Edition

This edition of NFPA 3, *Standard for Commissioning of Fire Protection and Life Safety Systems*, was prepared by the Technical Committee on Commissioning and Integrated Testing. It was issued by the Standards Council on August 1, 2017, with an effective date of August 21, 2017, and supersedes all previous editions.

This edition of NFPA 3 was approved as an American National Standard on August 21, 2017.

Origin and Development of NFPA 3

The 2012 edition of NFPA 3, *Recommended Practice for Commissioning and Integrated Testing of Fire Protection and Life Safety Systems*, represented NFPA's first document outlining a systematic approach to provide documented confirmation that fire protection and life safety systems function as intended by the owner and the design team. The genesis of this document was a request from the National Institute of Building Sciences (NIBS) to provide a commissioning document for fire protection systems that would be part of a conglomeration of commissioning documents that could be used to create a total building commissioning program.

NFPA 3 addresses the administrative and procedural concepts of fire protection and life safety system commissioning and also provides direction on the integrated system tests.

The document is designed to identify the commissioning team members, their qualifications, and their roles and responsibilities throughout the commissioning process. Chapter 5 addresses the concept of commissioning from the incipient stages of a project through the occupancy and operation of the facility. Throughout the commissioning process there are several key documents that are identified in the recommended practice such as the Owners Project Requirements (OPR) and the Basis of Design (BOD), that provide direction to the commissioning team members as they are executing the commissioning plan. These documents, which are generated during the design phase, are implemented during construction.

NFPA 3 also addresses retro-commissioning and re-commissioning of existing buildings. For existing buildings that have never been commissioned, a retro-commissioning plan is developed and executed to establish a benchmark for the facility. Existing buildings that have been previously commissioned are periodically re-commissioned and compared to the compliance benchmarks established in the original commissioning plan.

NFPA 3 contains many forms that are available to assist in project documentation and the implementation of the commissioning program.

The largest modification to NFPA 3 for the 2015 edition was the removal of Chapter 7 from the 2012 edition. This chapter addressed integrated system testing as part of the overall fire protection and life safety system commissioning concept. The Technical Committee on Commissioning and Integrated Testing determined that while commissioning fire protection systems was not ready for standardization, there was an imminent need to create a standard for testing integrated fire protection and life safety systems. The technical committee requested to separate the concepts of commissioning and integrated system testing into two documents: the first, a recommended practice on commissioning; and the second, a new standard, NFPA 4, *Standard for Integrated Fire Protection and Life Safety System Testing*, addressing the integrated system testing portion. This restructuring and request for a new project was approved by the Standards Council in October 2011 and resulted in Chapter 7 of the 2012 edition of NFPA 3 being removed for the 2015 edition and using it as the basis for NFPA 4.

In addition to the document split, the technical committee focused on updating the recommendations for existing building commissioning. Additional detail was added to the sections on re-commissioning and retro-commissioning to assist fire commissioning agents in carrying out commissioning projects on existing buildings.

The 2018 edition of NFPA 3 was changed from a recommended practice to a standard in order to be utilized by the commissioning industry and be referenced by other NFPA standards as well as other commissioning standards. Many of the changes throughout the document were made to reflect the change from recommendations to mandatory requirements. In addition, many of the requirements were reorganized and moved into other chapters to make the standard more useable.

NFPA 3 was originally developed as a recommend practice, however, its ability to be utilized by the commissioning industry is limited as a recommended practice. The document should be revised to be a standard so that it can easily be referenced by other NFPA standards as well as be referenced by other commissioning standards. The proposed text was developed by task group of the Technical Committee on Commissioning and Integrated Testing.

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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.

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NFPA 3

Standard for

Commissioning of Fire Protection and Life Safety Systems

2018 Edition

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NOTICE: An asterisk (*) following the number or letter designating a paragraph indicates that explanatory material on the paragraph can be found in Annex A.

A reference in brackets [] following a section or paragraph indicates material that has been extracted from another NFPA document. As an aid to the user, the complete title and edition of the source documents for extracts in the recommendations sections of this document are given in Chapter 2 and those for extracts in the informational sections are given in Annex F. Extracted text may be edited for consistency and style and may include the revision of internal paragraph references and other references as appropriate. Requests for interpretations or revisions of extracted text should be sent to the technical committee responsible for the source document.

Information on referenced publications can be found in Chapter 2 and Annex F.

Chapter 1 Administration

1.1* Scope. This standard shall provide the required procedures, methods, and documentation for the commissioning of active and passive fire protection and life safety systems and their interconnections with other building systems.

