Introduction to NFPA 4

Standard for Integrated Fire Protection and Life Safety Testing

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Illinois Fire Inspectors Association

January 25, 2013

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Disclaimer:

The comments and opinions made during the presentation of this session are solely those of the presenter and do not reflect an official position of the National Fire Protection Association, its employees, or any of its technical committees.

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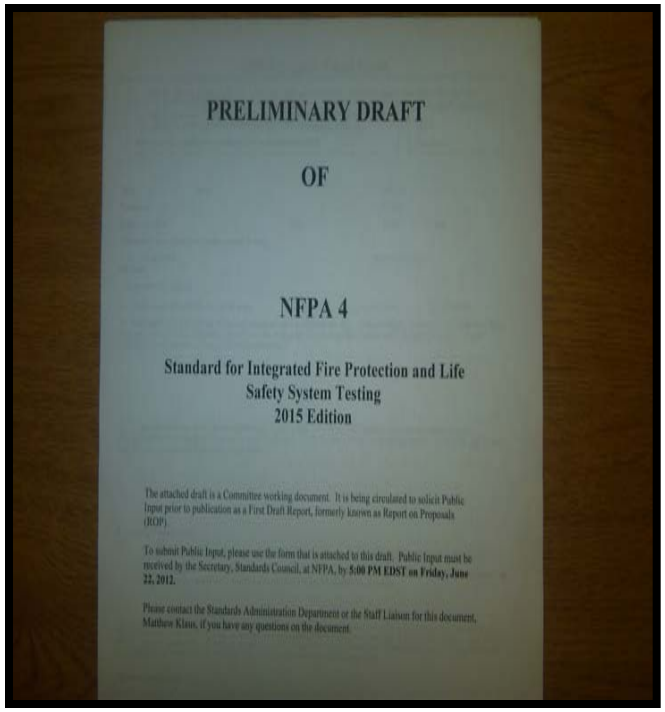
Overview:

- What is NFPA 4 and why do we need it…
- Development process…
- Organization of the standard…
- Chapter overview…
- Where do we go from here…

What is NFPA 4 and why do we need it?

- Creates minimum requirements for the testing of passive and active ***integrated*** fire protection and life safety systems
  - Where the testing is required by governing laws, codes or standards



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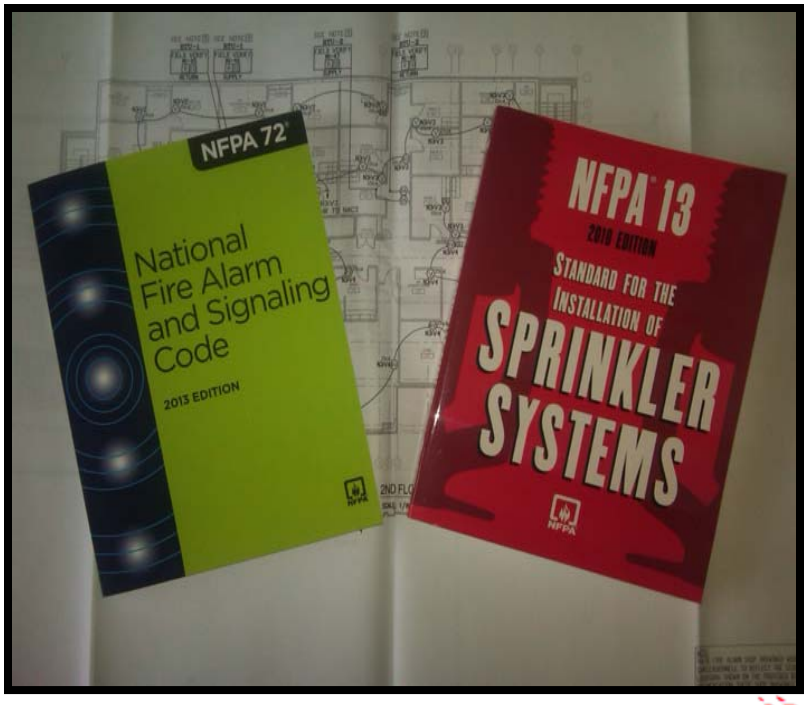
What is NFPA 4 and why do we need it?

- The standard will not provide the requirements for testing individual systems
- Codes and standards such as NFPA 13 and 72 no longer require integrated system testing



What is NFPA 4 and why do we need it?

