

FULL-LENGTH PRACTICE TESTS

Practice Test 13: Fire Alarm, Detection, And Smoke Control Systems — Chapter 13

Questions 1–50

1. What is the primary code standard governing fire alarm system design and installation in commercial buildings?

- A. NFPA 13 Standard for Sprinkler Systems
- B. NFPA 72 National Fire Alarm and Signaling Code
- C. NFPA 25 Inspection, Testing, and Maintenance Standard
- D. NFPA 20 Standard for Fire Pumps

2. What is the primary function of a fire alarm system in a commercial building?

- A. Suppressing fire through automatic water discharge
- B. Providing emergency electrical power during fire events
- C. Controlling elevator operation during normal business hours
- D. Detecting fire conditions, alerting occupants, notifying the fire department, and initiating emergency control functions

3. What is the central component that receives all input signals and controls all output functions in a fire alarm system?

- A. The fire alarm control panel

- B. The manual pull station at the main entrance
- C. The waterflow switch on the sprinkler riser
- D. The smoke detector in the main air handling unit

4. What is the primary difference between a conventional fire alarm system and an addressable fire alarm system?

- A. Conventional systems use wireless devices while addressable systems use wired devices
- B. Conventional systems can identify individual device locations while addressable systems cannot
- C. Addressable systems assign unique addresses to each device enabling individual device identification, while conventional systems identify only the circuit zone
- D. Addressable systems use audible notification only while conventional systems use visual notification

5. What is the primary advantage of an addressable fire alarm system in a commercial building?

- A. Lower installation cost than conventional systems in all building sizes
- B. Precise identification of the specific device in alarm allowing faster response to the exact location
- C. Elimination of the need for manual pull stations
- D. Operation without any connection to a monitoring station

6. What type of fire alarm initiating device allows building occupants to manually activate the fire alarm?

- A. A manual fire alarm pull station
- B. A photoelectric smoke detector
- C. A waterflow switch on the sprinkler riser
- D. A duct smoke detector in the air handling unit

7. Where does NFPA 72 require manual pull stations to be located in a commercial building?

- A. Only at the fire alarm control panel location
- B. Only in stairwells at every other floor
- C. Only at the security desk and main lobby
- D. At each exit from the building and within the required travel distance per code

8. What type of smoke detector uses a light source and photosensitive receiver to detect smoke particles?

- A. An ionization smoke detector
- B. A heat detector with rate-of-rise element
- C. A photoelectric smoke detector
- D. A flame detector using ultraviolet sensing

9. What type of smoke detector is most effective at detecting slow, smoldering fires that produce large visible smoke particles?

- A. An ionization detector
- B. A photoelectric detector
- C. A fixed-temperature heat detector
- D. A flame detector

10. What type of smoke detector is most effective at detecting fast-flaming fires that produce small invisible combustion particles?

- A. An ionization detector
- B. A photoelectric detector
- C. A fixed-temperature heat detector

D. A duct smoke detector

11. What is the primary function of a heat detector in a fire alarm system?

A. Providing backup smoke detection in harsh environments

B. Detecting carbon monoxide from combustion products

C. Measuring ambient temperature for HVAC control purposes

D. Activating when the ambient temperature reaches a fixed threshold or rises at an abnormal rate

12. In what environments are heat detectors preferred over smoke detectors?

A. Office spaces and conference rooms with smooth ceilings

B. Hotel guest rooms and residential sleeping areas

C. Areas where normal conditions produce airborne particles that would cause nuisance alarms in smoke detectors such as kitchens, garages, and mechanical rooms

D. Telecommunication rooms with sensitive electronic equipment

13. What is the primary function of a duct smoke detector installed in an air handling unit?

A. Detecting smoke in the HVAC ductwork and shutting down the air handler to prevent smoke distribution throughout the building

B. Measuring the air temperature in the supply duct

C. Monitoring the filter pressure drop across the AHU

D. Detecting refrigerant leaks in the cooling coil

14. Where must duct smoke detectors be installed per code requirements?

A. Only on the outdoor air intake duct

- B. On the supply duct downstream of the air handler and on the return air duct before the air handler for systems serving more than one floor or exceeding specified airflow
- C. Only on the exhaust duct at the roof penetration
- D. On every branch duct serving individual zones