1.2 Purpose. The purpose of this standard is to provide the minimum requirements for the commissioning process to verify fire protection and life safety systems perform in conformity with the owner’s project requirements, basis of design, and applicable governing law, codes, regulations, or standards.

1.3* Application.

1.3.1 This standard shall be applicable where required by the owner’s project requirements.

1.3.2* Where the project specifications or governing laws, codes, regulations, or standards require total building commissioning, this standard shall apply as part of that process.

1.3.3* This standard shall apply to passive and active fire protection and life safety equipment and systems.

1.4 New Technology.

N 1.4.1 New technology proposed for installation, for which there is no published product instruction or installation standard, shall function as intended throughout its life cycle in accordance with the owner’s project requirements, and basis of design.

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

N 1.4.3 The system, method, or device shall be approved for the intended purpose.

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 4, *Standard for Integrated Fire Protection and Life Safety System Testing*, 2018 edition.

2.3 Other Publications.

Merriam-Webster’s Collegiate Dictionary, 11th edition, Merriam-Webster, Inc., Springfield, MA, 2003.

2.4 References for Extracts in Mandatory Sections.

NFPA 70®, *National Electrical Code*®, 2017 edition.

NFPA 101®, *Life Safety Code*®, 2018 edition.

NFPA 110, *Standard for Emergency and Standby Power Systems*, 2016 edition.

NFPA 1031, *Standard for Professional Qualifications for Fire Inspector and Plan Examiner*, 2014 edition.

NFPA 5000®, *Building Construction and Safety Code*®, 2018 edition.

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, shall be 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 Should. Indicates a recommendation or that which is advised but not required.

3.2.5 Standard. An NFPA Standard, the main text of which contains only mandatory provisions using the word "shall" to indicate requirements and that is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions are not to be considered a part of the requirements of a standard and shall be located in an appendix, annex, footnote, informational note, or other means as permitted in the NFPA Manuals of Style. When used in a generic sense, such as in the phrase "standards development process" or "standards development activities," the term "standards" includes all NFPA Standards, including Codes, Standards, Recommended Practices, and Guides.

3.3 General Definitions.

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

3.3.2* Building. Any structure used or intended for supporting or sheltering any use or occupancy. [101, 2018]

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 governing 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 documents for the project.

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

3.3.3.6* Fire Protection and Life Safety Systems Commissioning (FCx). A systematic process that provides documented confirmation that fire protection and life safety systems function according to the design criteria as set forth in the project documents and satisfies the owner's operational

needs, including compliance with governing laws, regulations, codes, and standards.

3.3.3.7* Fire Protection and Life Safety Systems Commissioning Team. A team of qualified individuals or entities tasked with accomplishing the purpose of this standard.

3.3.3.8* Re-commissioning (Re-Cx). Where existing fire protection and life safety systems have previously been subject to fire protection and life safety systems commissioning, this is the process of reverifying that the system performance continues to meet the owner's project requirements and basis of design.

3.3.3.9* Retro-commissioning (Retro-Cx). For existing fire protection and life safety systems that were not previously subject to fire protection and life safety systems commissioning, the process of verifying that system performance and operation meet the original design intent, current owner requirements, and governing laws, regulations, codes, and standards.

3.3.4 Component. A part of an architectural, electrical, or mechanical system. [5000, 2018]

3.3.5 Construction Document. The plans, specifications, and other documents that describe the construction project.

3.3.6 Drawings.

3.3.6.1 Coordination Drawing. Reproducible drawings showing work with horizontal and vertical dimensions to avoid interference with structural framing, ceilings, partitions, equipment, lights, mechanical, electrical, conveying systems, and other services.

3.3.6.2 Record (Plan) Drawing. A design, working drawing, or as-built drawing that is submitted as the final record of documentation for the project. A drawing is also referred to as a plan.

3.3.6.3 Shop Drawings. Scaled working drawings, equipment cutsheets, and design calculations. [1031, 2014]

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

3.3.7 Emergency Power.

3.3.7.1 Emergency Power Supply (EPS). The source of electric power of the required capacity and quality for an emergency power supply system. [110, 2016]

3.3.7.2 Emergency Power Supply System (EPSS). A complete functioning emergency power supply system coupled to a system of conductors, disconnecting means and overcurrent protective devices, transfer switches, and all control, supervision, and support devices up to and including the load terminals of the transfer equipment needed for the system to operate as a reliable source of electric power.

