

# NFPA 72 –Inspection and Testing Requirements for Fire Alarm Systems

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Disclaimer: The comments and opinions made during the presentation 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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# Agenda

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



# Module 1

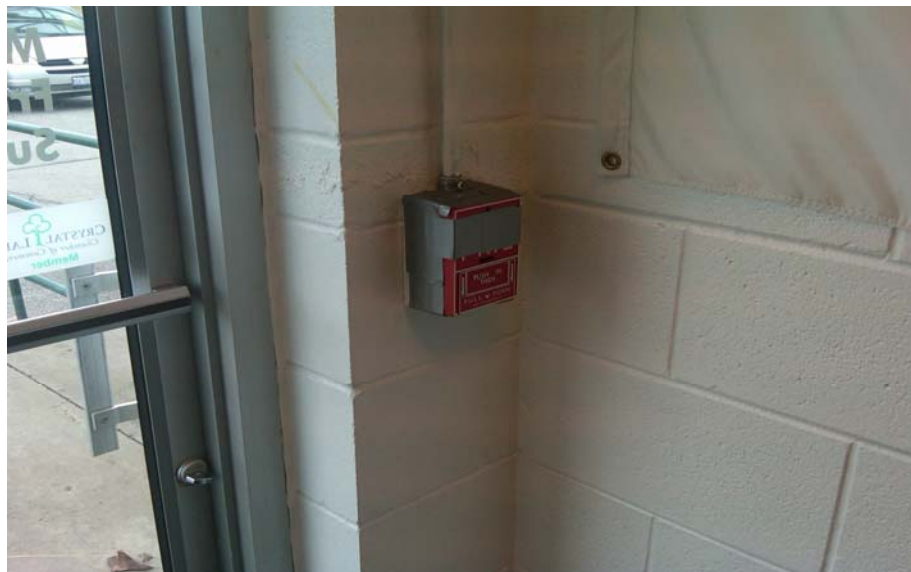
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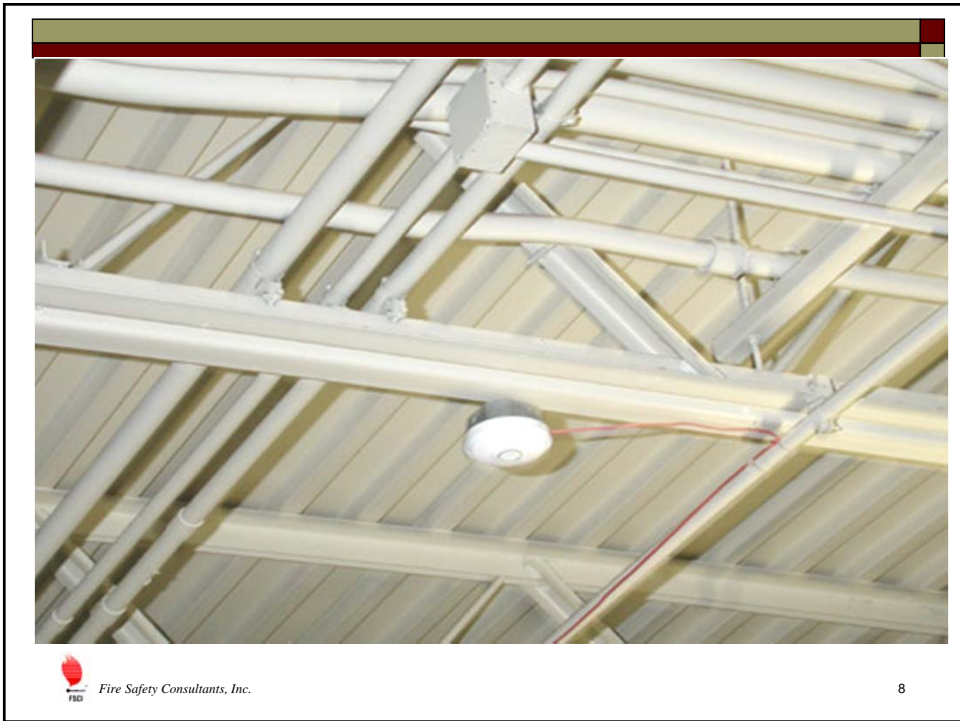
## Fire Alarm System Inspection Requirements



## Fire Alarm System - Inspections

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







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## Fire Alarm System - Inspections

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- 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



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## 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



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## Fire Alarm System - Inspections

- Table 14.3.1 – Visual Inspection Frequencies



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Table 14.5.1 Visual Inspection Frequencies