- The standard will apply to both new and existing systems

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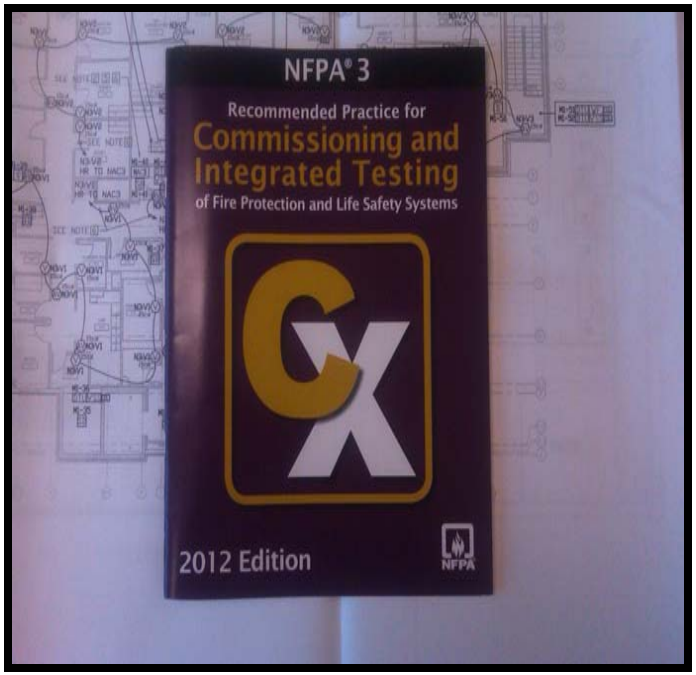
The Development Process

- Preceded by NFPA 3, *Recommended Practice for Commissioning and Integrated Testing of Fire Protection and Life Safety Systems*



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The Development Process

- First Official Meeting – January 4-5, 2012, Orlando, FL (Document Development)
- Second Official Meeting – July 25-26, 2012, NFPA Headquarters (Document Development)
- First Draft Meeting – Sept. 11-14, 2012, San Diego, CA
- Along the Way – Numerous Task Group Conference Calls

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Organization of the NFPA 4

- Chapter 1 – 3 NFPA Standard Organization
  - Chapter 1 – Administration
  - Chapter 2 – Referenced Publications
  - Chapter 3 – Definitions
- Chapter 4 – General Requirements
- Chapter 5 – Test Methods
- Chapter 6 – Documentation
- Annex A – Explanatory Material
- Annex B – Reserved for Sample Integrated Test Plans

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Chapter Review

- Chapter 1 – Administration
  - Purpose of the Standard:
    - To provide a testing protocol
    - To ensure that integrated fire protection and life safety systems perform as intended
    - Does not apply to the individual systems which make up the “integrated” system
      - NFPA 72, Chapter 14, Inspection, Testing, and Maintenance

        “*For initial, reacceptance, and periodic testing, verify emergency control function interface device activation.*”

Chapter Review

- Chapter 1 – Administration
  - Application of the Standard:
    - Integrated system testing shall verify and document:

      (1) Performance in accordance with applicable codes and standards

      (2) Sequence of operation

      (3) Performance in accordance with the manufacturer's published instructions

      (4) Accuracy of Record Documents

Chapter Review

- Chapter 3 – Definitions
  - Loaded with acronyms
    - Commissioning (Cx)
      - A systematic process that provides documented confirmation that building systems function according to operational needs, laws, codes and ordinances
      - Also includes Fire and Life Safety Commissioning (Cx)
    - Re-commissioning (Re-Cx)
      - Verifying the performance of existing fire protection and life safety systems which have been previously commissioned
    - Retro-commissioning Agent (RCx)
      - The process of commissioning existing fire and life safety systems that were not commissioned when originally installed

Chapter Review

- Chapter 3 – Definitions
  - Acronyms
    - Commissioning Authority (CxA)
      - The qualified person or company that plans, coordinates and oversees the entire commissioning process
    - Fire Commissioning Agent (FCxA)
      - The person or entity identified by the owner, who leads, plans, schedules, documents, and coordinates the fire protection and life safety commissioning team, commissioning process, and integrated testing

