

LEVEL III — SIMULATION EXAM 2

(115 QUESTIONS)

Time Limit: 170 Minutes

Allowed References: NFPA 72 (2022), NFPA 70 (2020), Ugly's Electrical References (2020)

DOMAIN 3.1 — INSTALLATION (Questions 1–40)

1. A fire alarm designer is specifying a voice evacuation system for a 45-story high-rise with mixed occupancies. The building uses 2-hour CI cable for all voice circuit risers. At Floor 22, both the outgoing and return CI cable paths cross through a common unrated mechanical chase spanning 80 feet between the east and west risers. A reviewer questions whether this crossing affects Level 2 or Class A pathway diversity. What is the correct assessment?

- A. Level 2 is lost at the crossing because CI cable requires fire-rated construction around it
- B. Class A diversity is maintained because CI cable in separate trays constitutes separate paths
- C. Both Level 2 and Class A are maintained because CI cable provides independent fire rating
- D. Level 2 is maintained by the CI cable but Class A diversity is compromised because both paths share the same physical space

2. A fire alarm designer is performing a battery calculation for a complex voice evacuation system. The main panel batteries serve: panel/SLC standby = 1.10A, voice amplifier standby = 2.20A, network communication standby = 0.45A. Alarm loads: NAC = 6.2A, voice = 13.5A. Two remote power supplies each have their own batteries. The building has no generator. What loads must the main panel battery calculation include?

- A. All system loads including both remote power supply loads must be on the main panel batteries
- B. Only the loads directly powered by the main panel batteries — each remote supply calculates separately

- C. All standby loads system-wide but only the main panel alarm loads
- D. Only the panel/SLC standby and NAC alarm — voice amplifier has its own internal battery

3. A fire alarm designer is evaluating a campus fire alarm network. Five buildings each have a panel on a peer-to-peer network. The underground conduit between Buildings 2 and 3 runs through a retention pond area that floods seasonally, causing repeated failures. Three previous repairs to the underground cable have failed within months. What is the most reliable permanent solution?

- A. Route the network cable through an aerial pathway between the buildings avoiding the flood zone entirely
- B. Install the cable in a waterproof inner duct within the existing underground conduit
- C. Replace the copper network cable with fiber optic which resists water damage on insulation
- D. Add a redundant wireless mesh backup link between Buildings 2 and 3

4. A fire alarm designer is specifying the cross-zone releasing system for a clean agent suppression system. The design uses photoelectric detectors in both Zone A and Zone B. During a design review, the mechanical engineer asks whether using the same detector technology in both cross-zones reduces the system's effectiveness. What is the correct assessment?

- A. Yes, NFPA 72 requires different technologies in each zone for releasing systems
- B. Yes, identical technologies produce simultaneous false alarms from the same nuisance source
- C. No, cross-zoning requires two independent zones to activate regardless of detector technology
- D. No, but different technologies provide a best-practice advantage for false alarm prevention

5. A fire alarm designer is specifying detection for a 100-foot atrium in a luxury resort. The atrium has a glass roof, water features at the base, and open balconies on every floor. Aesthetic requirements prohibit any visible detection equipment on walls or balcony railings. Spot detectors at the ceiling are impractical due to stratification. What detection approach satisfies both detection performance and aesthetic constraints?

- A. Projected beam detectors recessed into decorative columns at multiple elevations

- B. Ceiling-mounted spot detectors with extended-range sensing chambers rated for high ceilings
- C. Wireless detectors concealed behind removable decorative panels at each balcony level
- D. Aspirating detection with sampling pipes concealed within architectural trim at multiple heights

6. A fire alarm designer calculates NAC voltage drop: 12 AWG copper (1.98 Ω /1000 ft), round-trip 2,000 feet, 1.8 amps alarm load. $R = 3.96 \Omega$. $V_{\text{drop}} = 7.128\text{V}$. End voltage = 16.87 VDC. Devices listed 16-33 VDC. The margin is 0.87V above minimum. A second designer reviews and recommends redesign. Is the recommendation valid?