3.3.7.3 Emergency Systems. Those systems legally required and classed as emergency by municipal, state, federal, or other codes, or by any governmental agency having jurisdiction. These systems are intended to automatically supply illumination, power, or both, to designated areas and equipment in the event of failure of the normal supply or in the event of accident to elements of a system intended to supply, distribute, and control power and illumination essential for safety to human life. [70, 2017]

△ **3.3.7.4 Legally Required Standby Systems.** Those systems required and so classed as legally required standby by municipal, state, federal, or other codes or by any governmental agency having jurisdiction. These systems are intended to automatically supply power to selected loads (other than those classified as emergency systems) in the event of failure of the normal source.

• **3.3.8 Inspection.** For the purpose of this standard, a visual examination of a system, or portion thereof, to verify that it has been installed in accordance with the construction documents, codes, installation standards, and manufacturer's specifications.

3.3.9* Installation Contractor. A company that provides labor and materials to install systems and equipment.

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

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

3.3.12* Narrative. A written summary description of the building(s) or structure(s), including exterior property boundaries and all applicable fire protection and life safety systems and related integrated operational features.

3.3.13 Operation and Maintenance Manual. A system-focused composite document that includes the operation and maintenance requirements and additional information of use to the owner during the occupancy phase.

3.3.14 Owner's Project Requirements (OPR). The documentation that provides the owner's vision for the planned facility, integrated requirements, expectations for how it will be used and operated, and benchmarks and criteria for performance.

3.3.15 Project Phases.

3.3.15.1 Planning Phase (Phase 1). The phase the fire protection and life safety systems commissioning team is formed and initial project concepts and the owner's project requirements are developed.

3.3.15.2 Design Phase (Phase 2). The phase the basis of design is produced; drawings and calculations, including those for design and fabrication, are produced; and testing procedures are developed.

3.3.15.3 Construction Phase (Phase 3). The phase the systems, with their components, are procured, fabricated, installed, tested, and accepted.

3.3.15.4 Occupancy Phase (Phase 4). The phase the systems are used on a daily basis and periodic inspection, testing, and maintenance are scheduled and performed.

3.3.16 Qualified. A competent and capable person or entity that has met the requirements and training for a given field.

3.3.17 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.

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

3.3.19 Stakeholder. Any individual, group, or organization that might affect or be affected by the project.

3.3.20 System.

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

3.3.20.2 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, 2014]

3.3.20.3 Individual System. A system with no interconnections or a system within an integrated system to the point of interconnection or to the interface device.

3.3.20.4* Life Safety Systems. Systems that enhance or facilitate evacuation, smoke control, compartmentalization, and/or isolation. [1031, 2014]

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

3.3.21 System Connection.

△ **3.3.21.1* Integrated System.** A combination of systems that operate together as a whole to achieve the fire protection and life safety objectives.

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

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

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

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

3.3.23 Test. A procedure intended to establish the operational status or performance of a system or component.

3.3.23.1* Acceptance Test. Test performed on an individual system to verify compliance with approved design documents and to verify installation in accordance with governing laws, regulations, codes, and standards.

3.3.23.2* Integrated Test. Test performed on fire protection and life safety systems to confirm that operation, interaction, and coordination of multiple individual systems perform their intended function.

3.3.23.3* Pre-functional Test. Test performed prior to acceptance testing to confirm compliance with applicable requirements.

Chapter 4 General

N 4.1 Goals.

N 4.1.1 The goal of this standard shall be to establish a process that provides documentation that fire protection and life safety features and systems are planned, designed, and constructed as well as perform, in conformity with the owner's project requirements and the basis of design.

N 4.1.2 The services, products, and deliverables required by this standard shall provide the necessary documentation for the owner to verify the continued performance and operation of these systems.

N 4.2 Objectives. Commissioning shall achieve the following:

- (1) Document and communicate through specifications or work orders the owner's project requirements and the basis of design
- (2) Verify and document that all fire protection and life safety equipment and systems have been installed in accordance with the construction documents and applicable codes and standards and perform their function(s) as intended
- (3) Verify and document that all fire protection and life safety systems have been completed, inspected, successfully tested, and approved
- (4) Verify and document that all integrated system testing for all integrated fire protection and life safety systems has been completed, inspected, successfully tested, and approved
- (5) Verify and document that all outstanding fire protection and life safety deficiencies have been corrected to afford a reasonable degree of safety to the building occupants from fire and similar emergencies
- (6) Verify and document delivery of operation and maintenance documentation
- (7) Provide and document training requirements for facility operating and maintenance staff
- (8) Identify, turnover, and document the requirements for maintaining system performance to meet the original design intent during the occupancy phase

4.3 Qualifications.

N 4.3.1 Fire Protection and Life Safety Systems Commissioning Team. The members of the fire protection and life safety systems commissioning team shall have the necessary knowledge and experience to complete the commissioning process. (See Annex B for qualifications.)