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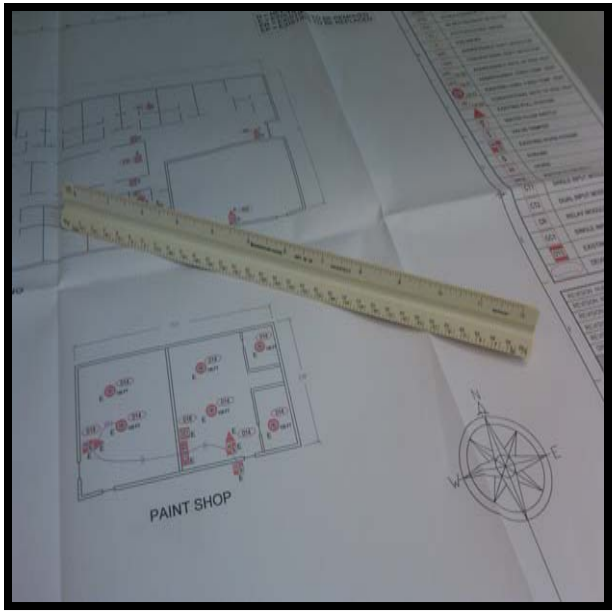
Chapter Review

- Chapter 3 – Definitions
  - Acronyms
    - Integrated Testing Agent (ITa)
      - The person or entity identified by the owner, who plans, schedules, documents, coordinates, and implements the integrated testing of ***individual*** fire protection and life safety systems and their associated subsystems

Chapter Review

- Chapter 3 – Definitions
  - Coordination Drawing – A drawing used to show and coordinate the placement and interaction of multiple individual systems or components
  - Record Drawings
  - Shop Drawings
  - Working (Plan) Drawings



Chapter Review

- Chapter 3 – Definitions
  - Interface – The place at which individual systems meet and act on or communicate with each other
  - Interface Device – The component that connects an individual system to one or more other individual systems

Chapter Review

- Chapter 3 – Definitions
  - Active Fire Protection Systems – Systems that use mechanical or electrical components to achieve a goal
  - Passive Fire Protection Systems – Any portion of a building or structure that provides protection from fire or smoke without activation or movement
  - Integrated System – A combination of systems that are required to operate together as a whole to achieve an overall objective

Chapter Review

- Chapter 3 – Definitions
  - Tests:
    - Acceptance Test
    - Pre-functional Test
    - Control Group Test
    - End to End Integrated System Test
    - Interface Test
    - Periodic Test [RESERVED]

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Chapter Review

- Chapter 4 – General Requirements
  - Where required by codes, standards or regulations, integrated testing of new or existing fire protection and life safety systems shall occur
  - Personnel responsible for integrated testing shall meet the qualifications of Section 4.3

Chapter Review

- Chapter 4 – General Requirements
  - Initial Integrated Testing
    - Shall be performed where required by a commissioning plan or integrated test plan
    - Shall verify the proper operation of all interconnected systems

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Chapter Review

- Chapter 4 – General Requirements
  - Periodic Integrated Testing
    - Integrated systems shall have periodic testing
    - Shall occur at intervals not exceeding 5 years; or,
      - At an interval stated in the commissioning plan; or,
      - When a system was not commissioned, an integrated testing plan shall be developed to identify the appropriate extent and frequency of the periodic integrated testing

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Chapter Review

- Chapter 4 – General Requirements
  - Periodic Integrated Testing
    - Shall also occur whenever:
      - New fire protection or life safety systems are installed and interconnected to existing fire protection and life safety systems
      - Existing fire protection and life safety systems are modified to become a part of interconnected systems
      - Interconnections, or the sequence of operation. are modified
      - Failures of an individual system interface occur during routine operations or testing of interconnected systems

Chapter Review

- Chapter 4 – General Requirements
  - Integrated Testing Team (ITt)
    - The ITt shall include an ITa
    - The exact size and members of the ITt shall be dependent upon the project type, size, and complexity
    - Personnel on the ITt shall be qualified

Chapter Review

- Chapter 4 – General Requirements
  - Qualifications
    - The AHJ can request evidence of ITt member qualifications
    - The ITa shall have an understanding of the design, installation, operation, and maintenance of the integrated systems installed
    - The ITt members shall have knowledge and experience in the proper application of the integrated system testing requirements of NFPA 4 and general industry practices

Chapter Review

- Chapter 4 – General Requirements
  - Testing Responsibilities
    - The owner is responsible for integrated system testing!
    - The owner may delegate his responsibility
    - The designated ITa shall perform the following related to integrated system testing:
      - Plan and schedule
      - Document and coordinate
      - Implement