15. What is the function of a beam smoke detector?

- A. Detecting smoke in small enclosed rooms using spot-type technology
- B. Providing manual alarm activation through an optical beam break
- C. Measuring carbon dioxide levels for ventilation control
- D. Projecting a light beam across a large open space and detecting smoke when particles reduce the beam signal strength

16. In what applications are beam smoke detectors commonly used?

- A. Standard office spaces with 9-foot ceilings
- B. Restrooms and storage closets with limited access
- C. Large open spaces with high ceilings such as atriums, warehouses, and convention centers where spot detectors are impractical
- D. Elevator shafts and hoistways exclusively

17. What is the primary function of notification appliances in a fire alarm system?

- A. Detecting smoke and heat conditions in protected spaces
- B. Alerting building occupants to a fire alarm condition through audible and visual signals
- C. Transmitting alarm signals to the fire department dispatch center
- D. Controlling elevator recall and HVAC shutdown functions

18. What are the two types of notification appliances required in commercial buildings?

- A. Audible horns or speakers and visible strobes providing both sound and light notification
- B. Only audible horns without visual notification
- C. Only visible strobes without audible notification
- D. Text message alerts and email notifications to occupant devices

19. What determines the required candela rating of fire alarm strobe notification appliances?

- A. The strobe manufacturer's standard product offering
- B. The fire alarm system voltage and available circuit power
- C. The ceiling height and architectural finish reflectance
- D. The room size and maximum viewing distance to ensure visible notification reaches all occupants per NFPA 72 spacing tables

20. What is the primary advantage of a voice evacuation system over a standard horn and strobe notification system?

- A. Lower installation cost than horn and strobe systems
- B. Providing intelligible voice instructions that direct occupants to appropriate actions rather than only sounding an alarm tone
- C. Eliminating the need for visible strobe notification
- D. Operating without connection to the fire alarm control panel

21. In what building types are voice evacuation systems typically required?

- A. High-rise buildings, large assembly occupancies, and other buildings where phased evacuation or specific occupant instructions are needed

- B. Only single-story retail stores
- C. Only residential apartment buildings
- D. Only industrial manufacturing facilities

22. What is the primary function of elevator recall initiated by the fire alarm system?

- A. Providing express elevator service to the fire floor for occupants
- B. Stopping all elevators at the nearest floor and opening doors
- C. Returning elevators to the designated recall floor and taking them out of normal service to prevent occupants from using elevators during a fire
- D. Increasing elevator speed for faster fire department response

23. What triggers Phase I elevator recall in a fire alarm system?

- A. Manual activation from the building security desk only
- B. Smoke detector activation in elevator lobbies, hoistways, or the elevator machine room
- C. Any heat detector activation anywhere in the building
- D. Power failure to the elevator controller

24. What is the primary function of HVAC shutdown and smoke damper control by the fire alarm system?

- A. Reducing energy consumption during fire alarm events
- B. Maintaining normal HVAC operation during fire conditions
- C. Increasing supply airflow to dilute smoke on the fire floor
- D. Preventing the HVAC system from distributing smoke throughout the building by shutting down fans and closing smoke dampers

25. What must the fire alarm system signal to the HVAC system when a duct smoke detector activates?

- A. Increase the supply fan speed to maximum
- B. Open all outdoor air dampers to 100 percent
- C. Shut down the associated air handling unit to stop air movement that could distribute smoke
- D. Switch the air handler to recirculation mode only

26. What is the function of a smoke control system in a commercial building?

- A. Filtering smoke particles from the supply air for continued HVAC operation
- B. Maintaining tenable conditions in egress paths and areas of refuge by managing smoke movement through pressurization, exhaust, or a combination
- C. Detecting smoke conditions and initiating fire alarm notification
- D. Providing emergency lighting in smoke-filled corridors