4.3.2 Fire Commissioning Agent.

4.3.2.1* The fire commissioning agent shall be qualified, knowledgeable, and experienced in the proper application of the commissioning requirements of this standard and general industry practices.

4.3.2.2 The fire commissioning agent shall be individually identified on the specifications or other enabling documentation.

N 4.3.2.3 The fire commissioning agent shall provide an objective and unbiased point of view.

N 4.4 Commissioning Record.

N 4.4.1 Documentation.

N 4.4.1.1 Approved commissioning documents and forms shall be used to record commissioning and testing of fire protection and life safety systems. (See Annex E.)

N 4.4.1.2* Documentation required by approved installation standards referenced in the basis of design shall be provided.

N 4.4.1.3* Forms and checklists required by installation standards referenced in the basis of design shall be utilized.

N 4.4.2 Document Retention.

N 4.4.2.1 The commissioning records shall be given to the owner.

N 4.4.2.2* The commissioning records shall be retained by the owner for the life of each individual fire protection and life safety system.

N 4.4.2.3 Where required, documents used to record commissioning of fire protection and life safety systems shall be provided to the authority having jurisdiction and other stakeholders.

Chapter 5 Commissioning

5.1 General.

5.1.1* Process. Commissioning of fire protection and life safety systems should include, but not be limited to, the planning phase, design phase, construction phase, and occupancy phase. [See Figure A.5.1.1(a), Figure A.5.1.1(b), and Figure A.5.1.1(c).]

N 5.1.2* Owner's Responsibilities.

N 5.1.2.1* The owner shall be responsible for the commissioning of all fire and life safety systems.

N 5.1.2.2* The owner shall be permitted to delegate the responsibility for commissioning to a designated representative.

N 5.1.2.3 The owner or owner's designated representative shall designate the fire commissioning agent.

5.2 Planning Phase.

5.2.1 Owner's Project Requirements.

5.2.1.1* The owner's project requirements shall be the foundation for design, construction, acceptance, and operation of fire protection and life safety systems.

5.2.1.2* Stakeholders shall have input into the development of the owner's project requirements.

N 5.2.1.3* Performance and acceptance criteria shall be documented in the owner's project requirements.

5.2.2* Commissioning Team.

5.2.2.1* A fire protection and life safety systems commissioning team shall have a fire commissioning agent.

5.2.2.2* The fire commissioning agent shall establish the fire protection and life safety systems commissioning team.

5.2.2.3* The fire protection and life safety systems commissioning team shall include, at a minimum, the owner and the fire commissioning agent.

5.2.3 Commissioning Plan.

5.2.3.1 The commissioning plan shall be updated by the fire protection and life safety systems commissioning team throughout the planning, design, construction, and occupancy phases of the building life cycle.

Δ 5.2.3.2* The commissioning plan shall contain the following information:

- (1) Commissioning scope
- (2) General project information
- (3) Fire protection and life safety systems commissioning team members, roles, and responsibilities
- (4) General communication plan and protocol
- (5) Commissioning process tasks and activities through all phases
- (6) Commissioning schedule
- (7) Commissioning process documentation and deliverables
- (8) Testing procedures, including integrated systems testing
- (9) Recommended training
- (10) Establishment frequency for integrated systems testing, as applicable

5.2.3.3 The commissioning plan shall form the commissioning record.

5.3 Design Phase.

5.3.1 Basis of Design. The basis of design shall include the following:

- (1)* A description of the building or structure
- (2)* A description of fire protection or life safety systems and components
- (3)* Performance objectives and criteria
- (4)* List of applicable codes and standards
- (5)* Alternative means and methods incorporated into the original design
- (6) Testing and start-up requirements

N 5.3.2 Commissioning Team.

