NFPA 72 – Inspection and Testing Requirements for Fire Alarm Systems

Presented by
Brent Gooden, CET

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Agenda

- Module 1 – Inspection Requirements
- Module 2 – Testing Requirements
- Module 3 – Documentation Requirements
- Module 4 – Conducting Inspections and Testing

Module 1

Fire Alarm System Inspection Requirements
Fire Alarm System - Inspections

- 14.3 – Inspections
  - Inspection = A “visual” check of the system
  - Frequencies are as stated in Table 14.3.1
Fire Alarm System - Inspections

- 14.3 – Inspections
  - Inspections are permitted to be scheduled around scheduled shut downs if approved by the AHJ
  - Intervals may be extended up to 18 months
Fire Alarm System - Inspections

14.3 – Inspections

- The visual inspection shall ensure that there are no changes that affect equipment performance
- Inspection should take a “common sense” approach

Table 14.3.1 – Visual Inspection Frequencies
Module 2

Fire Alarm System Testing Requirements
Fire Alarm System - Testing

- 14.4 – Testing
  - Testing = A “functional” check of the system
Fire Alarm System - Testing

- 14.4 – Testing
  - Frequencies as stated in Table 14.4.5
### Fire Alarm System - Testing

- **14.4 – Testing**
  - Testing methods = Described in Table 14.4.2.2
Fire Alarm System - Testing

- **14.4 – Testing**
  - **14.4.1.1 – Initial Acceptance Testing**
  - New systems shall be inspected and tested
  - The AHJ shall be notified prior to initial acceptance testing
Fire Alarm System - Testing

14.4 – Testing

- 14.4.1.2 – Reacceptance Testing
- When an initiating device, notification appliance or control relay is added – functional test required
- When an initiating device, notification appliance or control relay is removed – functional test required on another device, appliance or relay on the circuit
Fire Alarm System - Testing

- 14.4 – Testing
  - 14.4.1.2 – Reacceptance Testing
  - Changes to site-specific software require:
    - 100% test of all functions known to be affected by the change
    - Additionally, 10% of initiating devices that are not directly affected by the change (up to 50 devices) shall be tested to verify correct system operation
    - Record of Completion shall be revised
Fire Alarm System - Testing

- 14.4.5.1 – Testing
  - Testing is permitted to be scheduled around scheduled shut downs if approved by the AHJ
  - Intervals may be extended up to 18 months

- Special Testing Requirements
  - 14.4.5.3 - Smoke detector sensitivity testing
    - Within 1 year after installation
    - Then check every other year; except…
    - After the second test if the detector is within its listed sensitivity range the frequency can be extended to 5 years
Fire Alarm System - Testing

- Special Testing Requirements
  - 14.4.5.3.4 - Smoke detector sensitivity testing methods
    - Calibrated test method
    - Manufacturer’s calibrated sensitivity test equipment
    - Listed control equipment that can perform sensitivity testing
    - Listed control equipment that warn of a detector outside of its listed range

Fire Alarm System - Testing

- Special Testing Requirements
  - 14.4.5.5 - Restorable fixed-temp heat detectors
    - 2 or more detectors shall be tested per initiating circuit
    - Different detectors shall be tested each year (records must be kept)
    - All detectors need to be tested within 5 years
Fire Alarm System - Testing

- Special Testing Requirements
  - Table 14.4.2.2(9d3) *Non-restorable* fixed-temp heat detectors
    - First test occurs at 15 years
    - Test 2 detectors per 100 at lab
    - Replace those detectors with new detectors
    - If the test detectors pass, repeat the process in 5 years
    - If the test detectors fail, test additional detectors
    - Test circuit mechanically and electrically

Module 3

Inspection and Testing Documentation Requirements
Documentation

- 901.6.2 – IFC Records Requirements
  - Inspection, testing and maintenance records required by the IFC must be maintained on the premises for 3 years
  - Shall be copied to the fire code official upon request

Documentation

- 901.6.2.1 – IFC Records Information
  - Initial records shall include:
    - Name of the installation contractor
    - Type of components installed and their quantities
    - Manufacturer of components
    - O & M manuals
    - Also would include NFPA 72 requirements
Documentation

- 14.6.2 – NFPA 72 Maintenance, Inspection, and Testing Records

  - Shall be retained until the next test and for 1 year thereafter
  - Where restorable FT heat are tested over multiple years the records shall be maintained for the 5 years of testing plus 1 year
  - Records shall be on any medium that will survive the retention period

![Fire Alarm and Emergency Communication System Inspection and Testing Form](image.png)

FIGURE 14.6.2-4 Example of an Inspection and Testing Form.
Module 4

Conducting Fire Alarm System Inspections and Testing
Final Acceptance Inspection/Testing