27. What is the primary smoke control method used in high-rise building stairwells?

- A. Stairwell pressurization that introduces outdoor air to maintain positive pressure preventing smoke infiltration from adjacent floors
- B. Stairwell exhaust that removes smoke through rooftop fans
- C. Natural ventilation through operable windows at each landing
- D. Smoke curtains that deploy across stairwell doors automatically

28. What is the primary function of a smoke management system in a large atrium?

- A. Providing general HVAC ventilation to the atrium space
- B. Enhancing the architectural appearance of the atrium ceiling
- C. Reducing the atrium's heating and cooling energy consumption

D. Exhausting smoke from the upper atrium volume and maintaining tenable conditions at the occupied levels below

29. What commissioning test is required for smoke control systems?

A. Only a visual inspection of the ductwork connections

B. Only verification that the smoke control panel powers on

C. Full functional testing demonstrating correct activation, fan operation, damper positions, and pressurization levels under simulated fire conditions

D. Only measurement of the normal HVAC airflow rates

30. What is the primary function of fire alarm system monitoring by a supervising station?

A. Programming the fire alarm control panel remotely

B. Receiving alarm, supervisory, and trouble signals and dispatching the fire department or notifying responsible parties

C. Providing security guard services for the building

D. Controlling the building's access control system during alarms

31. What types of signals does the fire alarm system transmit to the monitoring station?

A. Only fire alarm signals indicating confirmed fire

B. Only trouble signals indicating system malfunctions

C. Alarm signals indicating fire conditions, supervisory signals indicating impaired protection, and trouble signals indicating system malfunctions

D. Only test signals during scheduled maintenance

32. What wiring method is required for fire alarm circuits in commercial buildings?

- A. Fire alarm circuits must be installed in dedicated conduit or listed fire alarm cable per NFPA 72, separated from other building wiring systems
- B. Fire alarm wiring may share conduit with standard power circuits
- C. Fire alarm wiring requires the same conduit as data network cabling
- D. Fire alarm wiring is not subject to any specific installation requirements

33. What type of fire alarm circuit is required for notification appliance circuits to ensure operation during a wiring fault?

- A. A standard initiating device circuit with no redundancy
- B. A non-supervised circuit without end-of-line monitoring
- C. A pathway using standard telephone cable
- D. A Class A circuit that provides redundant pathway routing so a single open or ground fault does not prevent notification appliance operation

34. What is the primary purpose of secondary power for the fire alarm system?

- A. Providing power to the building's emergency lighting system
- B. Maintaining fire alarm system operation during primary power failure for the code-required duration
- C. Supplying power to the fire pump motor
- D. Operating the building's emergency generator starter

35. How long must fire alarm system secondary batteries maintain the system in supervisory mode followed by alarm operation?

- A. 24 hours of supervisory operation followed by 5 minutes of alarm per NFPA 72 for non-voice systems, with extended requirements for voice evacuation

- B. 1 hour of supervisory operation followed by 1 minute of alarm
- C. 48 hours of supervisory operation with no alarm requirement
- D. 8 hours of supervisory operation followed by 30 minutes of alarm

36. What is the primary purpose of fire alarm system acceptance testing?

- A. Determining the system's aesthetic appearance rating
- B. Calculating the building's fire insurance premium reduction
- C. Verifying the installing contractor's license credentials
- D. Verifying that every device, circuit, and function operates correctly per NFPA 72 and the approved design documents

37. What must be tested during fire alarm acceptance testing?

- A. Only the fire alarm control panel power-up sequence
- B. Only a representative sample of 10 percent of devices
- C. Every initiating device, notification appliance, control function, supervisory point, and integration with other building systems
- D. Only the manual pull stations and audible notification

38. What is the required test for smoke detectors during acceptance testing?

- A. Only a visual inspection confirming physical installation
- B. Each detector must be functionally tested using approved methods to verify it detects the intended stimulus and reports to the correct panel address
- C. Only the first detector on each circuit requires testing
- D. Detectors are only tested by the manufacturer before shipment

39. What integration tests must be performed during fire alarm acceptance testing?

- A. Verification that all fire alarm-initiated functions operate correctly including HVAC shutdown, smoke damper closure, elevator recall, door release, and suppression system monitoring
- B. Only the connection between the panel and the monitoring station
- C. Only the sprinkler waterflow alarm function
- D. Only the emergency generator start signal