Chapter Review

- Chapter 4 – General Requirements
  - Testing Responsibilities
    - The designated ITa shall perform the following when a commissioning plan does not exist related to integrated system testing:
      - Prepare a test plan
      - Prepare a functional matrix depicting all input/output functions
      - Determine the systems to be tested
      - Determine which systems are required to be tested by other NFPA standards
      - Prepare the test processes
      - Develop the test scenarios
      - Create a test event schedule with applicable stakeholders

			System Outputs																							
			Occupant Notification & Information														System Functions & Indicators							Gate
			Bsmt speakers and strobes	1st floor speakers and strobes	2nd floor speakers and strobes	3rd floor speakers and strobes	4th floor speakers and strobes	5th floor speakers and strobes	6th floor speakers and strobes	7th floor speakers and strobes	8th floor speakers and strobes	Elev. penthouse speakers and strobes	Stair 1 speakers	Stair 1 strobes	Stair 2 speakers	Stair 2 strobes	Elev. recall to primary level	Elev. recall to secondary level	Elev. cab warning relay	Release fire and smoke doors	Unlock entry doors	Panel alarm audible & visible indicators	Panel supervisory audible & visible ind.	Trip masterbox to fire department
	Floor	Device/Input	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	X
1	Bsmt	manual fire alarm station	●	●																●	●	●		●
2	1st	manual fire alarm station	●	●	●															●	●	●		●
3	2nd	manual fire alarm station		●	●	●														●	●	●		●
4	3rd	manual fire alarm station			●	●	●													●	●	●		●
5	4th	manual fire alarm station				●	●	●												●	●	●		●
6	5th	manual fire alarm station					●	●	●											●	●	●		●
7	6th	manual fire alarm station						●	●	●										●	●	●		●
8	7th	manual fire alarm station							●	●	●									●	●	●		●
9	8th	manual fire alarm station								●	●	●								●	●	●		●
10	Elev. penthouse	manual fire alarm station									●	●								●	●	●		●
11	Bsmt	smoke detection	●	●																●	●	●		●
12	1st	smoke detection	●	●	●															●	●	●		●
13	2nd	smoke detection		●	●	●														●	●	●		●
14	3rd	smoke detection			●	●	●													●	●	●		●
15	4th	smoke detection				●	●	●												●	●	●		●
16	5th	smoke detection					●	●	●											●	●	●		●
17	6th	smoke detection						●	●	●										●	●	●		●
18	7th	smoke detection							●	●	●									●	●	●		●
19	8th	smoke detection								●	●	●								●	●	●		●
20	Elev. penthouse	smoke detection									●	●					●		●	●	●	●		●
21	Bsmt	elev. lobby smoke detector	●	●													●			●	●	●		●
22	1st	elev. lobby smoke detector	●	●	●													●		●	●	●		●
23	2nd	elev. lobby smoke detector		●	●	●											●			●	●	●		●
24	3rd	elev. lobby smoke detector			●	●	●										●			●	●	●		●
25	4th	elev. lobby smoke detector				●	●	●									●			●	●	●		●
26	5th	elev. lobby smoke detector					●	●	●								●			●	●	●		●

Chapter Review

- Chapter 4 – General Requirements
  - Test Plan
    - Integrated testing shall utilize test scenarios described in the Integrated Test Plan
    - Correct system responses shall be verified
    - All responses and interactions shall be verified
    - Testing begins with each initiating device and ends with the desired actions and responses
    - Control group testing is permitted

Chapter Review

- Chapter 5 – Test Methods
  - General
    - Integrated testing shall demonstrate that the final integrated system complies with specific design objectives for the project and applicable codes/standards

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Chapter Review

- Chapter 5 – Test Methods
  - General
    - Test scenarios shall include events and combination events including, but not limited to:
      - Loss of normal power
      - Water flow
      - Presence of smoke

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Chapter Review

- Chapter 5 – Test Methods
  - General
    - Simulated test scenario conditions are permitted
    - Wiring methods shall be verified such as:
      - Generator start circuits, emergency feeder circuits including wiring tests to the device, fire alarm circuits, fire pump feeders
    - Individual systems shall be tested to their specific standard
    - Written documentation shall be provided per Chapter 6

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Chapter Review

- Chapter 5 – Test Methods
  - General
    - Testing shall be repeated if changes or corrections are made to systems during testing
    - Control circuits requiring electrical power shall be tested for the presence of operating voltage
    - Loss of power supervision shall be verified
    - Systems sharing data circuits shall meet specific test requirements