- Begin with a process
  - Taking the inspection/testing request
  - Who needs to be present
  - What tools are needed
  - Personnel needed
  - Test forms
  - What to look for

- Taking the inspection/testing request
  - Who will you accept the request from
    - Building owner
    - General contractor
    - Fire alarm contractor
Final Acceptance Inspection/Testing

- Taking the inspection/testing request
  - What to ask the caller
    - Has the fire alarm system passed a 100% pre-test
  - Are all emergency control functions working
Final Acceptance Inspection/Testing

- Taking the inspection/testing request
  - What to ask the caller
    - Has the fire alarm system passed a 100% pre-test
    - Are all emergency control functions working
    - Will all contractors be available and present

  - Are “As-Built” plans and specifications complete and on the site
Final Acceptance Inspection/Testing

- Taking the inspection/testing request
  - What to ask the caller
    - Has the fire alarm system passed a 100% pre-test
    - Are all emergency control functions working
    - Will all contractors be available and present
    - Are “As-Built” plans and specifications complete and on the site
    - Are O & M manuals ready

- Taking the inspection/testing request
  - What to ask the caller
    - Is the Record of Completion filled out
Final Acceptance Inspection/Testing

- Taking the inspection/testing request
  - What to ask the caller
    - Is the Record of Completion filled out
    - Is the supervising station connection complete
    - Anything else you might require
Final Acceptance Inspection/Testing

- Begin with a process
  - Who needs to be present
    - Obviously, the AHJs
    - Fire, electrical, elevator, mechanical inspectors
    - Fire alarm contractor
    - Sprinkler contractor
    - Mechanical contractor
    - Elevator contractor
    - General contractor

- Begin with a process
  - What tools are needed
    - Portable radios
    - Canned smoke
    - Manometer
    - Flashlight
    - Other equipment required by the manufacturer’s published testing instructions
Final Acceptance Inspection/Testing

- Begin with a process
  - What tools are needed
    - Plan review report
    - Approved plans and/or “As-Builts”
    - Approved specifications
    - Approved calculations (NAC, Secondary Power)

- Begin with a process
  - Personnel needed
    - Usually 1 AHJ per applicable discipline
    - Minimum of 1 fire alarm contractor, but 2 desirable
    - Usually 1 contractor rep for each discipline connected to the fire alarm system
      - Sprinkler contractor
      - Elevator contractor
      - Mechanical contractor
      - Special suppression system contractor
Final Acceptance Inspection/Testing

- Begin with a process
  - Test forms
    - Inspection check list
    - Violations or inspection report

Acceptance Test Checklist
Final Acceptance Inspection/Testing

- Begin with a process
  - What to look for: General
    ✓ Test all equipment according to the manufacturer’s published instructions (MPI)
    ✓ Also test according to Table 14.4.2.2, Test Methods
    ✓ Test 100% of the system
    ✓ Visually check overall workmanship

- Begin with a process
  - What to look for: General
    ✓ The contractor does the testing
    ✓ Equipment installed needs to match approved plans, specifications, or “As-Built”
    ✓ Take system “off-line” with Supervising Station and return to “on-line” when completed
Final Acceptance Inspection/Testing

- Begin with a process
  - What to look for: Control equipment
    - Fire alarm control unit
    - Remote power supplies
    - Transponders

- Is the system programmed correctly to report accurate addresses or zones
Final Acceptance Inspection/Testing

- Begin with a process
  - What to look for: Control equipment
    - Is the system programmed correctly to report accurate addresses or zones
    - Does the system properly annunciate alarm, supervisory and trouble conditions locally
    - Does the panel annunciate an alarm or supervisory condition within 10 seconds and trouble conditions within 200 seconds
Final Acceptance Inspection/Testing

- Begin with a process
  - What to look for: Control equipment
    - Is the system programmed correctly to report accurate addresses or zones
    - Does the system properly annunciate alarm, supervisory and trouble conditions locally
    - Does the panel annunciate an alarm or supervisory condition within 10 seconds and trouble conditions within 200 seconds
    - Do all lamps and LEDs function

Final Acceptance Inspection/Testing

- Begin with a process
  - What to look for: Power supply and batteries
    - Is the primary power supply on its own dedicated and labeled circuit
Final Acceptance Inspection/Testing

- Begin with a process
  - What to look for: Power supply and batteries
    - Are power supplies on their own dedicated and labeled circuits
    - Are the circuits provided with a lock-out
Final Acceptance Inspection/Testing

- Begin with a process
  - What to look for: Power supply and batteries
    - Does the disconnection of the AC (with batteries connected) result in a trouble signal
    - Does the disconnection of the batteries (with AC turned on) result in a trouble signal
Final Acceptance Inspection/Testing