Component	Initial/ Reacceptance	Monthly	Quarterly	Semiannually	Annually
1. Control equipment: fire alarm systems monitored for alarm, supervisory, and trouble signals					
(a) Fuses	XXXX	—	—	—	XXXX
(b) Interfaced equipment	—	—	—	—	—
(c) Lamps and LEDs	—	—	—	—	—
(d) Primary (main) power supply	—	—	—	—	—
2. Control equipment: fire alarm systems unmonitored for alarm, supervisory, and trouble signals					
(a) Fuses	XXXX (weekly)	—	—	—	—
(b) Interfaced equipment	XXXX (weekly)	—	—	—	—
(c) Lamps and LEDs	XXXX (weekly)	—	—	—	—
(d) Primary (main) power supply	—	—	—	—	—
3. Batteries					
(a) Lead-acid	XXXX	X X	—	—	—
(b) Nickel-cadmium	—	—	—	—	—
(c) Primary (dry cell)	—	—	—	—	—
(d) Sealed lead-acid	—	—	—	X X	—
4. Transient suppressors	X	—	—	X	—
5. Fire alarm control unit trouble signals	X (weekly)	—	—	X	—
6. Fiber-optic cable connections	X	—	—	—	X
7. In-building fire emergency voice/alarm communications equipment	X	—	—	X	—
8. Remote annunciators	X	—	—	X	—
9. Initiating devices					
(a) Air sampling	X	—	—	—	—
(b) Inert detectors	X	—	—	—	—
(c) Electromechanical releasing devices	X	—	—	—	—
(d) Fire extinguishing system(s) or suppression system(s) switches	X	—	—	X	—
(e) Manual fire alarm boxes	X	—	—	X	—
(f) Heat detectors	X	—	—	X	—
(g) Radiant energy fire detectors	X	—	X	X	—
(h) Smoke detectors (excluding one- and two-family dwellings)	X	—	—	X	—
(i) Supervisory signal devices	X	—	X	—	—
(j) Waterflow devices	X	—	X	—	—



## Module 2

### Fire Alarm System Testing Requirements



## Fire Alarm System - Testing

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







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## Fire Alarm System - Testing

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- 14.4 – Testing
  - Frequencies as stated in Table 14.4.5



Table 14.4.5 Testing Frequencies

Component	Initial/ Reacceptance	Monthly	Quarterly	Semiannually	Annually	Table 14.4.2.2 Reference
1. Control equipment — building systems connected to supervising station						1, 7, 18, 19
(a) Functions	XXXXXX	—	—	—	XXXXXX	—
(b) Fuses	—	—	—	—	—	—
(c) Interfaced equipment	—	—	—	—	—	—
(d) Lamps and LEDs	—	—	—	—	—	—
(e) Primary (main) power supply	XXXXXX	—	—	—	XXXXXX	—
(f) Transponders	—	—	—	—	—	—
2. Control equipment — building systems not connected to a supervising station						1
(a) Functions	XXXXXX	—	XXXXXX	—	—	—
(b) Fuses	—	—	—	—	—	—
(c) Interfaced equipment	—	—	—	—	—	—
(d) Lamps and LEDs	—	—	—	—	—	—
(e) Primary (main) power supply	XXXXXX	—	XXXXXX	—	—	—
(f) Transponders	—	—	—	—	—	—
3. Engine-driven generator — central station facilities and fire alarm systems	X	X	—	—	—	—
4. Engine-driven generator — public emergency alarm reporting systems	X (weekly)	—	—	—	—	—
5. Batteries — central station facilities						
(a) Lead-acid type						
(1) Charger test (Replace battery as needed.)	X	—	—	—	X	6b
(2) Discharge test (30 minutes)	X	X	—	—	—	—
(3) Load voltage test (4) Specific gravity	X	X	—	—	—	—
(b) Nickel-cadmium type						
(1) Charger test (Replace battery as needed.)	X	—	X	X	—	6c
(2) Discharge test (30 minutes)	X	X	—	—	—	—
(3) Load voltage test (4) Sealed lead-acid type	X	X	—	—	X	6d
(1) Charger test (Replace battery within 5 years after manufacture or more frequently as needed.)	X	X	X	—	—	—
(2) Discharge test (30 minutes)	X	X	—	—	—	—
(3) Load voltage test	X	X	—	—	—	—
6. Batteries — fire alarm systems						
(a) Lead-acid type						
(1) Charger test (Replace battery as needed.)	X	—	—	—	X	6b
(2) Discharge test (30 minutes)	X	—	—	X	—	—
(3) Load voltage test (4) Specific gravity	X	—	—	X	—	—

(continues)

