

NFPA® 3

Recommended Practice for Commissioning and Integrated Testing of Fire Protection and Life Safety Systems

2012 Edition



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NFPA® 3

Recommended Practice for

Commissioning and Integrated Testing of Fire Protection and Life Safety Systems

2012 Edition

This edition of NFPA 3, *Recommended Practice for Commissioning and Integrated Testing of Fire Protection and Life Safety Systems*, was prepared by the Technical Committee on Commissioning Fire Protection Systems and acted on by NFPA at its June Association Technical Meeting held June 12–15, 2011, in Boston, MA. It was issued by the Standards Council on August 11, 2011, with an effective date of August 31, 2011.

This edition of NFPA 3 was approved as an American National Standard on August 31, 2011.

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*, represents 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), which 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. Chapter 7 addresses integrated testing of fire protection systems as a means of confirming the systems function as intended.

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.

Technical Committee on Commissioning Fire Protection Systems

Maurice M. Pilette, *Chair*
Mechanical Designs Ltd., MA [SE]

Jonathan R. Barnett, Simpson Gumpertz & Heger Inc., MA [SE]

Rep. Fire Protection Association Australia

John F. Bender, Underwriters Laboratories Inc., MD [RT]

Art Black, Carmel Fire Protection Associates, CA [E]

David L. Boswell, Hughes Associates, Inc., CO [SE]

Thomas C. Brown, The RJA Group, Inc., MD [SE]

George L. Church, Jr., Rowe Sprinkler Systems, Inc., PA [IM]

Rep. American Fire Sprinkler Association

Bruce H. Clarke, XL Global Asset Protection, LLC, NC [I]

Shane M. Clary, Bay Alarm Company, CA [IM]

Pat Cull, Lifespan, RI [U]

Michael D. DeVore, State Farm Insurance Company, IL [I]

Rep. NFPA Industrial Fire Protection Section

Paul F. Dunphy, Jr., Harvard University, MA [U]

Joseph Duquet, Sprinkler Fitters Local 704, MI [L]

Rep. United Assn. of Journeymen & Apprentices of the Plumbing & Pipe Fitting Industry

Douglas W. Fisher, Fisher Engineering, Inc., GA [SE]

Brian Foster, Aegis Insurance Services, Inc., FL [M]

Rep. Automatic Fire Alarm Association, Inc.

David W. Frable, U.S. General Services Administration, IL [U]

Bill Fremis, Defence Construction Canada, Canada [U]

Kimberly A. Gruner, Fike Corporation, MO [M]

David R. Hague, Liberty Mutual Commercial Markets, MA [I]

Rep. Property Casualty Insurers Association of America

John L. Hulett, Western States Fire Protection Company, CO [M]

Rep. National Fire Sprinkler Association

Rick Kabele, Clark County Development Services, NV [E]

John E. Kampmeyer, Triad Fire Protection Engineering Corporation, PA [SE]

Robert Kasiski, FM Global, MA [I]

Charles M. Kilfoil, Bechtel National, Inc., WA [U]

David O. Lowrey, City of Boulder Fire Rescue, CO [E]

Norbert W. Makowka, National Association of Fire Equipment Distributors, IL [IM]

Scott T. Martorano, The Viking Corporation, MI [M]

Michael Wade McDaniel, F Tech, Mexico [IM]

Rep. NFPA Latin American Section

Jeff Negley, Webcor Builders, CA [U]

Pascal Pfeiffer, AXA Insurance Company, France [I]

Rep. European Fire Sprinkler Network

Rodger Reiswig, Tyco/SimplexGrinnell, FL [M]

G. Andrew Shanahan, Aon/Schirmer Engineering Corporation, AZ [I]

Robert J. Tabet, U.S. Department of the Navy, VA [E]

Alternates

Leonard Belliveau, Jr., Hughes Associates, Inc., RI [SE]
(Alt. to D. L. Boswell)

Daniel T. Berkoski, U.S. Department of the Navy, DC [E]
(Alt. to R. J. Tabet)

Cecil Bilbo, Jr., Academy of Fire Sprinkler Technology, Inc., IL [M]
(Alt. to J. L. Hulett)

John C. Davis, Fike Corporation, MO [M]

(Alt. to K. A. Gruner)

Laura E. Doyle, U.S. General Services Administration, DC [U]
(Alt. to D. W. Frable)

Tanya M. Glumac, Liberty Mutual Property, MA [I]
(Alt. to D. R. Hague)

Richard J. Hinks, Bay Alarm Company, CA [IM]
(Alt. to S. M. Clary)

Jeremy W. John, Fisher Engineering, Inc., GA [SE]
(Alt. to D. W. Fisher)

Derek D. Mathews, Underwriters Laboratories Inc., IL [RT]
(Alt. to J. F. Bender)

Mark Mecham, The RJA Group, Inc., NV [SE]
(Alt. to T. C. Brown)

Anthony Mucci, Tyco/ADT Security Services, Inc., FL [M]
(Alt. to R. Reiswig)

Thomas F. Norton, Norel Service Company, Inc., MA [M]
(Alt. to AFAA Rep.)

Thomas G. Wellen, American Fire Sprinkler Association, Inc., TX [IM]
(Alt. to G. L. Church, Jr.)

Martin H. Workman, The Viking Corporation, MI [M]
(Alt. to S. T. Martorano)

Nonvoting

Earle Kennett, National Institute of Building Sciences, DC [C]

Matthew J. Klaus, NFPA Staff Liaison

This list represents the membership at the time the Committee was balloted on the final text of this edition. Since that time, changes in the membership may have occurred. A key to classifications is found at the back of the document.

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Committee Scope: This Committee shall have primary responsibility for documents that pertain to commissioning activities and tasks for fire and life safety systems. This includes the requirements for planning, organization, coordination, responsibility, implementation, and documentation of commissioning of active and passive systems and features that serve a fire or life safety purpose.



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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 D. 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 D.