40. What is the primary function of fire alarm system record of completion documentation?

- A. Establishing the fire alarm contractor's warranty period
- B. Calculating the system's total installed cost for the owner
- C. Determining the building's annual fire alarm monitoring fee
- D. Providing a permanent record of all installed devices, circuits, software, and test results as required by NFPA 72

41. What ongoing inspection and testing standard applies to installed fire alarm systems?

- A. NFPA 13 sprinkler system maintenance standard
- B. NFPA 72 Chapter 14 establishing required frequencies for visual inspection, testing, and maintenance of all fire alarm components
- C. ASHRAE Standard 90.1 energy efficiency testing
- D. NFPA 20 fire pump testing protocol

42. What is the required testing frequency for smoke detectors in commercial fire alarm systems?

- A. Only at initial installation with no subsequent testing required
- B. Every 5 years without interim functional checks

- C. Monthly functional testing of every individual detector
- D. Annual functional testing with sensitivity testing at intervals specified by NFPA 72

43. What is the primary purpose of sensitivity testing on smoke detectors?

- A. Measuring the detector's power consumption
- B. Verifying the detector's mounting height is correct
- C. Verifying that the detector's sensitivity remains within its listed range and has not drifted to a point where it is either too sensitive causing nuisance alarms or too insensitive to detect actual smoke
- D. Confirming the detector's color matches the ceiling finish

44. What is the primary purpose of a mass notification system in a commercial building?

- A. Providing building-wide emergency communication for fire, severe weather, security threats, and other emergencies with live or pre-recorded messages
- B. Broadcasting background music throughout the building
- C. Providing intercom service between offices
- D. Transmitting data network signals to wireless devices

45. How does a mass notification system differ from a fire alarm voice evacuation system?

- A. Mass notification uses only visual text displays without audio
- B. Mass notification addresses all emergency types beyond fire, can provide varied messages to different zones, and may override fire alarm notification
- C. Mass notification is limited to a single pre-recorded message
- D. Mass notification operates only during non-business hours

46. What is the primary construction coordination requirement for fire alarm device placement?

- A. Matching device housing color to the wall paint finish
- B. Selecting the fire alarm system manufacturer through bidding
- C. Scheduling the fire marshal's plan review appointment
- D. Verifying that detectors, pull stations, notification appliances, and control devices are located per the approved drawings with proper spacing and clearance from obstructions

47. What must the construction team coordinate between the fire alarm contractor and other trades?

- A. Conduit routing, device placement relative to ceilings and walls, integration wiring to HVAC and elevator systems, and access for installation and testing
- B. Only the fire alarm panel room paint color
- C. Only the exterior fire department connection location
- D. Only the fire alarm monitoring station telephone number

48. What is the primary purpose of a fire alarm system annunciator?

- A. Providing battery backup power to the fire alarm panel
- B. Testing individual fire alarm devices remotely
- C. Displaying system status and alarm locations at a remote location such as the building entrance for fire department use
- D. Programming the fire alarm control panel sequences

49. What documentation must the fire alarm contractor provide at project closeout?

- A. Only the fire alarm control panel serial number
- B. Record of completion, as-built drawings, device location maps, battery calculations, programming records, test reports, O&M manuals, and warranty information
- C. Only the monitoring station account number
- D. Only the fire marshal's acceptance certificate

50. What is the primary purpose of fire alarm system software backup documentation?

- A. Providing marketing information about the system capabilities
- B. Calculating the system's energy consumption
- C. Establishing the monitoring station communication protocol
- D. Preserving the complete system programming so it can be restored after panel replacement, software corruption, or system expansion without reprogramming from scratch