N 5.3.2.1 The commissioning team shall provide guidance to the design team for including the following in the design of active and passive fire protection systems:

- (1) That material and equipment installation meets the applicable listing for the products
- (2) That material and equipment has the capacity to perform as intended
- (3) The appropriateness of the application of fire protection systems
- (4) Locations of fire protection systems
- (5) Content of owner training

N 5.3.3 Commissioning Plan. The commissioning plan shall be updated to include the following:

- (1) The basis of design
- (2) Sequence of operation for fire protection and life safety systems
- (3)* Scope of work for commissioning activities
- (4) Commissioning procedures
- (5) Commissioning schedule coordinated with construction schedule
- (6) Commissioning benchmarks or milestones

- (7) Identification of qualified specialists, where required, and their responsibilities
- (8)* Issues log
- (9) Construction checklists

5.4 Construction Phase.

5.4.1 Commissioning Team.

5.4.1.1 The fire protection and life safety systems commissioning team shall perform the following:

- (1) Confirm the validity of the commissioning schedule and update as needed to coordinate with the construction schedule
- (2) Review submittals, plans and product data sheets, for conformance to the basis of design
- (3) Verify materials, construction, and installation conform to the basis of design
- (4) Confirm qualified specialists, where required, perform commissioning activities
- (5) Document issues and changes to the project and update the commissioning plan
- (6) Review integrated systems design for compatibility or communication problems
- (7) Complete commissioning construction checklists
- (8) Observe installation and test procedures or verify performance of the responsible party
- (9) Document the testing activities
- (10) Verify owner training took place

Δ 5.4.1.2 Passive fire protection systems shall be inspected or tested for proper installation, including the following:

- (1) Conformance to approved drawings and specifications
- (2) Installation in accordance with manufacturers' published instructions
- (3) Compliance with applicable codes and standards
- (4)* Correct performance of operable parts

N 5.4.1.3 Active fire protection systems shall be inspected and tested for proper installation and operation including completion of acceptance testing and integrated systems testing in compliance with NFPA 4.

N 5.4.2 Operation and Maintenance Manual.

N 5.4.2.1* The operation and maintenance manual shall be organized by specification section.

N 5.4.2.2 The operation and maintenance manual shall contain the following:

- (1) Product data sheets
- (2) Equipment installation instructions
- (3) Equipment operating manuals

5.4.3 Owner Training.

N 5.4.3.1 Owner training shall include the installed integrated systems, component systems, and devices.

N 5.4.3.2* Systems training shall be scheduled with or near to final systems acceptance.

N 5.4.3.3* Training session scope and attendees shall be documented.

5.4.4 Documentation.

N 5.4.4.1* The commissioning team shall verify the closeout documents are ready to submit to the owner.

N 5.4.4.2 The commissioning record shall be submitted to the owner.

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N 5.4.5* Turnover.

N 5.4.5.1 Systems or portions of systems shall be permitted to be tested and accepted at different times during the life of the construction project.

N 5.4.5.2 Where projects are turned over in stages, the commissioning plan shall incorporate requirements for turning over systems or portions of systems.

N 5.4.5.3 The requirements of 5.4.1 through 5.4.4 shall apply as each part of a system is tested and accepted.

N 5.4.5.4 The documentation and commissioning records shall be turned over to the owner in accordance with the commissioning plan.

N 5.5 Occupancy Phase.

N 5.5.1 Commissioning Team.

N 5.5.1.1* The commissioning team shall schedule and observe testing that had been deferred for seasonal conditions.

N 5.5.1.2 The following additional documentation shall be submitted to the owner:

- (1) Recommended predictive maintenance plan
- (2) Inspection, test, and maintenance frequencies list

N 5.5.2 Owner Administrative Controls.

N 5.5.2.1* The owner shall be responsible for conducting inspection, test, and maintenance as shown in 5.5.1.2(2).

N 5.5.2.2* The owner shall protect and maintain the commissioning documents.

N 5.5.3* Training. Facilities personnel or their designated representatives shall receive periodic re-training.

Chapter 6 Commissioning of Existing Fire Protection and Life Safety Systems

6.1 General. Commissioning of existing active and passive fire protection and life safety systems shall meet the requirements of this chapter.

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N 6.2 Re-commissioning.

N 6.2.1 The provisions of Section 6.2 shall apply to systems that followed the fire protection and life safety systems commissioning process through design, construction, and occupancy phases only where the original owner's project requirements or basis of design documents are available.

N 6.2.2* Where the original owner's project requirements or basis of design documents are unavailable, refer to the provisions of this chapter for retro-commissioning.

N 6.2.3* Re-commissioning shall be performed as specified in the fire protection and life safety systems commissioning plan or upon a change of fire protection and life safety systems affecting the operation of such systems.