Chapter 1 Administration

1.1 Scope. This recommended practice provides the recommended procedures, methods, and documentation for commissioning and integrated testing of active and passive fire protection and life safety systems and their interconnections with other building systems.

1.2* Purpose. The purpose of this recommended practice is to describe the commissioning process and integrated testing that will ensure fire protection and life safety systems perform in conformity with the design intent.

1.3* Application.

1.3.1* This recommended practice applies to passive and active fire protection and life safety equipment and systems including, but not limited to, the following:

- (1)*Infrastructure supporting the building fire protection and life safety systems within the boundaries of the project
- (2) Fixed fire suppression and control systems
- (3) Fire alarm systems
- (4) Emergency communications systems (ECS)
- (5) Smoke control and management systems
- (6)*Normal, emergency, and standby power systems
- (7) Explosion prevention and control systems
- (8)*Fire-resistant and smoke-resistant assemblies
- (9)*Firestopping
- (10) Systems associated with commercial cooking operations
- (11) Elevator systems
- (12)*Means of egress systems and components
- (13) 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

1.3.2* Commissioning should achieve the following:

- (1) Documentation of the owner's project requirements (OPR) and the basis of design (BOD) provided
- (2) Equipment and systems installed as required
- (3) Integrated testing for all integrated fire and life safety systems performed and documented
- (4) Delivery of operation and maintenance (O&M) documentation
- (5)*Training of facility operating and maintenance staff
- (6) Identification and documentation of the requirements for maintaining system performance to meet the original design intent during the occupancy phase

1.3.3 Integrated testing should verify and document the following:

- (1) Performance in accordance with applicable codes and standards
- (2) Compliance with BOD and OPR
- (3)*Sequence of operation
- (4) Installation in accordance with manufacturers' published instructions
- (5) Accuracy of diagrams of system interconnections and device locations

1.3.4* The recommendations for the commissioning of fire protection and life safety systems and equipment in this document should apply when required by the project specification.

1.3.5* The recommendations for the integrated testing of fire protection and life safety systems and equipment in this document should apply when required by applicable codes or standards or the project specification.

1.4* New Technology. New technology, proposed for installation, for which there is no published product instruction or installation standard, should function as intended throughout its life cycle in accordance with the OPR, BOD, and requirements of the authority having jurisdiction (AHJ).

1.4.1* Design Documentation. Designs using new technology should be submitted to the AHJ for review and approval.

1.4.1.1* Submittals should include documentation, in an approved format, of each performance objective and applicable scenario, together with any calculations, modeling, or other technical substantiation used to establish the fire protection and life safety performance of the design.

1.4.1.2* Tests submitted in support of an application should be performed by an agency approved by the AHJ.

1.4.1.3 The AHJ should be permitted to require the submission of additional information and data necessary to assist in the determination of equivalency.

1.4.1.4* The AHJ should be authorized to engage such expert opinion as deemed necessary to evaluate the new technology at no expense to the jurisdiction.

1.4.2 Acceptance Requirements. Upon completion of the installation, functional and interoperability testing should be conducted demonstrating performance consistent with the OPR and the BOD in a method acceptable to the AHJ.

1.4.3* Maintenance Documentation. Final documentation should contain required inspection, maintenance, and testing methods and intervals.



Chapter 2 Referenced Publications

2.1 General. The documents or portions thereof listed in this chapter are referenced within this recommended practice and should be considered part of the recommendations 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*, 2011 edition.

2.3 Other Publications. *Merriam-Webster's Collegiate Dictionary*, 11th edition, Merriam-Webster, Inc., Springfield, MA, 2003.

2.4 References for Extracts in Recommendations Sections.

NFPA 101®, *Life Safety Code*®, 2012 edition.

NFPA 820, *Standard for Fire Protection in Wastewater Treatment and Collection Facilities*, 2012 edition.

NFPA 1031, *Standard for Professional Qualifications for Fire Inspector and Plan Examiner*, 2009 edition.

NFPA 5000®, *Building Construction and Safety Code*®, 2012 edition.

Chapter 3 Definitions

3.1 General. The definitions contained in this chapter apply to the terms used in this recommended practice. Where terms are not defined in this chapter or within another chapter, they should 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* Recommended Practice. A document that is similar in content and structure to a code or standard but that contains only nonmandatory provisions using the word "should" to indicate recommendations in the body of the text.

3.2.5 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 applicable standards, laws, and regulations.

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 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, 2009]

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

3.3.7 Inspection. A visual examination of a system or portion thereof to verify that it appears to be in operating condition and is free of physical damage. [820, 2012]

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

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

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

3.3.11* 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.

3.3.12 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 and operations phase.

3.3.13 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.

3.3.14 Phase.

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

3.3.14.2 Design Phase. The phase during which the basis of design is produced, and drawings and calculations, including those for design and fabrication, are produced, and testing procedures are developed.

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

3.3.14.4 Planning Phase. The phase during which the fire protection and life safety commissioning team is formed and initial project concepts and the owner's project requirements are developed.

3.3.15 Registered Design Professional (RDP). In commissioning, 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.

3.3.16* Sequence of Operation. A matrix, narrative, or table of system inputs and outputs that can be used to illustrate the interactions of interconnected fire protection systems.

3.3.17 Stakeholder. Any individual, group, or organization that might affect, be affected by, or perceive itself to be affected by the risk.

3.3.18 System.

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

3.3.18.2 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]

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

3.3.18.4* 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.

3.3.19 System Connection.

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

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

3.3.19.2.1* Switch Connection. A subset of interconnected systems in which one system monitors a switch or relay in another system for either normal or not-normal conditions.

3.3.19.2.2* Data Sharing System. A subset of interconnected systems in which data streams are transferred between two or more control units.

3.3.19.3* Interconnection. The physical connections between interconnected systems.

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

3.3.21 Testing.

3.3.21.1 Acceptance Testing. Tests performed at the completion of installation to confirm compliance with applicable manufacturers' installation specifications, applicable codes and standards, and the project BOD and OPR.