ANSWER KEY 13: DETAILED EXPLANATIONS — PRACTICE TEST 13 FIRE ALARM, DETECTION, AND SMOKE CONTROL SYSTEMS

Questions 1–50

1. **B. NFPA 72 National Fire Alarm and Signaling Code** — NFPA 72 is the comprehensive standard governing fire alarm system design, installation, testing, and maintenance in commercial buildings. It establishes requirements for initiating devices, notification appliances, control functions, wiring methods, power supplies, and integration with other building systems referenced by the building code.
2. **D. Detecting fire conditions, alerting occupants, notifying the fire department, and initiating emergency control functions** — The fire alarm system performs four critical functions: detecting fire through automatic and manual devices, alerting building occupants through audible and visual notification, transmitting signals to the fire department through a monitoring station, and initiating control functions such as elevator recall, HVAC shutdown, and door release.
3. **A. The fire alarm control panel** — The FACP is the system's central processor that receives signals from all initiating devices, processes the information, activates appropriate notification appliances, initiates control functions, transmits signals to the monitoring station, and displays system status. It serves as the brain of the entire fire alarm system.
4. **C. Addressable systems assign unique addresses to each device enabling individual identification, while conventional systems identify only the circuit zone** — Conventional systems group multiple devices on a single circuit and can only identify which zone is in alarm, not the specific device. Addressable systems assign a unique digital address to every device, enabling the panel to identify the exact device and location in alarm.
5. **B. Precise identification of the specific device in alarm allowing faster response to the exact location** — Addressable systems display the specific device type, address, and programmed location description at the panel, enabling responders to proceed directly to the alarm location. Conventional systems identify only the zone, requiring a search of multiple devices across a larger area to find the source.

6. **A. A manual fire alarm pull station** — Manual pull stations provide building occupants with the means to activate the fire alarm system when they discover a fire or fire condition. Pulling the station handle sends an alarm signal to the FACP, which initiates full building notification and fire department dispatch regardless of whether automatic detectors have activated.
7. **D. At each exit from the building and within the required travel distance per code** — NFPA 72 and the building code require manual pull stations at each exit from the floor area so occupants can activate the alarm as they evacuate. Maximum travel distance to the nearest pull station is typically 200 feet. Stations must be mounted between 42 and 48 inches above the floor.
8. **C. A photoelectric smoke detector** — Photoelectric detectors contain a light source and photosensitive receiver arranged so that light does not normally reach the receiver. When smoke particles enter the sensing chamber, they scatter the light beam, redirecting light onto the receiver. The resulting signal triggers an alarm when it exceeds the detector's threshold.
9. **B. A photoelectric detector** — Smoldering fires produce large visible smoke particles that effectively scatter light within the photoelectric chamber. These large particles are highly effective at redirecting the light beam onto the receiver, causing the detector to alarm. Photoelectric detectors typically respond minutes faster than ionization detectors to smoldering fire conditions.
10. **A. An ionization detector** — Ionization detectors contain a small radioactive source that ionizes air molecules, creating a current between two electrodes. Small invisible combustion particles from fast-flaming fires disrupt this current, triggering the alarm. Ionization detectors respond faster to flaming fires but are more susceptible to nuisance alarms from cooking and steam.
11. **D. Activating when the ambient temperature reaches a fixed threshold or rises at an abnormal rate** — Fixed-temperature heat detectors activate at a preset temperature, typically 135 or 200 degrees Fahrenheit. Rate-of-rise detectors activate when the temperature increases faster than a specified rate, typically 12 to 15 degrees per minute. Combination detectors incorporate both elements for enhanced detection.
12. **C. Areas where normal conditions produce airborne particles that would cause nuisance alarms in smoke detectors** — Heat detectors are specified for environments such as commercial kitchens, parking garages, mechanical rooms, and loading docks where cooking fumes, vehicle exhaust, dust, or steam would cause frequent false alarms in smoke detectors. Heat detectors respond only to temperature, avoiding particle-related nuisance activations.
13. **A. Detecting smoke in the HVAC ductwork and shutting down the air handler to prevent smoke distribution throughout the building** — Duct smoke detectors sample air flowing through the ductwork. When smoke is detected, the detector signals the air handling unit to shut down, preventing the HVAC system from distributing smoke from a fire area to unaffected spaces throughout the building via the supply and return ductwork.

