

An Overview of Fire Protection and Life Safety Systems Commissioning

The requirement for building commissioning is becoming more commonplace within the building construction industry, and currently required on most federal projects and buildings pursuing LEED certification through the US Green Building Council. In 2007, the National Institute of Building Sciences reached out to NFPA and formally requested the establishment of a new technical committee to address commissioning of fire protection and life safety systems. As a result, the first edition of NFPA 3, *Recommended Practice for Commissioning and Integrated Testing of Fire Protection and Life Safety Systems*, was released in 2012.

Commissioning goes beyond traditional system acceptance testing to verify proper operation of the commissioned system and ensure that owner requirements are met. It is a standardized process performed by a Commissioning Authority, a professional who is knowledgeable in the design, construction and operation of systems. This facilitates more cost effective maintenance of the systems, ensures adequate performance over time, and provides a baseline for evaluating the impact of changes to the facility on the level of fire protection and life safety achieved. Commissioning also serves as a risk management tool, reducing risk by increasing the probability that installed fire protection and life safety features will function as intended should an incident occur.

Passive and active fire protection and life safety equipment and systems addressed by NFPA 3 include, but are not limited to:

- Fixed fire suppression and control systems
- Fire alarm systems
- Smoke control and management systems
- Emergency power systems
- Explosion prevention and control systems
- Fire-resistant and smoke-resistant assemblies
- Means of egress systems and components

Fire protection and life safety system commissioning is performed by the Fire Commissioning Agent (FCxA). NFPA 3 requires a qualified FCxA to have an advanced understanding of the installation, operation, and maintenance of all proposed fire protection and life safety systems, as well as the ability to read and interpret drawings and specifications, and analyze and facilitate resolution of issues related to failures in fire protection and life safety systems. Commissioning can be performed on both new and existing systems.

For new construction projects, the commissioning process spans four stages of the project – planning, design, construction, and occupancy. In the planning stage, the FCxA is involved in developing the owner’s project requirements. Activities include:

- Documentation of owner’s vision for use and operation of facility
- Identification of commissioning scope
- Initiation of commissioning plan

In the design stage, FCxA activities include:

- Develop the basis of design
- Ensure the owner’s project requirements are reflected in the design documents
- Develop commissioning test procedures
- Update the commissioning plan
- Begin preparation of the operation and maintenance manuals

Where integrated fire protection and life safety systems are planned, additional documentation is prepared to define the performance objectives of system interactions and analyze the impact those interactions will have on the proper operation of independent systems. Issues such as compatibility of data sharing systems, loss of communication between systems, and responsible parties for each portion of the interconnection are addressed at this time.

The bulk of commissioning services are performed during the construction stage. During construction, FCxA activities include:

- Verify coordination among trades
- Verify that submittals, materials, construction, and installation are in conformance with the basis of design
- Develop data records
- Periodic inspections prior to concealment of systems
- Perform and/or observe required testing

Completion and acceptance testing is performed as part of the commissioning of the fire protection and life safety systems, including inspection of the overall installation, functional testing, integrated testing, and verification of sequences of operations. Project closeout documents are developed including punch lists documenting deficiencies and verification of resolutions, operations and maintenance manuals, compiled test results and certificates, and record drawings. For integrated systems, a new standard was released in May 2014. The 2015 edition of NFPA 4, *Standard for Integrated Fire Protection and Life Safety System Testing*, contains test requirements to verify the proper operation and function of interconnected fire protection and life safety systems above and beyond testing requirements for individual systems.

In the occupancy stage, commissioning activities include:

- Verification that individual and integrated systems testing and inspections are complete, compliant, and fully documented
- Approval of any modifications made to systems or interconnections
- Completion of documentation in operation and owner's manuals
- Recommendations for a preventative maintenance program

Training on the use and operation of systems may occur during or just prior to the occupancy stage. Continued involvement of the FCxA through the warranty period provides assistance in identifying and addressing any issues that may arise.

For existing fire protection and life safety systems, recommissioning is performed to verify continued performance of previously commissioned systems or upon changes affecting operations of the systems. Retro-commissioning applies to systems that were not designed and installed using the commissioning process. It is recommended when design, installation, or operational issues are revealed during inspection, testing, and maintenance, or upon changes affecting operations of the systems. The procedures for commissioning of existing systems are similar to those for new systems, with a commissioning plan tailored to the needs of the project. Commissioning services enhance any project, and offer significant benefits to the owner in maintaining reliable and affordable operation of these systems over the life of the building.

References:

1. NFPA 3, *Recommended Practice for Commissioning and Integrated Testing of Fire Protection and Life Safety Systems*, National Fire Protection Association, Quincy, MA, 2015.
2. NFPA 4, *Standard for Integrated Fire Protection and Life Safety System Testing*, National Fire Protection Association, Quincy, MA, 2015.