3.3.21.2* Integrated Testing. An assessment of fire protection and life safety systems function and operation using direct observation or other monitoring methods to verify the correct interaction and coordination of multiple systems in conformance with the fire protection and life safety objectives.

3.3.21.3* Pre-Functional Testing. Tests performed prior to acceptance testing to confirm compliance with manufacturers' specification, applicable codes and standards, and the project BODs and OPRs.

Chapter 4 Qualifications of Commissioning Personnel

4.1 Applicability. Members of the fire protection and life safety commissioning team should meet the requirements of this chapter.

4.2 Qualifications.

4.2.1 Fire Commissioning Agent (FCxA).

4.2.1.1* General.

4.2.1.1.1 The FCxA should be knowledgeable and experienced in the proper application of commissioning recommendations of this recommended practice and general industry practices.



4.2.1.1.2 The FCxA should be individually identified on the specifications or other enabling documentation.

4.2.1.1.3 The FCxA should provide an objective and unbiased point of view.

4.2.1.2 Requisite Knowledge. A qualified FCxA should 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 testing.

4.2.1.3 Requisite Skills. An FCxA should 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.

4.2.2 Installation Contractor.

4.2.2.1 Installation contractors should be knowledgeable and experienced in the installation of the type of system proposed to be installed.

4.2.2.2* The installation contractor should submit evidence of required license or certification to the FCxA.

4.2.3 Registered Design Professional (RDP).

4.2.3.1 The RDP should be individually identified in the specifications or other enabling documentation.

4.2.3.2 Requisite Knowledge. A qualified RDP should have comprehensive knowledge of the following:

- (1) The design, installation, operation, and maintenance of all systems proposed to be installed
- (2) How individual and integrated systems operate during a fire or other emergency

4.2.4* Construction Manager and General Contractor. Construction managers and general contractors should be knowledgeable and experienced in the field of construction project management.

4.2.5 Facilities Management Personnel. Facilities management personnel should include building maintenance and service personnel, building engineering personnel, and similar job functions.

4.2.5.1 Facilities management personnel should 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.

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

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

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

4.2.6 Third-Party Test Entity.

4.2.6.1 Third-party test entities should have an advanced understanding of the installation, operation, and maintenance of all fire protection and life safety systems proposed to be tested, with particular emphasis on system integrated testing.

4.2.6.2* Third-party test entities should be licensed or certified where required by the AHJ and/or codes and standards.

4.2.6.3 The third-party test entities should 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) Provide good written, verbal, conflict resolution, and organizational skills.

4.2.7* Authority Having Jurisdiction (AHJ).

4.2.7.1 The AHJ should be knowledgeable in the applicable codes, ordinances, and standards as they relate to the fire protection and life safety systems installed.

4.2.7.2 The AHJ should have the ability to interface with the RDP and the commissioning authority in all phases of the commissioning process.

4.2.7.3 The AHJ should have the ability to determine the operational readiness of the fire protection and life safety systems installed.

4.2.7.4 The AHJ should have the ability to interface with the fire protection and life safety commissioning team in order to verify completion of integrated testing for the purpose of system acceptance.

4.2.8 Integrated Testing Agent (ITa).

4.2.8.1 The ITa should have an understanding of the design, installation, and operation and maintenance of the type of fire protection and life safety systems installed.

4.2.8.2 The ITa should demonstrate experience and knowledge of performance verification methods to validate functionality of integrated systems and components.

4.2.8.3 The ITa should 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.

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

Chapter 5 Commissioning

5.1 General.

5.1.1* This chapter provides the recommendations for commissioning fire protection and life safety systems.

5.1.2* 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.5.1.2(a), Figure A.5.1.2(b), and Figure A.5.1.2(c).]

5.2 Planning Phase.

5.2.1 Activities.

5.2.1.1* The fire protection and life safety commissioning team should be established during the planning phase.

5.2.1.2 During the planning phase of the project, the fire protection and life safety commissioning team should do the following:

- (1) Develop the OPR in accordance with Section 5.2.
- (2) Select the FCxA.
- (3) Identify the commissioning scope.
- (4) Develop the preliminary commissioning plan in accordance with Section 5.2.
- (5) Review the planning documents in accordance with Section 5.2.
- (6)*Develop regulatory code analysis.
- (7) Initiate the commissioning plan.

5.2.2* Fire Protection and Life Safety Commissioning Team. The fire protection and life safety commissioning team should be identified and documented.

5.2.2.1 The exact size and members of the fire protection and life safety commissioning team can vary depending on project type, size, and complexity and could include the following members:

- (1) Owner
- (2) Commissioning authority
- (3) FCxA
- (4)*Installation contractor(s)
- (5)*Manufacturer's representatives
- (6) RDP(s)
- (7) Construction manager/general contractor
- (8) Owner's technical support personnel
- (9) Facility manager or operations personnel
- (10) Insurance representative
- (11) Third-party test entity
- (12)*AHJ
- (13)*ITa

5.2.2.2* Entities listed in 5.2.2 not included as part of the project should not be required to be part of the fire protection and life safety commissioning team.

5.2.2.3 The fire protection and life safety commissioning team members should meet the requirements of Chapter 4.

5.2.2.4 Owner.

5.2.2.4.1 The owner should be responsible for the commissioning of all fire and life safety systems.

5.2.2.4.2* The owner should be permitted to delegate the responsibility for commissioning to a designated representative.

5.2.2.4.3 The owner responsibilities should include the following:

- (1) Contracting and delegating the commissioning process
- (2) Assisting in the development of and approval of the OPR
- (3) Assigning operations and maintenance personnel to participate in the commissioning process
- (4) Reviewing and approving any changes to the OPR
- (5) Reviewing and approving the construction documents
- (6) Reviewing and approving commissioning process progress reports
- (7) Reviewing and approving the fire protection and life safety commissioning team progress reports
- (8) Reviewing and approving the final commissioning report

5.2.2.5* Commissioning Authority (CxA). The CxA should be responsible for coordinating between the FCxA and the remainder of the building commissioning team, when applicable.