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## Fire Alarm System - Testing

- 14.4 – Testing
  - Testing methods = Described in Table 14.4.2.2



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Table 14.4.2.2 Test Methods

Device	Method
1. Control equipment	At a minimum, control equipment shall be tested to verify correct receipt of alarm, supervisory, and trouble signals (inputs); operation of evacuation signals and auxiliary functions (outputs); circuit supervision, including detection of open circuits and ground faults; and power supply supervision for detection of loss of ac power and disconnection of secondary batteries. The rating and supervision shall be verified. Integrity of single or multiple circuits providing interface between two or more control units shall be verified. Interfaced equipment connections shall be tested by operating or simulating operation of the equipment being supervised. Signals required to be transmitted shall be verified at the control unit. Lamps and LEDs shall be illuminated. All secondary (standby) power shall be disconnected and tested under maximum load, including all alarm appliances requiring simultaneous operation. All secondary (standby) power shall be reconnected at end of test. For redundant power supplies, each shall be tested separately.
(a) Functions	
(b) Fuses	
(c) Interfaced equipment	
(d) Lamps and LEDs	Lamps and LEDs shall be illuminated. All secondary (standby) power shall be disconnected and tested under maximum load, including all alarm appliances requiring simultaneous operation. All secondary (standby) power shall be reconnected at end of test. For redundant power supplies, each shall be tested separately.
(e) Primary (main) power supply	
2. Engine-driven generator	If an engine-driven generator dedicated to the system is used as a required power source, operation of the generator shall be verified in accordance with NFPA 110, <i>Standard for Emergency and Standby Power Systems</i> , by the building owner.
3. Secondary (standby) power supply*	All primary (main) power supplies shall be disconnected, and the occurrence of required trouble indication for loss of primary power shall be verified. The system's standby and alarm current demand shall be measured or verified, and, using manufacturer's data, the ability of batteries to meet standby and alarm requirements shall be verified. General alarm systems shall be operated for a minimum of 5 minutes, and emergency voice communications systems for a minimum of 15 minutes. Primary (main) power supply shall be reconnected at end of test.
4. Uninterrupted power supply (UPS)	If a UPS system dedicated to the system is used as a required power source, operation of the UPS system shall be verified by the building owner in accordance with NFPA 111, <i>Standard on Stored Electrical Energy Emergency and Standby Power Systems</i> .
5. Batteries—general tests	Prior to conducting any battery testing, the person conducting the test shall ensure that all system software stored in volatile memory is protected from loss.
(a) Visual inspection	Batteries shall be inspected for corrosion or leakage. Tightness of connections shall be checked and ensured. If necessary, battery terminals or connections shall be cleaned and coated. Electrolyte level in lead-acid batteries shall be visually inspected.
(b) Battery replacement	Batteries shall be replaced in accordance with the recommendations of the alarm equipment manufacturer or when the recharged battery voltage or current falls below the manufacturer's recommendations.
(c) Charger test	Operation of battery charger shall be checked in accordance with charger test for the specific type of battery.
(d) Discharge test	With the battery charger disconnected, the batteries shall be load tested following the manufacturer's recommendations. The voltage level shall not fall below the levels specified.
(e) Load voltage test	<i>Exception: An artificial load equal to the full fire alarm load connected to the battery shall be permitted to be used in conducting this test.</i> With the battery charger disconnected, the terminal voltage shall be measured while supplying the maximum load required by its application. The voltage level shall not fall below the levels specified for the specific type of battery. If the voltage falls below the level specified, corrective action shall be taken and the batteries shall be retested.
	<i>Exception: An artificial load equal to the full fire alarm load connected to the battery shall be permitted to be used in conducting this test.</i>



## 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

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- 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

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- 14.4 – Testing
  - 14.4.1.2 – Reacceptance Testing
  - Modifications or repairs to control equipment hardware require testing according to Table 14.4.2.2 (1a and 1d)



## 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 – Testing
  - 14.4.1.2 – Reacceptance Testing
  - Changes to control units connected or controlled by the system executive software:
    - ✓ Functional test of 10% of the system including a test of at least one device per input/output circuit
    - ✓ Verify critical functions including notification appliances, control functions, and off-premise signaling

## Fire Alarm System - Testing

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- 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



## Fire Alarm System - Testing

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- 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



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## 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



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## Fire Alarm System - Testing

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- 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

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- 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

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- 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

*To be completed by the system inspector or tester at the time of the inspection or test. It shall be permitted to modify this form as needed to provide a more complete and/or clear record. Attach additional sheets, data, or calculations as necessary to provide a complete record.*