N 6.2.4 Where any of the items listed in 5.2.3 other than the owner's project requirements or basis of design are unavailable, they shall be developed by the fire protection and life safety systems commissioning team utilizing as much historical infor-

mation as possible with the owner's project requirements and basis of design as the basis for any assumptions.

N 6.2.5 Re-commissioning shall be in accordance with Section 6.2.

N 6.2.5.1* A fire protection and life safety systems commissioning team shall be established and responsibilities assigned in accordance with 5.2.2.

N 6.2.5.2 The original owner's project requirements and basis of design shall be reviewed by the fire protection and life safety systems commissioning team against current facility operational conditions.

N 6.2.5.3* Where the owner's project requirements or basis of design do not match the current facility operational conditions, the owner's project requirements or basis of design shall be updated to meet current conditions, including any updates to the sequence of operation.

N 6.2.5.4 The original design and installation drawings shall be reviewed to gain familiarity with the individual systems and overall fire protection and life safety for the facility.

N 6.2.5.5 The original fire protection and life safety systems commissioning plan shall be reviewed and modified based on any revisions to the owner's project requirements or basis of design.

N 6.2.5.6 The original construction checklists and functional performance tests shall be reviewed and modified based on any revisions to the owner's project requirements or basis of design.

N 6.2.5.7* Functional performance testing of the existing fire protection and life safety systems shall be performed as described in the fire protection and life safety systems commissioning plan, including verification of the sequence of operation.

N 6.2.5.8 The original systems manuals and record drawings shall be reviewed for completeness and quality of materials.

N 6.2.5.9* Knowledge of the operation and maintenance of fire protection and life safety systems by on-site personnel shall be assessed to determine if additional training is required.

N 6.2.5.10 A re-commissioning report shall be developed by the fire commissioning agent and forwarded to the owner for review.

N 6.2.6 The re-commissioning report shall include the following information:

- (1) Scope and overview of the re-commissioning process
- (2) List of fire protection and life safety systems commissioning team members, including role and contact information
- (3) Updated owner's project requirements and basis of design
- (4) Updated fire protection and life safety systems commissioning plan, including any revisions to frequency of performing future re-commissioning or integrated systems testing
- (5) Updated and completed construction checklists
- (6) Updated and completed functional performance test results
- (7) Analysis of the existing systems manuals, record drawings, and personnel training

- (8) Issues log noting recommendations for corrective action by the owner

N 6.3 Retro-commissioning.

N 6.3.1* Retro-commissioning shall only be necessary where required by the owner or other governing laws, codes, or standards.

N 6.3.2* Where required by 6.3.1, the requirements in 6.3.2.1 through 6.3.2.13 shall be achieved during retro-commissioning.

N 6.3.2.1* A fire protection and life safety systems commissioning team shall be established and responsibilities assigned in accordance with 5.2.2.

N 6.3.2.2* An owner's project requirements shall be developed by the fire protection and life safety systems commissioning team in consultation with the owner.

N 6.3.2.3 The owner's project requirements shall meet 5.2.1 as applicable to the existing building.

N 6.3.2.4* A basis of design shall be developed by the fire protection and life safety systems commissioning team based on available historical information.

N 6.3.2.5 The basis of design shall meet 5.3.1 as much as applicable to the existing building.

N 6.3.2.6 Any design or installation drawings shall be reviewed to gain familiarity with the individual systems and overall fire protection and life safety for the facility.

N 6.3.2.7 A sequence-of-operation matrix shall be developed based on the information provided in the owner's project requirements or basis of design as well as an understanding of the system's current function.

N 6.3.2.8 A retro-commissioning plan shall be developed following 5.2.3.2 as applicable for the existing systems.

N 6.3.2.9 Functional performance tests shall be developed based on the current owner's project requirements, basis of design, and sequence-of-operation matrix.

N 6.3.2.10* Functional performance testing of the existing fire protection and life safety systems shall be performed as described in the retro-commissioning plan, including verification of the sequence of operation.

N 6.3.2.11 The original systems manuals and record drawings shall be reviewed for completeness and quality of materials.

N 6.3.2.12* Knowledge of the operation and maintenance of fire protection and life safety systems by on-site personnel shall be assessed to determine if additional training is required.

N 6.3.2.13 A retro-commissioning report shall be developed by the fire commissioning agent and forwarded to the owner for review to determine if the report is complete and acceptable.

