Understanding Commissioning versus System Acceptance Testing

By Jack Poole, PE, FSFPE

Understanding terminology used in the fire protection industry is of utmost importance for safety in all aspects of the profession. How often in the industry are the terms acceptance testing, integrated fire protection and life safety system testing, and commissioning used synonymously? In the past, the most-common terminology used when talking about fire protection system testing was “acceptance testing,” but fire protection is changing.

The NFPA now provides very specific definitions for acceptance testing, integrated fire protection and life safety system testing, and commissioning – and these three terms should not be confused.

NFPA 31 (2018) defines acceptance testing as the “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.” System acceptance testing is the type of testing most of us are familiar with and have been performing for years; however, it does not provide whole building system integration and testing to confirm all fire protection and life safety systems function together, as required, to ensure proper operation of these systems. System acceptance testing should be performed by the respective installing contractor to ensure that respective system functions are designed as required by code.

Several years ago, the National Institute of Building Sciences (NIBS) pushed a set of commissioning documents to set national guidelines on how fire protection and life safety systems are to be tested and commissioned, and to provide a commissioning document for fire protection systems that would be part of a collection of commissioning documents that could be used to create a total building commissioning program. During this period, NIBS reached out to the NFPA about developing a commissioning document focused on fire protection and life safety systems.

In 2012, NFPA published NFPA 3: Recommended Practice for Commissioning and Integrated Testing of Fire Protection and Life Safety Systems. It was the
first nationally recognized consensus document addressing commissioning for fire protection and life safety systems. It was also the first nationally recognized document addressing integrated testing of fire protection systems. In addition to outlining a standardized approach for commissioning and integrated testing, NFPA 3 developed standardized definitions for the industry, which were desperately needed.

In 2015, NFPA 3 remained a recommended practice, but was retitled as “Recommended Practice for Commissioning of Fire Protection and Life Safety Systems” because Chapter 7 was removed as the basis for a new standard, “Standard for Integrated Fire Protection and Life Safety System Testing.” In 2018, NFPA 3 became a “standard” versus a “recommended practice,” and is now called “Standard for Commissioning of Fire Protection and Life Safety Systems.”

Even the term “commissioning” in the fire protection field had different meanings to different people. Common terminology and meanings are crucial for people to understand and coordinate with each other during the commissioning process. For example, commissioning was often confused with acceptance testing and the assumption that the authority had jurisdiction (AHJ), which was very far from the case. NFPA 3 defines fire and life safety commissioning as “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.”

Today, total building commissioning is becoming a more-common process in all types of commercial construction. The basic purpose of building commissioning is to provide a quality-based process with documented confirmation that building systems are planned, designed, installed, tested, operated and maintained in compliance with the owner’s project requirements.

Although NFPA 3 largely discusses commissioning and integrated testing of new buildings and new systems, it also addresses commissioning existing systems that have not been commissioned previously (retro-commissioning; ReCx) and commissioning existing systems that have previously been commissioned (recommissioning; RCx).

NFPA 3 defines a process for commissioning but does not specifically detail how to test a particular fire protection or life safety system. Other NFPA standards, such as NFPA 72: National Fire Alarm and Signaling Code for Fire Alarm Systems, provide information about how to test specific fire protection and life safety systems functionally. The commissioning process focuses on three primary areas that are reviewed in all phases of the construction process: Owner Requirements, Commissioning Plan and Documentation. The commissioning process outlines four separate phases: Planning, Design, Construction and Occupancy.
Furthermore, NFPA 3 identifies the commissioning team members, their qualifications, and their roles and responsibilities throughout the process. A key component of this overall process is a written Commissioning Plan to identify the processes and procedures necessary for a successful commissioning process, and the roles and responsibilities of the team members. Throughout the commissioning process, several key documents provide direction to the commissioning team members as they execute the commissioning plan, such as the Owners Project Requirements (OPR) and the Basis of Design (BOD). The guidance provided in these documents, which are generated during the design phase, is implemented during construction.

The Fire Protection and Life Safety Systems Commissioning Team is a group of qualified individuals or entities responsible for accomplishing the goals of NFPA 3. The commissioning team is expected to provide guidance to the design team on including the design of active and passive fire protection systems. The team must include, at a minimum, the owner and the fire commissioning agent. The exact number and members of the Fire Protection and Life Safety Systems Commissioning Team can vary depending on project type, size and complexity, and may include representatives of the authority having jurisdiction (AHJ); installation contractors; manufacturer; registered design professionals; construction manager; general contractor; facility manager or operations personnel; and integrated testing agent (ITa) or insurance representative, just to name a few.

The Fire Commissioning Agent (FCxA) implements and leads the commissioning of fire protection and life safety systems. In the capacity of the owner’s representative, the FCxA provides another set of eyes and ears working in the owner’s best interest. A qualified FCxA has advanced knowledge, and experience with the installation and operation, of the fire protection and life safety system(s) being commissioned. The Integrated Testing Agent (ITa) implements and leads the integrated testing of the fire protection and life safety systems to verify the proper interface and coordination between various fire protection and life safety systems. A qualified ITa also has an advanced knowledge of and experience with the installation, operation and interfaces between the various fire protection and life safety systems being connected to each other.

For example, fire alarm systems typically have different types of integration with other fire protection and life safety systems, such as sprinkler and suppression systems, smoke control systems, elevator controls, HVAC fan shutdown, door release, card-access systems and emergency generators. It is acceptable for the same person to serve as both the FCxA and the ITa for a project, as long as they meet the qualifications for both positions.

Section 909.3 of the 2018 International Building Code\(^2\) contains code requirements for commissioning smoke control systems and establishes the need for a qualified commissioning agent for smoke control systems to serve as the Smoke Control Special Inspector — the qualified FCxA commissioning
smoke control agent is sometimes also referred to as the Smoke Control Special Inspector.

Commissioning fire protection and life safety systems occurs in the design phase of the project, as well as during the construction phase, via a comprehensive review and documentation of the commissioning process. For example, the FCxA attends coordination meetings; reviews the design documents, shop drawing submissions, installation progress and contractors’ pretest documents; and witnesses the systems’ performance in accordance with the commissioning test plan.

One more critical scope clarification item should be done in this phase. The fire protection and life safety features of the building are the most highly regulated pieces of the construction process. The Authority Having Jurisdiction — usually the fire marshal or the building official — will require documentation that the fire and life safety features have been completed. The AHJ may also witness the tests. The fire protection engineer should be designated as the liaison with the AHJ as these tasks relate to commissioning issues.

If the AHJ wishes to witness system tests, it is usually prudent to have scope and fee documents reflecting the costs associated with a complete successful pretest before that testing. Complex integrated fire and life safety systems often do not function correctly the first time, due to equipment failure, programming errors or misunderstanding project design documents. Bringing the AHJ out to witness a failing test diminishes confidence in the project team.

The last, and probably the most important, component of the overall commissioning process is documentation. Approved commissioning documents, including the commissioning plan and system forms, should be used to record commissioning and testing of fire protection and life safety systems. All documentation and commissioning records are to be turned over to the owner in accordance with the commissioning plan.

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**References**