- Begin with a process
  - What to look for: Power supply and batteries
    - Does the disconnection of the AC (w/batteries connected) result in a trouble signal
    - Does the disconnection of the batteries (w/AC turned on) result in a trouble signal
    - Is the control unit programmed to delay an AC power loss signal transmission for 60 – 180 minutes to the supervising station

- Begin with a process
  - What to look for: Power supply and batteries
    - Does the system operate properly under full load with the AC power disconnected (run only on batteries)
    - Run under full load for a minimum of 5 minutes when general evacuation will occur
    - Or, 15 minutes if partial evacuation or relocation will occur (EVAC provided)
Final Acceptance Inspection/Testing

- Begin with a process
  - What to look for: Power supply and batteries
    - Does the system operate properly under full load with the batteries disconnected

- Begin with a process
  - What to look for: Power supply and batteries
    - If an automatic starting generator is supplying power to the fire alarm system, does it do so as designed
Final Acceptance Inspection/Testing

- Begin with a process
  - What to look for: Power supply and batteries
    - Do the batteries include a month/date of manufacture (not the install date)
    - 2010 edition and older (5 year maximum life)
    - 2013 and newer editions (no maximum life)

- Remote annunciators
  - Located where approved for beneficial fire department use
Final Acceptance Inspection/Testing

- Begin with a process
  - What to look for: Remote annunciators
    - Located where approved for beneficial fire department use
    - Does it operate correctly

- Begin with a process
  - What to look for: Conductors (Metallic)
    - Stray voltage
    - Ground faults
    - Short-circuit faults
    - Loop resistance
Final Acceptance Inspection/Testing

- Begin with a process
  - What to look for: Conductors (Metallic)
    - Supervision – open at least 10% of devices, appliances and control devices on IDCs, SLCs and NACs and check for trouble signals
    - Verify that the correct wiring type(s) and size(s) are used (i.e. plenum or riser were required, in conduit, outside, 14g – 18g)
Final Acceptance Inspection/Testing

- Begin with a process
  - What to look for: Conductors (Metallic)
    - Supervision – open at least 10% of devices, appliances and control devices on IDCs, SLCs and NACs and check for trouble signals
    - Verify that the correct wiring type(s) and size(s) are used (i.e. plenum or riser were required, in conduit, outside, 14g – 18g)
    - Verify that wiring is supported independent of other wiring or equipment

- Begin with a process
  - What to look for: Initiating devices – Smoke
    - Smoke detectors are tested with smoke or a listed aerosol
    - Duct smoke detectors with pick-up tubes also are tested using a manometer
    - Projected beam detectors typically use a filter card or test buttons on the device
Final Acceptance Inspection/Testing

- Begin with a process
  - What to look for: Initiating devices - Heat
    - Important to follow MPI as incorrect testing can damage device (example: can you use a heat source and what type is recommended)
    - 2 per circuit rule does not apply for initial acceptance testing
    - For line-type heat detection follow MPI

Final Acceptance Inspection/Testing

- Begin with a process
  - What to look for: Initiating devices – Manual fire alarm boxes
    - Physically activate the box
Final Acceptance Inspection/Testing

- Begin with a process
  - What to look for: Initiating devices – Other detection (i.e. flame, spark/ember, video)
    - Follow MPI

- Begin with a process
  - What to look for: Initiating devices – Waterflows
    - Verify receipt of waterflow activation in not more than 90 seconds from waterflow equal to the smallest sprinkler on the system
Final Acceptance Inspection/Testing

- Begin with a process
  - What to look for: Initiating devices – Supervisory devices (i.e. valve supervision, low/high air, low temp, low water)
    - Devices shall be operated to verify receipt of a supervisory signal as intended
  - Testing is functional, but may need simulation
    - Valve supv. - Fully close control valve
    - Air pressure supv. - Lower/raise air pressure
    - Room/water temp supv. – Lower room/water temp or simulate
    - Water level supv. – Raise/lower water in tank
Final Acceptance Inspection/Testing

- Begin with a process
  - What to look for: Emergency control functions (i.e. Elevator recall, shunt trip, HVAC shutdown)
    - Verify operation of ECF when initiating device responsible for the ECF activation is operated

Final Acceptance Inspection/Testing

- Begin with a process
  - What to look for: Notification appliances and emergency communication systems
    - Audible
    - Textual audible
    - Visible
Final Acceptance Inspection/Testing

- Begin with a process
  - What to look for: Notification appliances and emergency communication systems
    - Audible
      - Verify correct dBA reading with Type 2 sound meter

Final Acceptance Inspection/Testing

- Begin with a process
  - What to look for: Notification appliances and emergency communication systems
    - Audible
      - Verify correct dBA reading with Type 2 sound meter
      - Required throughout all areas of the building with the exception of: Elevators, stairways, exit access ways (permitted but not required)
Final Acceptance Inspection/Testing