N 6.3.3 The retro-commissioning report shall include, at a minimum, the following information:

- (1) Scope and overview of the retro-commissioning process.
- (2) List of fire protection and life safety systems commissioning team members, including role and contact information.
- (3) Current owner's project requirements, basis of design, and sequence of operation, as developed by the fire protection and life safety systems commissioning team.

- (4) Retro-commissioning plan, including any frequency of future re-commissioning or integrated systems testing.
- (5) Completed functional performance test results.
- (6) Analysis of the existing systems manuals, record drawings, and personnel training.
- (7) Issues log noting recommendations for corrective action by the owner.

Annex A Explanatory Material

Annex A is not a part of the requirements of this NFPA document but is included for informational purposes only. This annex contains explanatory material, numbered to correspond with the applicable text paragraphs.

N A.1.1 It is intended that the implementation of the requirements of this standard vary by the type, number, and complexity of systems utilized within a particular building. For example, a hospital or high-rise building would most likely necessitate a strict application of all the requirements of the standard while other structures, with simpler fire protection systems, such as a convenience store or small warehouse would certainly mandate a simpler application. Facilities where this document would be used include hospitals, high-rise buildings, and other structures having complex fire protection and life safety systems. A convenience store or warehouse that only has an automatic fire sprinkler or fire alarm system would not be expected to do commissioning as outlined in this document.

A.1.3 Planning for integrated fire protection and life safety systems commissioning for a building or structure involves a systems approach that enables the designers to analyze all the components and individual systems as a total fire protection and life safety system. This standard should apply to structures such as roadway and transit tunnels, bridges, towers, fuel storage facilities, and other structures. There might also be a need to commission existing systems where not previously commissioned.

A.1.3.2 This standard does not apply except where referenced by other legally adopted governing laws, codes, regulations, or standards. This is not to say that the standard could not be referenced by an owner of a building, or other individuals, who might be involved in the design of a new building, or who recognize the need to commission existing systems where existing systems were not previously commissioned, or which have been modified.

Δ A.1.3.3 Passive and active fire protection and life safety systems include the following:

- (1) Infrastructure supporting the 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, such as the following:
 - (a) Access roadways for general ingress and egress and those necessary for fire department access in accordance with local laws and applicable codes and standards
 - (b) Public 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
- (d) Underground fire protection pipe mains and fire hydrants
- (2) Fixed fire suppression and control systems, including special hazard systems.
- (3) Fire alarm and signaling systems.
- (4) Emergency communications systems.
- (5) Smoke control and management systems.
- (6) Emergency systems, legally required standby systems, and critical operations power systems, including those powering systems or equipment such as the following:
 - (a) Smoke control systems
 - (b) Stair pressurization systems
 - (c) Smoke-proof enclosure ventilation systems
 - (d) Electric-driven fire pumps
 - (e) Fire service access elevators
 - (f) Occupant evacuation elevators
 - (g) Fire suppression systems controllers

Emergency power supply systems in large area occupancies, health care facilities, or high-rise buildings, supply power to the electrical systems required for life safety and therefore require commissioning. The emergency power supply systems should be evaluated for their functionality to provide illumination and critical power to serve the needs of those who can physically evacuate a building, including the sustaining of life for those who cannot, whether or not there is a fire event in the building.

- (7) Explosion prevention and control systems.
- (8) Fire-resistant and smoke-resistant assemblies, such as floor/ceilings and ceiling/roof decks, doors, windows, barriers, fire dampers, smoke dampers and combination smoke/fire dampers, and walls protected by a firestop system or device for through-penetrations and membrane penetrations, and other fire and smoke assemblies.
- (9) Firestopping, which includes fire- and smoke-resistant-rated assemblies protected by a firestop system or device for through-penetrations and membrane penetrations.
- (10) Systems associated with cooking operations.
- (11) Elevator systems.
- (12) Means of egress systems and components, including 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
 - (d) Fire barrier components for horizontal exits
- (13) Other systems or installations integrated or connected to a fire or life safety system such as access control, critical processes, and hazardous operations.

In manufacturing and industrial complexes, commissioning could be required to ascertain and document that interconnections with machinery or parts of the process function as planned by the owner's project requirements and basis of design. This could necessitate or induce partial or full interruption of the industrial process. An example would be the automatic shutdown of conveyors in the case of a sprinkler activation. The

automatic shutdown feature is part of the commissioning process.

- **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.3.3.2 Building.** The term *building* should be understood as if followed by the words "or portions thereof."