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Chapter Review

- Chapter 5 – Test Methods
  - General
    - Issues Logs and Corrective Actions
      - Failures found during testing and the corrective actions taken shall be documented
      - The ITa must submit a final test report to the owner and other stakeholders upon the completion of testing
      - Final report must:
        - Summarize the results of the integrated testing
        - Include all issues logs and corrective actions reports

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Chapter Review

- Chapter 6 – Documentation
  - General
    - Minimum documentation is required, but the standard does not prohibit additional documentation
    - Responsibility of the ITa to provide documentation when required by the design documents or governing laws, codes, standards or the AHJ

Chapter Review

- Chapter 6 – Documentation
  - Minimum documentation required:
    - A final test report summarizing the results of the integrated testing
    - The summation shall include a narrative or matrix describing each test and the response of the integrated system and the individual systems

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Chapter Review

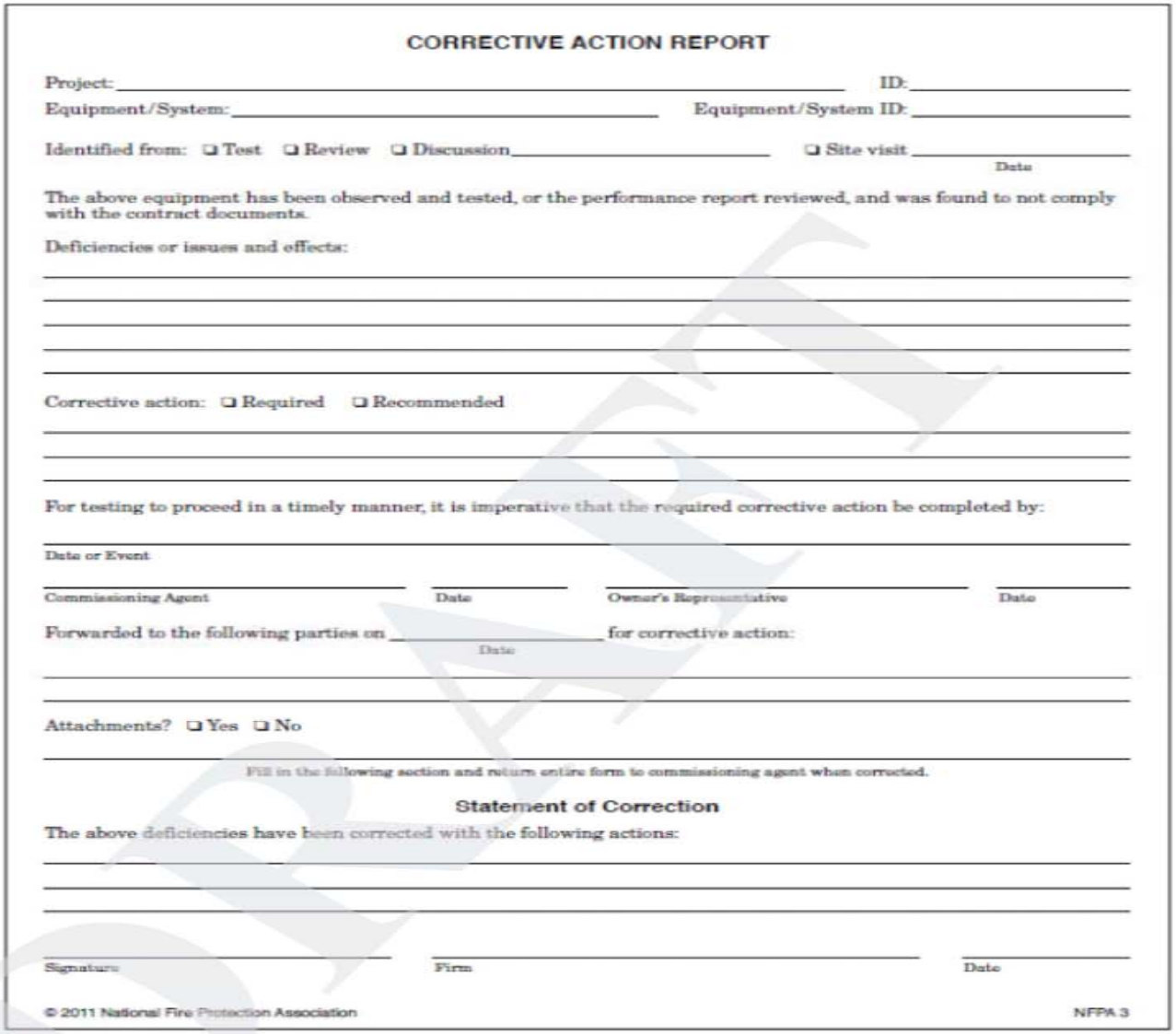
- Chapter 6 – Documentation
  - Minimum documentation required:
    - The summation shall include a statement that all input and output functions of the integrated system have been tested and operate as intended
    - The test report shall track and record all faults, failures, and discrepancies discovered in the issues log
    - The issues log shall list each fault separately and the corresponding resolution

COMMISSIONING ISSUES LOG

Project: _____ Prepared by: _____ Page _____ of _____

Attach additional pages as necessary for issues requiring more explanation and tracking.