14. **B. On the supply duct downstream of the air handler and on the return air duct before the air handler for systems serving more than one floor or exceeding specified airflow** — Code requires duct smoke detectors on the supply side downstream of the fan and filters, and on the return side before the air handler. This arrangement detects smoke entering through the return system or developing within the unit before it can be distributed to occupied spaces.
15. **D. Projecting a light beam across a large open space and detecting smoke when particles reduce the beam signal strength** — Beam detectors consist of a transmitter and receiver separated by distances up to 300 feet or more. The projected infrared beam crosses the protected space at ceiling level. When smoke particles reduce the beam signal strength below the alarm threshold, the detector activates.
16. **C. Large open spaces with high ceilings such as atriums, warehouses, and convention centers where spot detectors are impractical** — Beam detectors are ideal for spaces where ceiling heights make spot detector installation and maintenance impractical or where large open areas would require hundreds of individual spot detectors. A single beam detector can monitor an area equivalent to many spot detectors.
17. **B. Alerting building occupants to a fire alarm condition through audible and visual signals** — Notification appliances are the output devices that inform building occupants of a fire alarm condition. Audible devices such as horns and speakers produce sound signals, while visual devices such as strobes produce flashing light signals. Both types are required to ensure notification reaches all occupants.
18. **A. Audible horns or speakers and visible strobes providing both sound and light notification** — NFPA 72 and the ADA require both audible and visible notification in commercial buildings. Audible devices alert occupants who can hear, while visible strobes alert occupants who are deaf or hard of hearing. Both types must meet specific performance requirements for sound level and light intensity.
19. **D. The room size and maximum viewing distance to ensure visible notification reaches all occupants per NFPA 72 spacing tables** — Strobe candela ratings are selected based on the room dimensions to ensure the flash is visible from every point in the space. Larger rooms require higher candela ratings or multiple strobes. NFPA 72 provides spacing tables correlating room size to minimum required candela output.
20. **B. Providing intelligible voice instructions that direct occupants to appropriate actions rather than only sounding an alarm tone** — Voice evacuation systems deliver clear spoken messages directing occupants to evacuate, shelter in place, or take other specific actions. This is far more effective than a simple alarm tone, especially in large or complex buildings where occupants need specific directional guidance.
21. **A. High-rise buildings, large assembly occupancies, and other buildings where phased evacuation or specific occupant instructions are needed** — Voice evacuation is required in

buildings where simultaneous full evacuation is impractical or dangerous. High-rise buildings use phased evacuation, alerting the fire floor and floors immediately above and below while instructing other floors to stand by, requiring targeted voice messaging capability.

22. **C. Returning elevators to the designated recall floor and taking them out of normal service to prevent occupants from using elevators during a fire** — Elevator recall brings all elevators to the designated floor, typically the main lobby, opens the doors, and removes them from normal service. This prevents occupants from entering elevators that could stop on the fire floor, trapping them in a smoke-filled shaft or lobby.
23. **B. Smoke detector activation in elevator lobbies, hoistways, or the elevator machine room** — Phase I recall is triggered automatically by smoke detectors specifically designated for elevator recall in elevator lobbies, hoistways, and machine rooms. If the designated floor lobby detector activates, elevators recall to an alternate floor. This automatic response occurs without fire department intervention.
24. **D. Preventing the HVAC system from distributing smoke throughout the building by shutting down fans and closing smoke dampers** — The fire alarm system commands HVAC shutdown and smoke damper closure to stop air movement through ductwork that could carry smoke from the fire area to other parts of the building. Smoke dampers close at duct penetrations of smoke barriers to maintain compartmentation.
25. **C. Shut down the associated air handling unit to stop air movement that could distribute smoke** — When a duct smoke detector activates, the fire alarm system signals the air handling unit controller to shut down the supply and return fans. This immediately stops the mechanical air distribution that would otherwise carry smoke through the ductwork to spaces throughout the building.
26. **B. Maintaining tenable conditions in egress paths and areas of refuge by managing smoke movement through pressurization, exhaust, or a combination** — Smoke control systems actively manage smoke movement to maintain survivable conditions in exit stairwells, corridors, and areas of refuge during a fire. They use mechanical pressurization, exhaust, or both to prevent smoke from entering critical egress paths.
27. **A. Stairwell pressurization that introduces outdoor air to maintain positive pressure preventing smoke infiltration** — Stairwell pressurization fans inject outdoor air into the stairwell, creating higher pressure inside than on the adjacent floors. This positive pressure differential prevents smoke from entering the stairwell when doors are opened, maintaining a tenable egress path for occupants evacuating the building.
28. **D. Exhausting smoke from the upper atrium volume and maintaining tenable conditions at the occupied levels below** — Atrium smoke management systems use mechanical exhaust fans or natural venting at the top of the atrium to remove smoke that rises and accumulates in the upper