A.3.3.3.2 Commissioning Authority (CxA). A commissioning authority is typically provided and leads the overall fire protection and life safety systems 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 fire commissioning agent can assume the role of the commissioning authority, or vice versa.

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.3.3.3.6 Fire Protection and Life Safety Systems 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, operation and maintenance manual documentation verification, and the training of operating personnel.

N A.3.3.3.7 Fire Protection and Life Safety Systems Commissioning Team. The fire protection and life safety systems commissioning team can be part of a larger building commissioning team with team members whose focus is on commissioning electrical, mechanical, plumbing, and electronics systems. The overall team can be led by a commissioning authority whose responsibility is defined in ASHRAE Guideline 0, *The Commissioning Process*. Roles and responsibilities of members of the fire protection and life safety systems commissioning team are described in Annex C.

Δ A.3.3.3.8 Re-commissioning (Re-Cx). Re-commissioning can be initiated periodically or in response to a building renovation or change in building use. Re-commissioning is simply a full or partial repeat of the commissioning process that was performed prior to building occupancy. The purpose of re-commissioning is to verify that the systems still function according to the original owner's project requirements and basis of design, as well as governing laws, regulations, codes, and standards that were in effect at the time of initial installation, unless changes to the building have occurred that would require changes to the owner's project requirements and basis of design.

Δ A.3.3.3.9 Retro-commissioning (Retro-Cx). Retro-commissioning is a process that ensures building systems perform interactively according to the design intent or to meet the owner's current operational needs, and are in compliance with governing laws, regulations, codes, and standards that were in effect at the time that the systems were originally installed.

This is achieved by researching and documenting the original owner's project requirements and basis of design, and regulations in effect at the time of installation, to the best extent practical as well as the current operational needs. Once the owner's project requirements and basis of design have been developed, based on either assumptions of the original design or current operational needs, the fire protection and life safety systems would follow an abbreviated commissioning process. The abbreviation mainly deals with the operations normally realized during the planning phase and the construction phase that will not be undertaken under retro-commissioning.

A.3.3.9 Installation Contractor. Installation contractors often provide shop drawings, working plans, and other related documents. In some cases an installation contractor might provide labor only, with the owner or general contractor providing the materials or equipment.

A.3.3.12 Narrative. The narrative is written to assist and expedite the plan review and inspection process by the authority having jurisdiction. For some buildings and systems, the narrative could be relatively simple or for complex systems quite extensive. In all cases, it should be written in a way that is easy to understand and follow. 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 buildings' 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 nonrequired fire protection and life safety systems set forth by applicable codes, and standards, and local laws, and ordinances of the jurisdiction. The level of qualification for the individual narrative depends on the complexity of the systems or building. For less complex systems, the preparer could be an alarm, suppression, or other design technician. For more complex systems, the needed expertise might require that of an experienced consultant or engineer.

The narrative should be submitted with plans and specifications for review and approval by the authority having jurisdiction 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 authority having jurisdiction 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 authority having jurisdiction; uniformity is not always necessarily achieved. The narrative should attempt to clarify to the authority having jurisdiction the designer's intent and interpretation of the code and standards. The narrative 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. The narrative should be written in a three-sectional format with subsections as necessary (e.g., 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 D.

A.3.3.18 Sequence of Operation. See Figure A.3.3.18(a) and Figure A.3.3.18(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.

Δ A.3.3.20.1 Active Fire Protection System. Examples of active systems include gaseous extinguishing systems, sprinklers, standpipes, dampers, or fire alarm systems.

System Inputs		System Outputs												Other Required Fire Safety																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
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Notes:

- Five-story office building, use Group B, Cafeteria (use Group A) on first floor equipped with a hood and duct extinguishing system. Computer room on third floor equipped with a preaction system.
- Upon activation of elevator recall the elevator should stop at primary recall floor. If fire is on primary recall floor the elevator should stop at an alternate recall floor. Primary and alternate recall floor should be coordinated with the fire department.
- Shutdown of mechanical equipment should be interfaced with building automation system.

▲ FIGURE A.3.3.18(a) Sequence of Operation.

Shaded text = Revisions. ▲ = Text deletions and figure/table revisions. • = Section deletions. N = New material



SEQUENCE OF OPERATION TEST FORM

Building Information

Building name: _____

Building address: _____

Owner's name: _____

Owners address: _____

Owner's phone/fax/e-mail: _____

Installing Contractor

Company name: _____

Address: _____

Contact person: _____

Phone/fax/e-mail: _____

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

▲ FIGURE A.3.3.18(b) Sequence of Operation Form.