#	Issue	Date Found	Code / Document Reference	Possible Cause	Recommendations	Actions Taken	O&M Doc. Issue?	Signature and Date



CORRECTIVE ACTION REPORT

Project: _____ ID: _____

Equipment/System: _____ Equipment/System ID: _____

Identified from: ❑ Test ❑ Review ❑ Discussion _____ ❑ Site visit _____
Date

The above equipment has been observed and tested, or the performance report reviewed, and was found to not comply with the contract documents.

Deficiencies or issues and effects:

_____

_____

_____

_____

_____

Corrective action: ❑ Required ❑ Recommended

_____

_____

_____

For testing to proceed in a timely manner, it is imperative that the required corrective action be completed by:

_____
Date or Event

_____ _____ _____ _____
Commissioning Agent Date Owner's Representative Date

Forwarded to the following parties on _____ for corrective action:
Date

_____

_____

Attachments? ❑ Yes ❑ No

_____

Fill in the following section and return entire form to commissioning agent when corrected.

Statement of Correction

The above deficiencies have been corrected with the following actions:

_____

_____

_____

_____ _____ _____
Signature Firm Date

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FIGURE 6.5.5(b) Corrective Action Report

Chapter Review

- Chapter 6 – Documentation
  - Minimum Completion Documentation required:
    - The ITa shall submit completion documentation to the owner and, where required, to other stakeholders
    - All minimum test documentation shall be included
    - A copy of the test plan shall be included
    - All documentation required by the integrated system design documentation, or by other governing laws, codes or standards, shall be included

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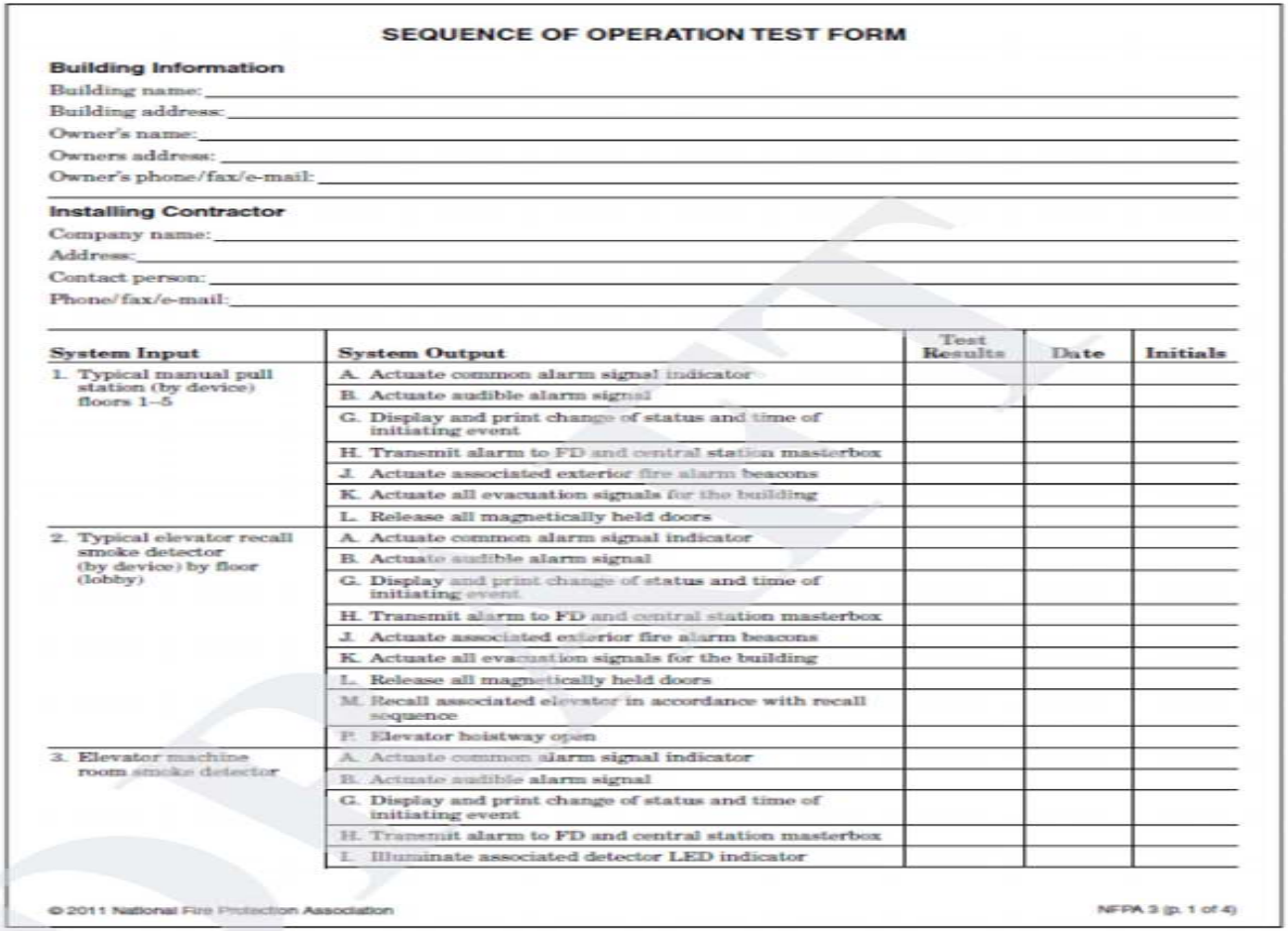