5.2.2.6 Fire Commissioning Agent (FCxA). The FCxA responsibilities should include the following:

- (1) Organize and lead the fire protection and life safety commissioning team.
- (2) Coordinate and attend fire protection and life safety commissioning team meetings.
- (3) Facilitate the development of and document the OPR.
- (4) Verify that commissioning process activities are clearly stated in all scopes of work.
- (5) Identify and integrate the commissioning process activities into the project schedule.
- (6) Prepare the commissioning plan.
- (7) Prepare the commissioning process activities to be included in the project specification.
- (8) Execute the commissioning process.
- (9) Review the plans and specifications during the planning and design phases.
- (10) Attend pre-bid meeting to detail the commissioning contractor requirements.
- (11) Review and approve the O&Ms to compile the systems manual.
- (12) Track and document issues and deviations to the OPR and log resolutions in the issues log.
- (13) Write and review commissioning process progress reports.
- (14) Organize and coordinate system testing.
- (15) Witness system testing.
- (16) Review installation and record documents.
- (17) Recommend acceptance of the systems to the owner.
- (18) Track development, accuracy, and compliance with sequence of operation.
- (19) Compile and submit the final fire protection and life safety commissioning team report to the owner.
- (20) Compile and submit to the owner all fire protection and life safety systems commissioning documents required by the AHJ.

5.2.2.7 Installation Contractor. The installation contractor responsibilities should include the following:

- (1) Provide commissioning process requirements and activities as specified in the construction documents.
- (2) Attend required fire protection and life safety commissioning team meetings.
- (3) Include or comply with commissioning process milestones in the project schedule.
- (4) Implement the training program as required by the construction documents.



- (5) Provide submittals to the RDP, owner, and fire protection and life safety commissioning team.
- (6) Develop an individual system test plan, including acceptance and integrated testing.
- (7) Notify the general contractor, third-party test entity, and FCxA when systems are ready for testing.
- (8) Demonstrate the performance of the systems, including integration.
- (9) Complete the construction checklists as the work is accomplished.
- (10) Continuously maintain the record drawings as required by the construction documents.

5.2.2.8 Manufacturer's Representative. The manufacturer's representative responsibilities should include the following:

- (1) Provide technical support to the installation contractor.
- (2) Provide all information required for the operation and maintenance of the system.
- (3) Provide the requirements to maintain the warranty as part of the initial submittal.
- (4) Assist the installation contractor in the development of the individual systems test plans.
- (5) Assist the installation contractor and fire protection and life safety commissioning team with installation verification and testing.
- (6) Assist in development and implementation of system training.

5.2.2.9 RDP. The RDP responsibilities should include the following:

- (1) Participate and assist in the development of the OPR.
- (2) Create and document the basis of design.
- (3) Prepare construction documents.
- (4) Respond to the fire protection and life safety commissioning team's design submission review comments.
- (5) Specify operation and maintenance of systems in the project specification.
- (6) Review and incorporate the fire protection and life safety commissioning team's comments, as appropriate.
- (7) Review test procedures submitted by the installation contractor.
- (8) Review and comment on the commissioning record.
- (9) Review and accept record documents as required by the construction documents.
- (10) Review and comment on the final commissioning record.
- (11) Recommend final acceptance of the systems to the owner.

5.2.2.10 Construction Manager/General Contractor. The construction manager's/general contractor's responsibilities should include the following:

- (1) Include commissioning process requirements and activities in all contracts.
- (2) Obtain cooperation and participation of all subcontractors and manufacturers' representatives.
- (3) Attend required fire protection and life safety commissioning team meetings.
- (4) Include commissioning process milestones in the project schedule.
- (5) Notify the FCxA when systems are ready for testing.
- (6) Certify that all work has been completed and the facility is operational in accordance with the construction documents.

- (7) Remedy deficiencies identified by the fire protection and life safety commissioning team during installation verification or testing.
- (8) Review and comment on the final commissioning record.

5.2.2.11* Insurance Representative. The insurance representative(s) responsibilities should include the following services, as contracted with the owner:

- (1) Provide fire protection recommendations to RDP for inclusion in the basis of design and other construction documents.
- (2) Review the construction documents during the planning and design phases to evaluate alignment with insurance risk management recommendations.
- (3) Participate in commissioning team (CxT) meetings, as necessary, to ensure scope of project, responsibilities, and project timeline (including commissioning) is established/agreed to.
- (4) Visit project site during installation phase to review physical/actual installation is consistent with reviewed/accepted construction documents, as necessary.
- (5) Review and approve proposed inspection, testing, performance criteria, and documentation recommended for acceptance of commissioning.
- (6) Witness installation verification and system testing in conjunction with the CxT, as necessary.
- (7) Verify any issues detected during commissioning are resolved in timely and appropriate manner.
- (8)*Verify adequate training and documentation is provided for onsite personnel.
- (9) Review final commissioning documentation.

5.2.2.12 Owner's Technical Support Personnel. The owner's technical support personnel's responsibilities should include the following:

- (1) Review and comment on the OPR.
- (2) Provide technical assistance to the fire protection and life safety commissioning team, RDP, and installation contractor.
- (3) Review any changes to the OPR.
- (4) Review the construction documents.
- (5) Review the fire protection and life safety commissioning team's commissioning process progress reports.
- (6) Review the fire protection and life safety commissioning team's progress reports.
- (7) Review the fire protection and life safety commissioning team's commissioning record.
- (8) Review the systems manual.