Date of this inspection or test: \_\_\_\_\_ Time of inspection or test: \_\_\_\_\_

#### 1. PROPERTY INFORMATION

Name of property: \_\_\_\_\_

Address: \_\_\_\_\_

Description of property: \_\_\_\_\_

Occupancy type: \_\_\_\_\_

Name of property representative: \_\_\_\_\_

Address: \_\_\_\_\_

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_ E-mail: \_\_\_\_\_

Authority having jurisdiction over this property: \_\_\_\_\_

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_ E-mail: \_\_\_\_\_

#### 2. INSTALLATION, SERVICE, AND TESTING CONTRACTOR INFORMATION

Service and/or testing organization for this equipment: \_\_\_\_\_

Address: \_\_\_\_\_

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_ E-mail: \_\_\_\_\_

Service technician or tester: \_\_\_\_\_

Qualifications of technician or tester: \_\_\_\_\_

A contract for test and inspection in accordance with NFPA standards is in effect as of: \_\_\_\_\_

The contract expires: \_\_\_\_\_ Contract number: \_\_\_\_\_ Frequency of tests and inspections: \_\_\_\_\_

Monitoring organization for this equipment: \_\_\_\_\_

Address: \_\_\_\_\_

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_ E-mail: \_\_\_\_\_

Entity to which alarms are retransmitted: \_\_\_\_\_ Phone: \_\_\_\_\_

#### 3. TYPE OF SYSTEM OR SERVICE

Fire alarm system (nonvoice)

Fire alarm with in-building fire emergency voice alarm communication system (EVACS)

Mass notification system (MNS)

Combination system, with the following components:

Fire alarm  EVACS  MNS  Two-way, in-building, emergency communication system

Other (specify): \_\_\_\_\_

FIGURE 14.6.2.4 Example of an Inspection and Testing Form.



**FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM RECORD OF COMPLETION**

*To be completed by the system installation contractor at the time of system acceptance and approval. It shall be permitted to modify this form as needed to provide a more complete and/or clear record. Insert N/A in all unused lines.*

*Attach additional sheets, data, or calculations as necessary to provide a complete record.*

**1. PROPERTY INFORMATION**

Name of property: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 Description of property: \_\_\_\_\_  
 Occupancy type: \_\_\_\_\_  
 Name of property representative: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 Phone: \_\_\_\_\_ Fax: \_\_\_\_\_ E-mail: \_\_\_\_\_  
 Authority having jurisdiction over this property: \_\_\_\_\_  
 Phone: \_\_\_\_\_ Fax: \_\_\_\_\_ E-mail: \_\_\_\_\_

**2. INSTALLATION, SERVICE, AND TESTING CONTRACTOR INFORMATION**

Installation contractor for this equipment: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 License or certification number: \_\_\_\_\_  
 Phone: \_\_\_\_\_ Fax: \_\_\_\_\_ E-mail: \_\_\_\_\_  
 Service organization for this equipment: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 License or certification number: \_\_\_\_\_  
 Phone: \_\_\_\_\_ Fax: \_\_\_\_\_ E-mail: \_\_\_\_\_  
 A contract for test and inspection in accordance with NFPA standards is in effect as of \_\_\_\_\_  
 Contracted testing company: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 Phone: \_\_\_\_\_ Fax: \_\_\_\_\_ E-mail: \_\_\_\_\_  
 Contract expires: \_\_\_\_\_ Contract number: \_\_\_\_\_ Frequency of routine inspections: \_\_\_\_\_

**3. DESCRIPTION OF SYSTEM OR SERVICE**

- Fire alarm system (nonvoice)
- Fire alarm with in-building fire emergency voice alarm communication system (EVACS)
- Mass notification system (MNS)
- Combination system, with the following components:
  - Fire alarm  EVACS  MNS  Two-way, in-building, emergency communication system
- Other (specify): \_\_\_\_\_

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FIGURE 10.18.2.1.1 Record of Completion.