SEQUENCE OF OPERATION TEST FORM

Building Information

Building name: _____

Building address: _____

Owner's name: _____

Owners address: _____

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

Installing Contractor

Company name: _____

Address: _____

Contact person: _____

Phone/fax/e-mail: _____

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

FIGURE A.3.3.21(b) Sequence of Operation Form.

TESTING OF INTEGRATED FIRE AND LIFE SAFETY SYSTEMS
RECORD OF COMPLETION

(Draft Version 1.0)

This is to be completed by the designated Integrated Testing Agent (ITa), and/or the Enforcing Authority, following the completion of the testing of Integrated Fire and Life Safety Systems within the property listed below.

1. Property Information

Name of property:_____

Addresses covered by Integrated Systems:_____

Description of property:_____

Occupancy type:_____

Property owner name:_____

Address:_____

Phone:_____ Email:_____

Enforcing authority having jurisdiction over property:_____

Phone:_____ Email:_____

2. Integrated Systems Installed and Their Responsible Contractor Covered By This ROC

List each system installed within the building which is covered by this Record of Completion. (or mark N/A)

System 1: Fire Alarm System Contractor:_____ N/A ☐

System 2: Fire Sprinkler System Contractor:_____ N/A ☐

System 3: HVAC Contractor:_____ N/A ☐

System 4: Kitchen Fire Suppression System Contractor:_____ N/A ☐

System 5: Elevator Phase I/Power Shut Down Contractor:_____ N/A ☐

System 6:_____ Contractor:_____ N/A ☐

System 7:_____ Contractor:_____ N/A ☐

System 8:_____ Contractor:_____ N/A ☐

3. Individual System Testing Completion * *(See Annex for individual system documentation)*

It shall be verified that individual systems installed within the building and covered by this Record of Completion are tested in accordance with the applicable code or standard before Integrated Testing occurs.

System 1: Acceptance testing completed in accordance with NFPA 72? Yes ☐ No ☐

System 2: Fire Sprinkler System – Testing completed in accordance with NFPA____? Yes ☐ No ☐

System 3: HVAC System – Testing completed in accordance with _____? Yes ☐ No ☐

System 4: Kitchen F.S. System – Testing completed in accordance with NFPA _____? Yes ☐ No ☐

System 5: Phase I and Power Shut Down (If applicable) – Testing completed in accordance with ASME A17.1? Yes ☐ No☐

System 6: Tested in accordance with_____? Yes ☐ No ☐

System 7: Tested in accordance with_____? Yes ☐ No ☐

System 8: Tested in accordance with_____? Yes ☐ No ☐

4. Results of Integrated System Acceptance Testing * *(See Annex for Acceptance Testing Guidance)*

Document the testing of integrated systems by verifying if the operation of the integration systems occurred as designed, and/or as required by applicable codes and standards, and/ or as approved by the enforcing authority.

a. System ___ integrated with System ___ - Performed as required, designed and/or approved. Yes ☐ No ☐

b. System ___ integrated with System ___ - Performed as required, designed and/or approved. Yes ☐ No ☐

c. System ___ integrated with System ___ - Performed as required, designed and/or approved. Yes ☐ No ☐

d. System ___ integrated with System ___ - Performed as required, designed and/or approved. Yes ☐ No ☐

5. Certifications

Integrated fire and life safety systems listed in Section 2 have been satisfactorily proven to function as designed, required, and/or approved as indicated in Section 4.