5.2.2.13 Third-Party Test Entity. The third-party test entity's responsibilities should include the following:

- (1) Include all commissioning process requirements and activities in the scope of services.
- (2) Attend required fire protection and life safety commissioning team meetings.
- (3) Include commissioning process milestones in the project schedule.
- (4) Develop individual system test plan, including acceptance and integrated testing.
- (5) Demonstrate the performance of the systems, including integration.
- (6) Complete the construction checklists as the work is accomplished.
- (7) Develop and submit final testing documentation.

5.2.2.14 Facility Manager or Operations Personnel. The facility manager or operations personnel's responsibilities should include the following:

- (1) Attend systems training sessions.
- (2) Review and comment on the OPR.
- (3) Review and comment on the systems manuals.
- (4) Organize, coordinate, and implement system inspection, testing, and maintenance as required by the systems manuals.

5.2.2.15 AHJ. The AHJ's responsibilities should include the following:

- (1) Participate in fire protection and life safety commissioning team meetings as necessary.
- (2) Provide all inspection, testing, and performance criteria required for acceptance and issuance of certificate of occupancy to be included in the commissioning plan.
- (3) Witness installation verification and system testing in conjunction with the fire protection and life safety commissioning team, as necessary.
- (4) Identify AHJ personnel to attend training.

5.2.3 Owner's Project Requirements (OPR).

5.2.3.1 The OPR should form the basis from which all design, construction, acceptance, and operational decisions are made.

5.2.3.2* The OPR should be developed with input from the owner and all key facility users and operators.

5.2.3.3* The OPR should be documented at the planning stage of the project.

5.2.3.3.1 Each item of the OPR should have defined performance and acceptance criteria.

5.2.3.3.2 The OPR should include, but is not limited to, the following:

- (1) Infrastructure requirements (utilities, roads, site access)
- (2) Facility type, size, height
- (3) Intended use
- (4) Occupancy classification, number of occupants, number and hours of operation
- (5) Future expansion requirements
- (6) Applicable codes and standards
- (7) Specific user requirements
- (8) Training requirements
- (9) Warranty, operations, and maintenance requirements
- (10) Integrated system requirements in accordance with Chapter 5
- (11) Specific performance criteria
- (12) Third-party requirements

5.2.3.4 The OPR should be updated as required by the fire protection and life safety commissioning team throughout the planning, design, construction, and occupancy phases of the building life cycle.

5.2.4 Commissioning Plan.

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

5.2.4.2* The commissioning plan should contain the following information:

- (1) Commissioning scope and overview specific to the project
- (2) General project information
- (3) Fire protection and life safety 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 testing
- (9) Recommended training
- (10) Establishment of an integrated testing frequency, as applicable

5.2.4.3 The following materials should be added as annex sections of the completed commissioning plan:

- (1) A — Owner's project requirements
- (2) B — Basis of design
- (3) C — Commissioning specifications
- (4) D — Design review
- (5) E — Submittal review
- (6) F — Issues log
- (7) G — Construction checklists
- (8) H — Site visit and commissioning meeting minutes
- (9) I — Systems manual review
- (10) J — Training
- (11) K — Integrated testing procedures
- (12)*L — Warranty review
- (13) M — Test data reports
- (14) N — Sequence of operation

5.2.4.4 The commissioning plan, including all annexes, should form the commissioning record at the end of the construction phase.

5.2.4.5 A current copy of the commissioning record should be presented to the owner at the end of the construction phase.

5.2.5 Planning Review.

5.2.5.1 The FCxA should review the planning documentation to compare the design concept with the interests and needs of the owner as defined in the OPR.

5.2.5.2 The FCxA should identify required changes and improvements affecting operations and maintenance.

5.2.5.3 It should not be the intent of the planning review to verify compliance with local, state and federal codes, unless specifically identified in the commissioning scope.

5.2.6 Planning Approval Documentation.

5.2.6.1 The FCxA should submit documentation stating completion and recommending acceptance of the planning requirements to the owner or other designated individual.

5.2.6.2 The documentation should include, but is not limited to, the following information:

- (1) Receipt, review, and approval of planning submittal
- (2) Updates to the commissioning plan, as applicable
- (3) Any additional comments or requests for information considered by the FCxA to be appropriate to the commissioning process
- (4) Preliminary sequence of operation

5.3* Design Phase.

5.3.1* Design phase activities should include, but not be limited to, the following:

- (1) Developing the BOD
- (2) Review and approval of the sequence of operation
- (3) Review of project drawings and calculations affecting fire protection and life safety systems
- (4)*Documentation of the scope for commissioning activities in the construction documents
- (5) Documentation of the commissioning procedures
- (6) Developing a commissioning schedule
- (7) Verifying that the construction documents comply with the requirements of the BOD
- (8) Identifying qualified specialists in accordance with Chapter 4 and their responsibilities
- (9) Coordinating and documenting fire protection and life safety commissioning team meetings and progress reports
- (10)*Documenting issues and changes
- (11) Updating the commissioning plan
- (12)*Developing construction checklists

5.3.2 Basis of Design.

5.3.2.1 General.

5.3.2.1.1 The basis of design should be the documentation describing the initial design decision-making process and description of systems.

5.3.2.1.2 The document described in 5.3.2.1.1 should be in the form of a narrative report and should be submitted for review prior to the installation of any system.

5.3.2.1.3 The basis of design should include but not be limited to 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) Referenced codes and standards
- (5) Alternative means and methods incorporated into the original design
- (6) Testing and start-up requirements
- (7) Inspection, testing, and maintenance requirements

5.3.2.1.4 The BOD should be included with other required submittals to facilitate plan review and approval by the AHJ prior to the issuance of a permit to install the system.

5.3.2.1.5 The BOD should be updated in accordance with the recommendations for OPR in 5.2.3 after every revision of the design documents.

5.3.2.1.6 The outline for the BOD should include the items in 5.3.2.2 through 5.3.2.7.

5.3.2.2* Applicable Standards, Laws, and Regulations. This section should identify the codes and standards that apply to the design, plan review, installation, testing, acceptance, inspection, and maintenance of the proposed fire protection and life safety systems.