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# Module 4

## Conducting Fire Alarm System Inspections and Testing



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## 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



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## Final Acceptance Inspection/Testing

- Taking the inspection/testing request
  - Who will you accept the request from
    - ✓ Building owner
    - ✓ General contractor
    - ✓ Fire alarm contractor



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## Final Acceptance Inspection/Testing

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- Taking the inspection/testing request
  - What to ask the caller
    - ✓ Has the fire alarm system passed a 100% pre-test



## Final Acceptance Inspection/Testing

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- 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

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- 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



## Final Acceptance Inspection/Testing

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- 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

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- 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



## Final Acceptance Inspection/Testing

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- Taking the inspection/testing request
  - What to ask the caller
    - ✓ Is the Record of Completion filled out





## Final Acceptance Inspection/Testing

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- Taking the inspection/testing request
  - What to ask the caller
    - ✓ Is the Record of Completion filled out
    - ✓ Is the supervising station connection complete



## Final Acceptance Inspection/Testing

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- 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

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- 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



## Final Acceptance Inspection/Testing

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- 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

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



## Final Acceptance Inspection/Testing

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- 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

Property Name: \_\_\_\_\_ Date: \_\_\_\_\_  
 Address: \_\_\_\_\_ Co. performing test \_\_\_\_\_  
 AHJ witnessing test \_\_\_\_\_

#### Y N I. NOTIFICATION OF TESTING

- Fire Department Dispatch
- Building Occupants
- Monitoring Facility if monitored off-premises (after verification of acceptable call back)

#### Y N II. CONTROL UNIT TEST

1. Location of Record (As-Built) Drawings.
  - Zone indicators labeled properly?
  - Smoke detector protecting the control unit? (if not in a constantly attended area) (Use heat detector if ambient conditions do not allow use of smoke detector)
2. Panel in normal condition.
  - Power indicator on.
  - No trouble or alarm indicators on.
3. Operate the lamp test switch.
  - All indicators on.
4. Check for ground fault indication – contractor to connect a jumper from an initiating or signaling line circuit to ground [conduit, system cabinet, etc.].
  - Ground fault indicator on (if applicable).
5. Contractor trips main breaker to disconnect AC power.
  - Location of breaker is indicated at control unit.
  - Power indicator off.
  - Audible and Visual trouble indicators on.
6. Operate trouble silence switch.
  - Audible trouble sounder silences.
  - Visual trouble indicator stays on.

#### Y N

7. Restore normal power.
  - Power indicator on.
  - Audible and visual trouble indicators off.
8. Battery verification.
  - Batteries dated.
  - Batteries same rating (or larger) as battery calculations in Record of Completion.
  - Battery location recorded at control (if located remote from control).
9. Contractor disconnects battery lead.
  - Audible and Visual trouble indicators on.
  - Reconnect batteries.
10. Contractor initiates an alarm from any device in the system.
  - Alarm sounds.
  - Proper identification of actuated device.
11. Operate alarm silence switch.
  - Alarms silence.
  - Zone light or display stays on.
12. Contractor initiates another alarm from a device on a different initiating device circuit.
  - Alarms resound.
13. Reset devices and operate system reset switch.
  - System resets.
  - Trouble indicators activate until alarm silence switch is returned to normal.



## Final Acceptance Inspection/Testing

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- 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



## Final Acceptance Inspection/Testing

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- 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

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



## Final Acceptance Inspection/Testing

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- Begin with a process
  - What to look for: Control equipment
    - ✓ Is the system programmed correctly to report accurate addresses or zones



## Final Acceptance Inspection/Testing

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- 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



## Final Acceptance Inspection/Testing

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- 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

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- 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

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- 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

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- 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

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- 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
    - ✓ Are the provided batteries based on approved calculations



## Final Acceptance Inspection/Testing

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- 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



## Final Acceptance Inspection/Testing

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- 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



## Final Acceptance Inspection/Testing

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- **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



## 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 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



## Final Acceptance Inspection/Testing

---

- 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)



## Final Acceptance Inspection/Testing

- Begin with a process
  - What to look for: 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

## Final Acceptance Inspection/Testing

---

- 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



## 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



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## Final Acceptance Inspection/Testing

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- 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



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## 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



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## Final Acceptance Inspection/Testing

- 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



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## Final Acceptance Inspection/Testing

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- 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



## 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)
    - ✓ 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

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- 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



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## Final Acceptance Inspection/Testing

---

- Begin with a process
  - What to look for: Notification appliances and emergency communication systems
    - ✓ Audible
    - ✓ Textual audible
    - ✓ Visible



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## 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



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## 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)



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## 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



## 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



## 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)



## 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
      - ✓ 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

## 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



## 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

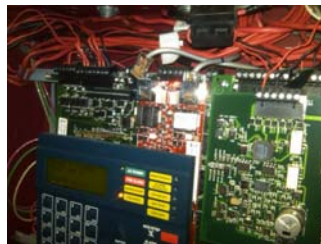


## Final Acceptance Inspection/Testing

- 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



## 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

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- 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

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- 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

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- 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



## Final Acceptance Inspection/Testing

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- 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

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- Begin with a process
  - What to look for: Documentation
    - ✓ Record of completion

## 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



## 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



## 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?

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