Chapter Review

- Chapter 6 – Documentation
  - Record Retention, Record Maintenance:
    - The property or building, or system owner, or the owner's designated representative shall be responsible
    - Survivable paper or electronic media is permitted
    - Must be made available for examination by the AHJ

Chapter Review

- Chapter 6 – Documentation
  - Record Retention, Record Maintenance:
    - Initial Integrated System Test documentation shall be retained until new IIST documentation has been provided to the owner
    - Periodic Integrated System Test documentation shall be retained until the next PIST has been completed and the documentation is provided to the Owner

Chapter Review

- Chapter 6 – Documentation
  - Record Retention, Record Maintenance:
    - All required records shall be kept in one location
    - The location of the records shall be identified at the FACU

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Chapter Review

- Chapter 6 – Forms
  - Options:
    - Approved forms shall be used
    - Forms required by the AHJ may be used in place of the forms found in the standard if they include the minimum information found in the standard forms
    - Custom forms permitted if they include the minimum information

Where do we go from here?

- Closing of public comment period for the 2nd draft is May 3, 2013!
- Second Draft Meeting – Week of July 29, 2013, Indianapolis, IN
- Scheduled for Membership Acceptance at the June 2014 Annual Meeting in Las Vegas
- Tentative publish date Fall of 2014
- Would be a 2015 Edition (along with NFPA 3)

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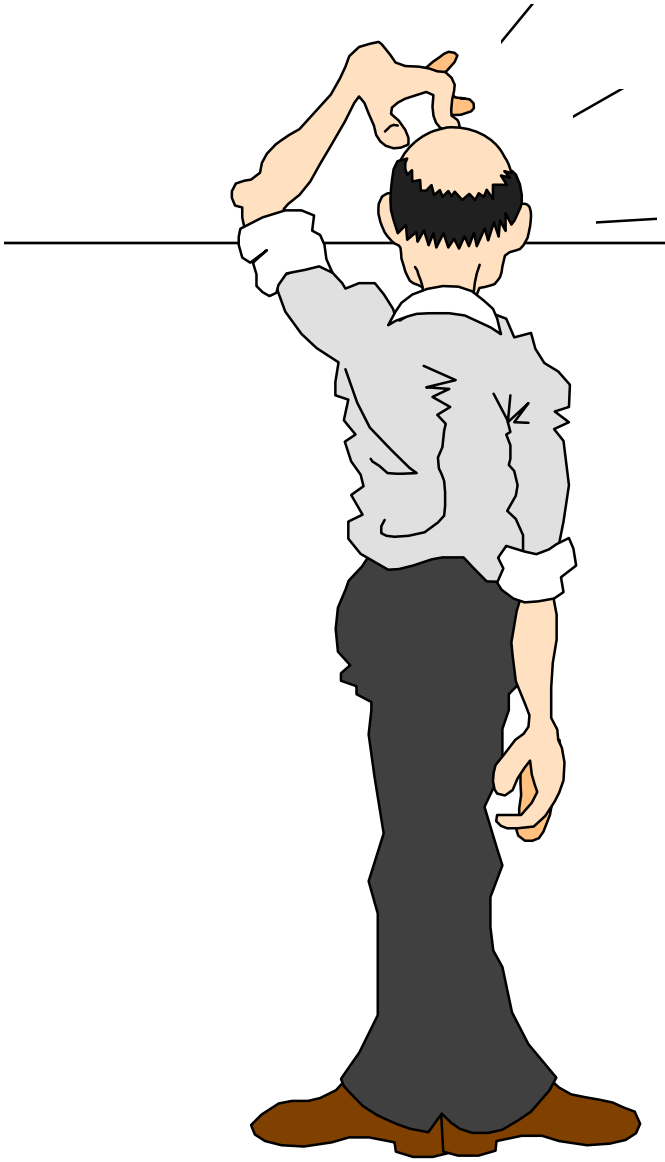

Questions?

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