volume. Makeup air is introduced at lower levels to maintain the smoke layer above the occupied zone.

29. **C. Full functional testing demonstrating correct activation, fan operation, damper positions, and pressurization levels under simulated fire conditions** — Smoke control commissioning requires comprehensive testing with simulated fire alarm activations to verify that fans start, dampers move to correct positions, stairwell or zone pressurization achieves design levels, and the complete sequence operates as designed under various fire scenarios.
30. **B. Receiving alarm, supervisory, and trouble signals and dispatching the fire department or notifying responsible parties** — The supervising station continuously monitors the fire alarm system through a dedicated communication path. Upon receiving an alarm signal, the station dispatches the fire department. Supervisory and trouble signals are communicated to the building's responsible parties for corrective action.
31. **C. Alarm signals indicating fire conditions, supervisory signals indicating impaired protection, and trouble signals indicating system malfunctions** — The three signal types provide comprehensive system monitoring. Alarm signals require immediate fire department response. Supervisory signals indicate conditions that impair fire protection such as closed sprinkler valves. Trouble signals indicate system faults requiring maintenance attention.
32. **A. Fire alarm circuits must be installed in dedicated conduit or listed fire alarm cable per NFPA 72, separated from other building wiring** — Fire alarm wiring must maintain independence from other building electrical systems to prevent interference and ensure reliable operation during fire conditions. Dedicated conduit or listed fire alarm cable installed according to NFPA 72 requirements provides the required protection and separation.
33. **D. A Class A circuit that provides redundant pathway routing so a single open or ground fault does not prevent operation** — Class A circuits route wiring in a complete loop from the panel through all devices and back, providing a redundant path. If a single wire break or ground fault occurs, signals can still reach the panel through the alternate path, maintaining notification capability despite the fault.
34. **B. Maintaining fire alarm system operation during primary power failure for the code-required duration** — Secondary power, typically standby batteries, ensures the fire alarm system remains fully operational during power outages. The system must detect fires, alert occupants, and notify the fire department regardless of the building's primary power status.
35. **A. 24 hours of supervisory operation followed by 5 minutes of alarm per NFPA 72 for non-voice systems** — NFPA 72 requires secondary batteries to support the system in normal supervisory mode for 24 hours of primary power failure, then provide 5 minutes of full alarm operation including all notification appliances. Voice evacuation systems require 15 minutes of alarm, and emergency communications systems may require longer durations.

