

INTEGRATED SYSTEMS TESTING

Introduction

Integrated fire protection and life safety system testing is required to be performed as required in accordance with 780 CMR (Building Code) and 527 CMR (Fire Code) and NFPA 4 (Standard for Integrated Fire Protection and Life Safety System Testing).

The process for Integrated Fire Protection System and Life Safety System Testing is as follows:

General Requirements

A preliminary integrated fire protection and life safety test plan shall be submitted with the application for a building permit at ISD. If a phased occupancy of the building is to be sought, it must be approved by both Boston Fire Department (BFD) and Inspectional Services Department (ISD). The owner must produce a written phased occupancy plan and acknowledge that a preliminary integrated system test plan be incorporated in each occupancy phase temporary Certificate of Occupancy (COO) request. Integrated system testing and documentation of each phase is required. Discrepancies and corrections between the preliminary test plan and the final test plan are to be documented and completed at the time of application for the Certificate of Occupancy for review and approval by BFD and ISD. The Testing of Integrated Fire Protection and Life Safety Systems Record of Completion (see NFPA 4 for NFPA's suggested form(s)) is required to be submitted to the Boston Fire Department (BFD) for review and approval prior to BFD approval of the application for a Certificate of Occupancy (temporary or final). Additional documentation requirements and forms are found in NFPA 4.

The Integrated Testing agent (ITa) shall prepare the required test plans. The ITa shall be responsible for planning, scheduling, documenting, coordinating, and implementing the test plans. The owner is responsible for selecting the members of the integrated test team. Integrated testing teams shall provide evidence of their qualifications and their compliance with the requirements of licensing law and regulation relevant to the specific individual system. The building owner shall provide evidence in writing of the delegation of their responsibilities to a qualified ITa.

The ITa shall keep a log of the results and milestones of the integrated test process as they proceed during the construction process. Written test plan clarifications and all required accompanying documentation shall be added to the test plan log by the ITa as they are developed for generating the final test plan and completion documents required by NFPA 4 by the ITa. The log is subject to review by BFD at any time during the duration of the building process. Record keeping is important and essential for a successful witnessing of any final end-to-end verification testing that is to be witnessed by BFD.

The purpose of this document is to provide guidance for the submission and performance of integrated system testing and shall not be construed to nullify any requirements found in 780 CMR, 527 CMR, or NFPA 4.

Test Plan Requirements

Integrated System testing plans shall include scenarios that confirm that responses and interactions found in the integrated fire protection and life safety systems conform to the design objectives.

Preliminary Test Plan Requirements

ISD Building permit applications for new construction projects, as well as for alterations to existing buildings, are to include a preliminary test plan and shall include the following minimum requirements:

1. Written verification that the integrated system and its individual systems will be installed in accordance with the approved design documents.
2. A list of the individual systems to be tested.
3. A written statement that documentation will be provided for the individual systems as required by the applicable codes and standards.
4. A written statement that the integrated test team and additional entities required to be in attendance will be provided and qualified and/or licensed by law or regulation as necessary.
 - a. An ITa is required to have been selected by the owner by the time of building permit issuance.
5. A written statement confirming that equipment required for testing will be available.
6. A comprehensive functional matrix depicting all system inputs and associated output functions.
7. A written statement that a list of necessary drawings, including riser diagrams and control diagrams, will be incorporated into the test plan as it develops.
8. A narrative description of the test scenarios as they develop, including what is needed for the record of completion and other final documentation for review and approval by BFD.
9. A preliminary description of the extent of systems to be tested under the direction of the ITa.
10. A written statement that a test schedule including individual systems will be incorporated as the test plan develops.
11. Documentation of the periodic integrated system test frequencies per 527 CMR and NFPA 4.

Final Test Plan Requirements

The minimum requirements for a final test plan to be submitted at time of COO application shall include the following:

1. Written statement confirming that the integrated system and its individual systems have been installed in accordance with the approved design documents and standards.
2. A list of the individual systems to be tested.
3. Documentation of the individual systems as required by the applicable codes and standards.

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4. Integrated test team and additional entities required to be in attendance.
5. Equipment required for testing.
6. A comprehensive functional matrix depicting all system inputs and associated output functions.
7. A list of necessary drawings, including riser diagrams and control diagrams.
8. A narrative description of the test scenarios as they are developed, including what is needed for the record of completion and other final documentation for review and approval by BFD.
9. A description of the extent of systems to be tested under the direction of the ITa.
10. A test schedule including individual systems.
11. Documentation of the periodic integrated system test frequencies per 527 CMR.

Test Methods and Scenario Testing

The main objective of integrated testing is to demonstrate that the final integrated system installation complies with the specific design objectives for the building and applicable codes and standards and perform according to their design function.

Testing of integrated systems shall begin by initiating the test scenarios described in the integrated test plan and shall demonstrate that required responses have occurred in accordance with the integrated test plan. Each individual fire protection and life safety system or components of an integrated system shall be first installed and tested as required by the applicable standard. If a standard for a system or component does not have testing requirements or if a standard does not exist for the system or component, they shall then be tested in accordance with the manufacturer's published instructions.

Control group testing is permitted to be part of an integrated system test upon successful completion of the individual systems acceptance test.

- The results of the individual acceptance test and a list of the devices within each control group shall be provided before integrated system testing.
- Section 5.1.4 of NFPA 4 may be used if all of the conditions and tests found in Section 5.1.4(subsections 1-7) are satisfied.

All integrated system test methods, test scenarios, control circuits testing, power loss to monitored circuits testing, data sharing systems testing, switch connection testing, and physical connections testing shall comply with the requirements of Section 5.2.

Test scenarios could be a simple event scenario or a combination of events. Test scenarios shall demonstrate that all interface devices perform their intended function and that all required building functions occur and any interconnections between and amongst systems function properly. See the functional matrix.

The requirements found in NFPA 4, Section 5.2 shall be complied with.

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Note: All individual fire protection and life safety systems and components may be subject to an acceptance test witnessed by BFD. Please refer to the acceptance test, documentation requirements, and sequence found in the Certification of Occupancy requirements ([web link](#)). Complete pre-functional test documentation is required to be submitted to BFD for review prior to a scheduled witnessing of that system or component's acceptance test.

Individual system and component pre-functional and acceptance testing shall be finalized as a condition before BFD will schedule final integrated fire protection and life safety end-to-end testing and for filing with BFD the Testing of Integrated Fire Protection and Life Safety Systems Record of Completion with all final required documentation (see NFPA 4).

Documentation

Written documentation of the testing shall be provided to BFD in accordance with NFPA 4 Chapter 7. A final test report is required from the ITa which includes a statement that the integrated systems have been tested in accordance with the approved test plan and NFPA 4.

Note: The forms provided in NFPA 4 are acceptable.

Existing Buildings, Periodic Testing, and Record Retention

Existing buildings with integrated systems shall be tested periodically as required by 527 CMR and the applicable codes and standards.

Record Retention shall be in accordance with NFPA 4 Section 7.4.