5.3.2.2.1 All codes and standards should be referenced as they apply, including, but not limited to, the following:

- (1) NFPA standards, including edition used for the design of each fire protection/life safety system
- (2) Applicable local, state, and federal laws and regulations (OSHA, ADA, etc.)

- (3) Specialized codes and standards (HVAC, plumbing, etc.)
- (4) Green building design considerations that affect fire and life safety systems

5.3.2.3 Building Description. The following specific features of fire protection and life safety systems should be identified in the BOD:

- (1) Building use group or occupancy classification
- (2) Total area of the building
- (3) Building height
- (4) Number of floors above grade
- (5) Number of floors below grade
- (6) Area per floor
- (7) Type(s) of hazardous areas within buildings
- (8) Type(s) of construction
- (9) Site access arrangement for emergency response vehicles
- (10) Descriptions of fire protection and life safety systems

5.3.2.4 Fire Protection and Life Safety System Objectives and Decisions.

5.3.2.4.1 The BOD should describe the performance objectives of each fire protection and life safety system, including, but not limited to, the following:

- (1) Whether each system is required by code or installed voluntarily
- (2) Whether it is a complete or partial installation
- (3) Whether it is an addition or modification to an existing system

5.3.2.4.2 The BOD should describe the decisions made and the criteria established to achieve the performance objectives, including, but not limited to, the following:

- (1) Building occupant notification and evacuation procedures
- (2) Emergency personnel response
- (3) Site and systems features
- (4) Safeguards during construction, including fire prevention and emergency procedures
- (5) Impairment plans when modifying existing systems
- (6) Methods for inspection, testing, and maintenance of systems

5.3.2.5 Consideration and Description of Alternative Means and Methods. The design intent of any alternatives to prescriptive requirements of the codes and standards, including, but not limited to, the following, should be identified:

- (1) Interpretations and clarifications
- (2) Waiver or variance sought through the regulatory appeal process

5.3.2.6 Testing Criteria.

5.3.2.6.1 The FCxA should be responsible for all items listed in 5.2.2.6.

5.3.2.6.2 Testing criteria should be established and documented.

5.3.2.6.3 The methods for prefunctional and integrated testing should be documented.

5.3.2.7* Equipment and Tools. The FCxA should identify and document the tools and equipment necessary for testing.

5.3.3 Operation and Maintenance Manuals (O&Ms).

5.3.3.1 O&Ms should be provided.

5.3.3.2 O&Ms should contain, but not be limited to, the following information:

- (1) Project name and address
- (2) Discipline (i.e., fire protection)
- (3) Specification section number
- (4) Volume number

5.3.3.3* The RDP should review and approve the O&Ms for conformance with the OPR.

5.3.4 Training of Operations Personnel. The content, duration, and learning outcomes of training for operations personnel should be provided in the design documentation in accordance with Section 5.3.

5.3.5 Design Methodology.

5.3.5.1* The design should take into consideration the final commissioning of the active and passive fire protection systems.

5.3.5.2 The recommendations for design consideration should include, but not be limited to, the following:

- (1) Materials and equipment applied in such a manner that will not affect their listing or their intended use where applicable
- (2) Materials and equipment have the capacity to perform their intended use
- (3) Design documents or details to demonstrate how the systems operate and communicate to attain the desired outcome
- (4) Design documents and/or details to demonstrate the application of fire protection systems in the construction
- (5) Locations of fire protection systems
- (6) The procedures for verification of fire protection systems
- (7) Assignment of responsibility for the testing and inspection of the fire protection systems during the construction phase
- (8) Specification of the deliverables, including final documentation for the conclusion of the project
- (9) Specification of the format of the deliverables

5.4 Construction Phase. During the construction phase the systems should be delivered, installed, and tested in accordance with the OPR, construction documents, shop drawings, and coordination drawings.

5.4.1 Construction Phase Commissioning Activities.

5.4.1.1 The fire protection and life safety commissioning team should complete the following:

- (1) Confirm that the commissioning schedule is still valid, and update if required.
- (2) Verify that submittals, including, but not limited to, working plans and product data sheets, are in conformance with the BOD and have been reviewed.
- (3) Verify that materials, construction, and installation are in conformance with the BOD.
- (4) Confirm qualified specialists are performing commissioning activities per commission plan (CP).
- (5) Coordinate and document fire protection and life safety commissioning team meetings and progress reports.
- (6) Document any issues and changes to the project and update the CP.
- (7) Complete Cx construction checklists.
- (8) Perform required observation procedures or cause them to be performed by the responsible party.
- (9) Update related documents to record and adjust for any revisions and/or changes.
- (10) Verify and document testing performed in the construction phase.

5.4.1.2 Construction should take into consideration the final commissioning of the passive fire protection systems.

5.4.1.3 The recommendations for installation should include but not be limited to the following:

- (1) Conformance to the approved drawings and specifications
- (2) Compliance with the manufacturers' published instructions
- (3) Compliance with applicable codes and standards
- (4) Materials and equipment of proper rating for the use

5.4.2 Construction Inspections.

5.4.2.1 Pre-Installation or Preconstruction.

5.4.2.1.1 A preconstruction conference should be held to ensure the fire protection and life safety commissioning team and those performing the work all understand the schedule, procedures, and process.

5.4.2.1.2 Schedule commissioning process activities should include the following:

- (1) Address any outstanding issues that are best resolved in this venue.
- (2) Verify coordination has taken place among trades.
- (3) Identify and establish benchmarks to be met during the construction phase.
- (4) Verify submittals are in accordance with design intent documents and approvals and permits are secured.
- (5) Confirm integrated testing requirements are being addressed.
- (6) Develop test data records.
- (7) Confirm compliance with sequence of operation.