36. **D. Verifying that every device, circuit, and function operates correctly per NFPA 72 and the approved design documents** — Acceptance testing is the comprehensive verification performed before the fire alarm system is placed in service. Every component must be individually tested to confirm proper installation, correct panel programming, and reliable operation as designed. The AHJ witnesses acceptance testing before granting approval.
37. **C. Every initiating device, notification appliance, control function, supervisory point, and integration with other building systems** — Acceptance testing requires 100 percent testing of all system components. Every smoke detector, heat detector, pull station, waterflow switch, tamper switch, horn, strobe, speaker, elevator recall function, HVAC shutdown, door holder release, and monitoring station communication must be individually verified.
38. **B. Each detector must be functionally tested using approved methods to verify it detects the intended stimulus and reports to the correct panel address** — Every smoke detector must be tested with approved test methods such as aerosol or magnet testing to confirm it responds to smoke-like stimulus, transmits the correct alarm signal to the panel, and reports its correct address and location description. Visual inspection alone is insufficient.
39. **A. Verification that all fire alarm-initiated functions operate correctly including HVAC shutdown, smoke damper closure, elevator recall, door release, and suppression system monitoring** — Integration testing confirms that the fire alarm system properly controls all connected building systems. Each function must be activated by appropriate initiating devices and verified to respond correctly, including timing, sequence, and coordination with all affected systems.
40. **D. Providing a permanent record of all installed devices, circuits, software, and test results as required by NFPA 72** — The record of completion is a standardized NFPA 72 form documenting the complete installed system including device quantities and types, circuit configurations, software version, battery calculations, system configuration, and the results of all acceptance tests. It becomes part of the building's permanent fire protection records.
41. **B. NFPA 72 Chapter 14 establishing required frequencies for visual inspection, testing, and maintenance of all fire alarm components** — Chapter 14 of NFPA 72 specifies the ongoing inspection, testing, and maintenance requirements for installed fire alarm systems. It establishes the frequency for visual inspections, functional testing, and maintenance activities for every system component to ensure continued reliable operation.
42. **D. Annual functional testing with sensitivity testing at intervals specified by NFPA 72** — NFPA 72 requires annual functional testing of all smoke detectors to verify they respond to test stimulus. Sensitivity testing, which measures the detector's actual alarm threshold, is required within one year of installation and then at intervals per manufacturer's instructions or every two years thereafter.

43. **C. Verifying that the detector's sensitivity remains within its listed range and has not drifted due to contamination or age** — Smoke detector sensitivity changes over time due to dust accumulation, environmental contamination, and component aging. Sensitivity testing measures the detector's actual alarm threshold and compares it to the listed acceptable range. Detectors outside the acceptable range must be cleaned, recalibrated, or replaced.
44. **A. Providing building-wide emergency communication for fire, severe weather, security threats, and other emergencies** — Mass notification systems extend beyond fire alarm notification to address all emergency types. They can deliver targeted messages to specific building zones, provide live public address capability for emergency responders, and override other audio systems to ensure critical emergency information reaches all occupants.
45. **B. Mass notification addresses all emergency types beyond fire, can provide varied messages to different zones, and may override fire alarm notification** — While fire alarm voice evacuation is limited to fire events with standardized evacuation messages, mass notification handles multiple emergency types with customizable messages targeted to specific zones. Mass notification can override fire alarm audio when a higher-priority emergency requires different occupant instructions.
46. **D. Verifying that detectors, pull stations, notification appliances, and control devices are located per the approved drawings with proper spacing and clearance** — Fire alarm device placement must comply with NFPA 72 spacing requirements and the approved shop drawings. Detectors require specific mounting heights and spacing from walls and obstructions. Notification appliances require correct mounting heights and candela ratings. Pull stations require accessible locations at proper mounting heights.
47. **A. Conduit routing, device placement relative to ceilings and walls, integration wiring to HVAC and elevator systems, and access for installation and testing** — Fire alarm installation requires coordination with multiple trades. Conduit must be routed without conflicting with other MEP systems. Devices must be positioned correctly relative to architectural finishes. Integration wiring must connect to HVAC controllers, elevator equipment, and door holders installed by other contractors.
48. **C. Displaying system status and alarm locations at a remote location such as the building entrance for fire department use** — Fire alarm annunciators provide a simplified display of system status at locations remote from the main control panel, typically at the building's fire department entrance. They show zone or device alarm status, trouble conditions, and supervisory signals, enabling responders to quickly identify alarm locations upon arrival.
49. **B. Record of completion, as-built drawings, device location maps, battery calculations, programming records, test reports, O&M manuals, and warranty information** — Complete fire alarm closeout documentation provides the building owner with all records needed for ongoing system operation, maintenance, and future modifications. The record of completion is specifically

required by NFPA 72, and programming documentation is critical for future system servicing and expansion.

50. **D. Preserving the complete system programming so it can be restored after panel replacement, software corruption, or system expansion** — Fire alarm system programming includes device addresses, zone assignments, control sequences, notification priorities, custom labels, and integration parameters. Without backup documentation, a panel failure or replacement requires complete reprogramming from scratch, a costly and time-consuming process that leaves the building unprotected.