OBJECTIVE

• Provide an overview of the inspection, testing, and maintenance requirements for
  ▪ Fire alarm systems
  ▪ Automatic sprinkler systems

• Emphasize differences between current editions of NFPA standards and those referenced by TJC
INSPECTION, TESTING, AND MAINTENANCE OF FIRE PROTECTION SYSTEMS

NFPA 72®
2010 EDITION
NATIONAL FIRE ALARM and SIGNALING CODE

NFPA 25
2011 edition
Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems
THE OWNER’S RESPONSIBILITY

• The owner is responsible for all inspection, testing, and maintenance procedures
  ▪ BE CAREFUL WITH YOUR CONTRACT LANGUAGE

• The owner may delegate the authority for the inspection, testing, and maintenance of the fire protection systems

• The designated representative must comply with all requirements identified for the owner
QUALIFICATIONS (PER NFPA 72)

• Service personnel shall be qualified
• Qualifications may include:
  ▪ Factory trained and certified for the make/model being serviced
  ▪ National certification approved by AHJ
  ▪ Registered or licensed by AHJ
  ▪ Employed by listed service company
• Provide evidence of qualifications to AHJ
NOTIFICATION OF TESTING

- Notification required prior to testing
- Building occupants
- Have a plan for reporting fires during testing
- Notification on completion of testing
• When requested, the owner must provide service personnel with software:
  ▪ Current revisions of site-specific software
  ▪ Current revisions of interfaced system software
  ▪ Software must be verified for compatibility
• When requested, the owner must provide service personnel with:
  ▪ Approval and acceptance documentation
  ▪ Completion documentation
| Floor | Device/Input         | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X |
| 1     | E1st 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    | E1st 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 | ● |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
• Retain all records until one year after the next test
• Records must be promptly provided to the AHJ upon request
For hospitals that accreditation for deemed status purposes, documentation of ITM procedures for fire protection systems shall include:

- Name of activity
- Date of activity
- Required frequency
- Name of person performing activity
- NFPA Standard referenced
- Results of the activity

EC 02.03.05 revised effective July 1, 2011
• System defects and impairments must be corrected
  ▪ Promptly?
• Where system defects and impairments are not corrected, the owner (or designated representative) must be informed of the impairment in writing within 24 hours
• Impairments longer than $X$ hours requires special consideration
  ▪ ILSM’s??
VISUAL INSPECTIONS – WHAT TO LOOK FOR?
VISUAL INSPECTIONS

• Periodic Inspections
  ▪ Detect changes to building that affect the system
  ▪ Detect deteriorating conditions that affect system performance
  ▪ Detect damage
VISUAL INSPECTIONS
Three categories of tests

- Initial Acceptance Tests
- Re-acceptance Tests
- Periodic Tests (Testing Frequency)
• Initial Acceptance Tests
  ▪ All new systems must be 100% tested
  ▪ The AHJ must be notified prior to all tests
• Re-acceptance Tests are required after any change to the system:
  - Addition of device(s)
  - Deletion of device(s)
  - Change in system circuits
  - Software change
Tests

- Site specific software changes
  - Test ALL functions affected by change
  - Test 10% of initiating devices up to a maximum of 50
  - Revise Record of Completion
- Executive software changes
  - Requires a 10% functional test of system
  - At least one device/function on each circuit
TESTS

- Test Methods covered under Table 14.4.2.2
- Test frequencies covered under Table 14.4.5
MANUAL FIRE ALARM BOXES

• Operate using manufacturer’s recommended methods
• May be necessary to remove glass rods/plates
• Keys/wrenches required
• Test annually
SMOKE DETECTORS

• Functional Test
  ▪ Ensure smoke entry into sensing chamber and response
  ▪ Use aerosol or real smoke acceptable to manufacturer

• Test annually
SMOKE DETECTORS

- Sensitivity Tests
  - Calibrated test method
  - Manufacturer’s calibrated sensitivity test instrument
  - Listed control unit arranged for the purpose
  - Smoke detector/control unit arrangement whereby the detector causes a signal at the control unit when its sensitivity is outside its listed sensitivity range
  - Other calibrated methods approved by the AHJ
SMOKE DETECTORS