5.4.2.2 Rough-In Phase. The following tasks should be performed prior to concealment of the installed material:

- (1) Inspect and verify delivered materials meet requirements.
- (2) Verify installation is proceeding in accordance with coordinated, approved shop drawings.
- (3) Complete periodic site visits to verify compliance with the owner's commissioning plan.
- (4) Inspect installation as outlined in the commissioning plan.
- (5) Perform testing as applicable.
- (6) Update owner project requirements and address any outstanding issues.
- (7) Update commissioning plan as needed.
- (8) Issue rough-in phase commissioning progress report.

5.4.2.3 Finish Phase. The following tasks should be performed after the rough-in phase is complete:

- (1) Inspect and verify delivered materials meet requirements.
- (2) Verify installation is proceeding in accordance with coordinated, approved shop drawings.
- (3) Complete periodic site visits to verify compliance with OPR.
- (4) Inspect installation as outlined in the commissioning plan.
- (5) Perform testing as applicable (post-concealment).
- (6) Update OPR and address any outstanding issues.
- (7) Update commissioning plan.
- (8) Issue finish phase commissioning progress report.

5.4.3 Testing and Inspection.

5.4.3.1 Testing and inspection should include passive fire protection systems.

5.4.3.2 The recommendations for testing and inspection should include, but not be limited to, the recommendations of Chapters 7 and 9.



5.4.3.2.1* Fire protection systems that have no operating components should be inspected to verify conformance with the BOD.

5.4.3.2.2 Fire protection systems that have operating components should have their functionality tested to demonstrate compliance with the BOD.

5.4.3.2.3 Written documentation of the testing and inspection should be provided.

5.4.3.2.4 Inspection and testing should be repeated if changes are made to systems.

5.4.3.3 Testing and inspection of passive fire protection systems should be completed as required during construction.

5.4.4 Completion and Acceptance Testing. The following tasks should be performed as part of the acceptance of the fire protection and life safety systems:

- (1) Verify installation is in accordance with coordinated, approved shop drawings.
- (2) Inspect overall installation as outlined in the commissioning plan.
- (3) Perform prefunctional testing of all systems to provide proper functionality and to ensure interoperability.
- (4) Perform and document testing of all systems to provide proper functionality, to ensure integration, and to ensure the systems were left in a state of operational readiness.
- (5) Update owner project requirements and address any outstanding issues.
- (6) Update commissioning plan/record.
- (7) Issue completion/acceptance phase commissioning progress report.
- (8) Verify compliance and accuracy of sequence of operation.

5.4.5* Owner Training. Training should be permitted to take place in the construction phase.

5.4.6* Closeout Documents. Closeout documents should include, but not be limited to, the following:

- (1) Compiled list of all deficiencies and resolutions and verification of resolution achieved
- (2) Operations and maintenance manuals
- (3) Compile test results and certificate
- (4) As-built drawings
- (5) Warranty and extended warranties
- (6) Spare parts list and supplier listings
- (7) Re-commissioning plan (integrated testing)
- (8) Sequence of operation

5.5 Occupancy Phase.

5.5.1 Occupancy phase should be the final stage of the commissioning process for the fire protection or life safety systems.

5.5.2 The recommendations for occupancy phase should include but not be limited to the following:

- (1) Documentation and completion of remaining acceptance testing and inspections
- (2) Testing conducted for modifications made during the construction phase commissioning
- (3)*Performing deferred testing for seasonal conditions
- (4) Submission of the system manual, operation and maintenance manuals, and vendor emergency contact list
- (5) Training on the use and operation of the fire protection and life safety systems
- (6) Delivery of the record set drawings and documents

- (7) Delivery of the test and inspection records for the fire protection and life safety systems
- (8)*Delivery of a digital copy of site-specific software for fire protection and life safety systems that is current with the installed system
- (9)*Delivery of warranties for the systems and equipment
- (10) Submission of recommended preventative maintenance program for fire protection and life safety systems
- (11) Delivery of a list of required inspections, tests, and maintenance for fire protection and life safety systems

5.5.3 Administrative Controls. The owner should be responsible for the continued performance of fire protection and life safety systems.

5.5.3.1* Applicable inspection and testing should be performed when modifications are made.

5.5.3.2* When changes are made to the use of the facility, the OPR should be re-evaluated.

5.5.3.3* The design documents should be maintained for future reference.

5.5.3.4 Inspection, testing, and maintenance should be performed as specified in the installation standard or manufacturer's instructions.

5.5.3.5 Integrated systems should be inspected, tested, and maintained in accordance with the commissioning plan.

5.5.4 Training.

5.5.4.1* The training should include, but not be limited to, the following:

- (1) The systems, component systems, and devices for which training will be required
- (2) The capabilities and knowledge of the occupants and maintenance personnel
- (3) The number and type of training sessions
- (4) The location and organization of operation and maintenance manuals

5.5.4.2* Systems training should be scheduled to be completed at or as close as possible to final systems acceptance.

5.5.4.3* Training session scope and attendees should be documented as part of the commissioning record.

5.5.4.4* Facilities personnel or their designated representatives should receive periodic re-training as determined by the commissioning agent.

Chapter 6 Integrated Systems Commissioning

6.1 General. This chapter should apply to the functions of integrated systems provided for fire protection or life safety in the design phase, construction phase, and occupancy phase of the commissioning process of Chapter 5.

6.2 Design Phase.

6.2.1 Narrative Report. Construction documents should include a narrative report of the system interactions, including but not limited to the following:

- (1) Sequence of operations of integrated fire protection or life safety systems
- (2) Performance objectives of system interactions

- (3) Analysis of the impact that interactions will have on the proper operation of each independent fire protection or life safety system
- (4) Owner's expectation of how fire protection or life safety systems work together

6.2.2 Design Methodology.

6.2.2.1 The design should take into consideration the interconnections of the fire protection or life safety systems.

6.2.2.2 The recommendations for design consideration should include, but not be limited to, the following:

- (1) Materials and equipment interconnected in such a manner that will not affect their listing or their intended use where applicable
- (2)*Materials and equipment have the capacity to perform their intended use
- (3)*Design documents or details to demonstrate how the systems operate and communicate to attain the desired outcome
- (4)*Design documents or details to demonstrate how operations of integrated systems do not impair the functionality of other component systems, unless designed to impair another system
- (5)*Sequence of operation for integrated systems
- (6)*Locations of interconnections
- (7) Procedures for integrated testing
- (8)*Required frequency for integrated testing
- (9) Assignment of responsibility for the testing and inspection of the systems and interconnections during the construction phase
- (10) Specification of the deliverables, including final documentation for the conclusion of the project
- (11)*Specification of the format of the deliverables

6.2.2.3* The methods for pre-functional and integrated testing should be included in the construction and systems manual.