- Begin with a process
  - What to look for: Notification appliances and emergency communication systems
    - Audible
      - Verify correct dBA reading with Type 2 sound meter
      - Required throughout all areas of the building with the exception of: Elevators, stairways, exit access ways
      - Must exceed average ambient (and maximum noise lasting at least 60 seconds) as required for public or private mode
      - Must be a minimum of 75 dBA in sleeping rooms at the pillow
Final Acceptance Inspection/Testing

- Begin with a process
  - What to look for: Notification appliances and emergency communication systems
    - Textual Audible
      - Verify correct alert tone dBA reading with Type 2 sound meter
      - Verify intelligibility throughout all required areas (quantitative measurement not required)
Final Acceptance Inspection/Testing

- Begin with a process
  - What to look for: Notification appliances and emergency communication systems
    - Textual Audible
      - Verify correct alert tone dBA reading with Type 2 sound meter
      - Verify intelligibility throughout all required areas
      - Required throughout all areas of the building with the exception of: Elevators, stairways, exit access ways (permitted but not required – exception manual voice)

- Alert tone must exceed average ambient (and maximum noise lasting at least 60 seconds) as required for public or private mode
Final Acceptance Inspection/Testing

- Begin with a process
  - What to look for: Notification appliances and emergency communication systems
    - Visible
      - Verify correct candela setting on all appliances
Final Acceptance Inspection/Testing

- Begin with a process
  - What to look for: Notification appliances and emergency communication systems
    - Visible
      - Verify correct candela setting on all appliances
      - Verify that each NAC circuit has the number of appliances on it that were proposed in the calculations
      - Required throughout all areas of the building with the exception of: Elevators, stairways, exit access ways, individual offices and other areas permitted by the IAC/ADA
    - Verify that the strobe flashes
Final Acceptance Inspection/Testing

- Begin with a process
  - What to look for: Notification appliances and emergency communication systems
    - Visible
      - Verify correct candela setting on all appliances
      - Verify that each NAC circuit has the number of appliances on it that were proposed in the calculations
      - Required throughout all areas of the building with the exception of: Elevators, stairways, exit access ways
      - Verify that the strobe flashes
      - Verify synchronization where more than two visible appliances are in the field of view

Final Acceptance Inspection/Testing

- Begin with a process
  - What to look for: Supervising station transmitters
    - Testing is dependent on the transmitter type(s)
Final Acceptance Inspection/Testing

- Begin with a process
  - What to look for: Supervising station transmitters
    - Testing is dependent on the transmitter type(s)
    - Verify signals received at the SS within 90 seconds of transmitter sending successful signal

- Verify correct account information (i.e. address, business name, fire department contact number)
Final Acceptance Inspection/Testing

- Begin with a process
  - What to look for: Supervising station transmitters
    - Performance-based technologies
      - IP Communicators
      - GSM radios
      - Direct connect phones lines
      - Refer to performance requirements found in Chapter 26

Final Acceptance Inspection/Testing

- Begin with a process
  - What to look for: Supervising station transmitters
    - Performance-based technologies
      - Single and multiple technologies have different loss of communication path requirements
      - IP Communicators require secondary power on all communications equipment within the building that the signal may pass-through until it leaves the building (i.e. routers, modems, LANs)
Final Acceptance Inspection/Testing

- Begin with a process
  - What to look for: Supervising station transmitters
    - DACT (Digital Alarm Communicating Transmitter)
      - Test required of both means of transmission (usually two phone lines)
      - Verify loss of each transmission path
      - Verify that signals can transmit across the surviving transmission path

- Begin with a process
  - What to look for: Supervising station transmitters
    - Private One-Way Radios (i.e. Keltron, AES)
      - Verify availability of a minimum of two signal paths to the Supervising Station
      - Verify radio trouble signals (i.e. low battery, supervision, connection between radio/FACU)
Final Acceptance Inspection/Testing

- Begin with a process
  - What to look for: Documentation
    - Record of completion
    - Letter stating system was installed according to NFPA 72, Manufacturer’s Published Instructions, Approved Plans
Final Acceptance Inspection/Testing

- Begin with a process
  - What to look for: Documentation
    - Record of completion
    - Letter stating system was installed according to NFPA 72, Manufacturer’s Published Instructions, Approved Plans
    - O & M manuals for the owner
  - Copy of site specific-software for the owner
Final Acceptance Inspection/Testing

- Begin with a process
  - What to look for: Documentation
    - Record of completion
    - Letter stating system was installed according to NFPA 72, Manufacturer’s Published Instructions, Approved Plans
    - O & M manuals for the owner
    - Copy of site specific-software for the owner
    - Your inspection report

- As-Built” plans, specifications, calculations
Questions?

Brent Gooden
847-697-1300
bgooden@firesafetyfsci.com
info@firesafetyfsci.com