- Sensitivity tests are conducted within one year after installation and every alternate year
- May be extended to 5 years
- Good records are essential
DUCT SMOKE DETECTORS

• Same functional and sensitivity tests as for smoke detectors
• Test sampling tube pressure
• Test annually
SPRINKLER WATERFLOW

- Must actuate within 90 seconds of flow equal to the flow from a single sprinkler head
- Device must not respond to surges and varying pressure
- Test semi-annually
  - Quarterly per TJC
**SPRINKLER WATERFLOW**

- **EC 02.03.05**
  - For hospitals that use Joint Commission accreditation for deemed status purposes
    - At least quarterly, the hospital tests water-flow devices
    - Effective July 1, 2011
NOTIFICATION APPLIANCES

• Bells
• Horns
• Speakers
• Lights
• Textual Displays
• Combination
• **Public Mode Signaling**
  - 15 dBA above average ambient SPL, or 5 dBA above the maximum SPL lasting a minute or more
  - Measure 5 feet above the floor
  - Test annually
    - Language difference between 1999 and 2010 Editions

• **Private Mode Signaling**
  - 10 dBA above average ambient SPL, or 5 dBA above the maximum SPL lasting a minute or more
  - Measure 5 feet above the floor
  - Test annually
    - Language difference between 1999 and 2010 Editions
AUDIBLE SYSTEM TESTING

• Initial and reacceptance tests
  ▪ Measure for conformity with Chapter 18

• Periodic tests
  ▪ Measure where building, system, or occupancy changes have occurred
VISIBLE APPLIANCE TESTING

• Verify correct rating (strobes) during the initial inspection
• Verify visible appliances operate
• Test annually
EMERGENCY SAFETY FUNCTIONS

- Elevator recall and shutdown
- HVAC shutdown
- Stair pressurization
- Smoke door closure
- Door unlocking devices
- Damper control
- Smoke evacuation
EMERGENCY SAFETY FUNCTIONS

• Test by operating or simulating alarm signals
• Test at the same frequency as the initiating device that causes the function to occur (most are annual)
  - Discuss damper testing
Part 2
1.1.3 This standard addresses the **operating condition** of fire protection systems . . .

1.1.3.1 This standard **does not** require the inspector to verify the adequacy of the design of the system
• Where an impairment is to last for more than 10 hours in a 24 hour period **one** of the following must be done:
  - Evacuation of the affected area
  - Fire Watch
  - Temporary water supply
  - Implement an approved fire control program

• Note that NFPA 101 until the 2012 Edition referred to four hours in a 24 hour period
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TYPICAL INSPECTION
SPRINKLERS ARE INSPECTED FOR

- Leakage
- Corrosion
- Paint
- Loading
- Orientation
- Empty bulbs
- Clearance below sprinkler (such as storage)
SPRINKLER TESTING

• Standard response sprinklers tested or replaced at 50 years and 10 years thereafter
• Fast-response sprinklers tested or replaced at 20 years and 10 years thereafter
• Dry sprinklers tested or replaced at 10 years and 10 years thereafter
• Sprinklers exposed to harsh environment tested at 5 year intervals
SPRINKLER TESTING

• Test includes 4 sprinklers or 1 percent of sample area whichever is greater
• If one sprinkler fails, then all sprinklers in sample must be replaced
• Tested annually
• The concentration of solution must be limited to the minimum that is necessary to protect for the lowest anticipated temperature
MAIN DRAIN TEST
FIRE PUMPS
HYDRAULIC GRAPH Pressure vs. (Flow)$^{1.85}$

Fire Pump rating
500gpm @ 80 psi
• Inspection
  ▪ Conducted at specified intervals
  ▪ Covers two points in the system (end of one main and sprinkler on one branch line)

• Examination
  ▪ Conducted when certain conditions exist
  ▪ Covers four points in the system (valve, riser, cross main, branch line)
SOURCES OF OBSTRUCTIONS
SOURCES OF OBSTRUCTIONS
SOURCES OF OBSTRUCTIONS
COMPONENT ACTION REQUIREMENTS

- Required for any component that is adjusted, repaired, reconditioned, or replaced.
- Main drain test is required if any system control valve or other upstream valve was operated.
- It is not intended that a design review be conducted.
QUESTIONS AND DISCUSSION