6.3 Construction Phase. The recommendations for installation of integrated systems should include but not be limited to the following:

- (1) Conformance to the approved drawings and specifications
- (2) Compliance with the manufacturers' published instructions
- (3) Compliance with applicable codes and standards
- (4) Review of material and equipment submittals of proper rating for the use
- (5) Coordination of all contractors' submittal drawings, sequence of operation, and procedures

6.4 Occupancy Phase.

6.4.1 The recommendations for occupancy consideration should include but not be limited to the following:

- (1) Verification that individual system testing and inspection is complete and documented in accordance with applicable codes and standards and the design specifications for the project
- (2) Verification that integrated system testing and inspection is complete and documented in accordance with the design specifications and the commissioning plan for the project
- (3) Approval of modifications made to the system or interconnections by the design professional

- (4) Retesting as determined by the ITa
- (5) Interconnections documented in operation and owner manuals
- (6) Training as recommended in 5.3.4, 5.4.5, and 5.5.4 on the use and operation of the systems and interconnections
- (7) The vendor emergency contact list
- (8) The as-built documents for the systems and interconnections
- (9) A copy of test and inspection records of the systems and interconnections
- (10) A copy of site-specific software of the systems and interconnections that is current with the installed system
- (11) A copy of warranties for the systems and interconnections
- (12) A copy of a recommended preventative maintenance program for the systems and interconnections
- (13) A list of recommended periodic inspections and tests for the systems

6.4.2* The design documents should be maintained for future reference.

6.5 Data Sharing Systems. During the design phase, the fire protection and life safety commissioning team should document the following:

- (1) Where data sharing systems occur in the project
- (2) Compatibility of data sharing systems
- (3) Where gateways or interfaces are recommended between data sharing systems
- (4) The responsible parties for each portion of the interconnection
- (5) Degrade mode for each data sharing system upon loss of communication

Chapter 7 Integrated System Testing

7.1 General.

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

7.1.2 Personnel responsible for integrated testing should meet the qualifications listed in 4.2.8 for ITa.

7.2 Test Frequency.

7.2.1* In new construction, integrated testing of fire protection and life safety systems should occur following:

- (1) Verification of completeness and integrity of building construction
- (2)*Individual system functional operation and acceptance as required in applicable installation standards tests
- (3) Completion of pre-functional tests of integrated systems

7.2.2 Existing fire protection and life safety systems should have periodic integrated testing.

7.2.2.1 Integrated systems that were commissioned upon installation in accordance with Chapter 6 should have integrated testing at the interval specified in the commissioning plan.

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



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

- (1) New component 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 components of interconnected systems.
- (3) Interconnections or sequence of operations of existing integrated fire protection and life safety systems are modified.

7.3 Test Method.

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

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

7.3.3* During integrated testing, equipment should be tested in accordance with the applicable installation standard to verify systems perform according to their design function.

7.3.4 Written documentation of the testing and inspection should be provided.

7.3.5* Testing should be repeated if changes are made to systems.

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

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

7.3.7.1 Loss of power to monitored circuits should 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*

7.3.8 Integrated testing of data sharing systems should 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

7.4 Testing Responsibility.

7.4.1 The owner should be responsible for integrated testing of fire and life safety systems.

7.4.2 The owner should be permitted to delegate the authority and responsibility for integrated 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.

7.4.3* The ITa should be responsible for planning, scheduling, documenting, coordinating, and implementing the integrated testing of the fire protection and life safety systems and their associated subsystems.

7.4.4 Where a commissioning plan does not exist, the ITa should 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 ITa
- (3) The testing of component systems required by associated NFPA standards conducted separately under contract to the owner
- (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

7.4.5* Documentation.

7.4.5.1 The ITa should maintain a record of faults, failures, and discrepancies discovered through the testing process in an official issues log (IL).

7.4.5.1.1 The IL should list each separate finding and its corresponding resolution, including dates of discovery and resolution.

7.4.5.2 Corrective action reports (CAR) should provide a specific and detailed description of actions taken to remediate faults, failures, and discrepancies discovered during the testing process.

7.4.5.3 Upon completion of testing, the ITa should submit a final test report to the owner and other stakeholders as requested.

7.4.5.4 The final test report should summarize the results of the integrated testing and should include ILs and CARs.

Chapter 8 Re-commissioning (Re-Cx) and Retro-commissioning (RCx) of Fire Protection and Life Safety Systems

8.1* General. This chapter provides recommendations for the re-commissioning and retro-commissioning recommendations of active and passive fire protection and life safety systems where installed in existing structures.

8.2 Re-commissioning.

8.2.1* Fire protection and life safety systems that have been commissioned upon installation in accordance with the commissioning process of Chapter 5 of this standard should be re-commissioned as specified by a re-commissioning plan.

8.2.2 Recommendations for Re-commissioning. The following should be achieved during re-commissioning:

- (1) A fire protection and life safety commissioning team should be established and responsibilities should be assigned in accordance with 5.2.2.
- (2) The fire protection and life safety commissioning team should complete the applicable recommendations of 5.2.1.2, 5.3.1, 5.4.1, and 5.5.2.

8.3 Retro-commissioning.

8.3.1* Where testing of existing fire protection and life safety systems has not been conducted in accordance with the commissioning process of Chapter 5 of this recommended practice,