- A. No, the circuit meets the 16 VDC minimum and satisfies all code requirements
- B. Yes, the 0.87V margin is insufficient to account for aging, temperature, and future additions
- C. No, 12 AWG is the maximum size permitted for NAC circuits per NEC Article 760
- D. Yes, but only because the 2,000-foot distance exceeds the NEC maximum for fire alarm circuits

7. A fire alarm designer is developing the sequence of operations for a 200-bed hospital. The facility has patient care floors, surgical suites, an emergency department, a neonatal ICU, and administrative offices. The designer must create differentiated alarm response profiles. How many distinct profiles are needed at minimum?

- A. At least five — patient care, surgical, ED, NICU, and administrative — each with unique responses
- B. Three — patient care, surgical/ED/NICU combined, and administrative
- C. One universal profile with zone-based notification adjustments across all areas
- D. Fourteen — one per floor because every floor has unique equipment and staffing

8. A fire alarm designer is specifying the system for a convention center with a main ballroom divisible into ten independent event spaces using acoustically rated partitions. Each space has a separate entrance when deployed. How must the notification design address these configurations?

- A. Only the fully open ballroom configuration requires notification design consideration
- B. Only alternating spaces need independent coverage since adjacent spaces share notification

- C. Each enclosed space must have independent notification when its partitions are deployed
- D. A single high-output central device covers all ten configurations from the ballroom center

9. A fire alarm designer is specifying communication paths for a high-rise with central station monitoring. The DACT uses copper lines being discontinued in 12 months. The designer evaluates three replacement options: (1) IP only, (2) cellular only, (3) IP primary with cellular secondary. Per NFPA 72 Chapter 26, which option provides the most robust code-compliant monitoring?

- A. Cellular only because modern cellular exceeds traditional DACT reliability significantly
- B. IP only with 200-second supervision meets all requirements for a single-path system
- C. All three options are equally compliant provided each meets the technology requirements
- D. IP primary with cellular secondary because dual-path provides redundancy with continuous monitoring

10. A fire alarm designer is developing elevator recall for a building with six elevator banks. Banks A-D serve the main tower. Bank E is a dedicated freight elevator. Bank F serves the parking garage exclusively. The machine room is on the penthouse level. When the machine room detector activates, what recall configuration is required?

- A. All six banks must recall to the same single alternate floor per NFPA 72 Section 21.3
- B. All six banks must recall to alternate floors — different banks may use different alternates based on function
- C. Only Banks A-D must recall — freight and garage elevators are exempt from machine room recall
- D. Banks A-D recall to the lobby alternate, Bank E to the loading dock, and Bank F remains in service

11. A fire alarm designer is specifying detection for a heritage building with ornate plaster ceilings, historic millwork, and landmark preservation restrictions. Surface-mounted conduit, visible cable, and ceiling-mounted devices are prohibited. What detection approach satisfies both code and preservation requirements?

- A. Aspirating detection with sampling pipes threaded through existing architectural cavities

- B. Surface-mounted detectors painted to match the ceiling with preservation commission approval
- C. Battery-powered wireless detectors adhered to the ceiling with removable adhesive
- D. Detection requirements may be waived for buildings with landmark preservation status

12. A fire alarm designer is evaluating speech intelligibility for a voice evacuation system. The specification requires STI of 0.50 minimum. Three challenging spaces: a marble lobby (high reverberation), a loading dock (high ambient noise with reflective concrete), and a boiler room (extreme ambient noise exceeding 110 dB). For which space is achieving 0.50 STI most likely impractical?

- A. The marble lobby because reverberation degrades word clarity beyond correction
- B. The loading dock because noise plus reflective surfaces create worst combined conditions
- C. The boiler room because extreme ambient noise overwhelms voice notification capability
- D. All three present equal challenges requiring identical acoustic treatment approaches

13. A fire alarm designer is developing the fire command center per NFPA 72 Section 23.10 for a building where the panel is in a basement mechanical room and the FCC is in the main lobby. The building owner asks whether an iPad mounted in a permanent dock at the FCC can serve as the panel repeater. What is the correct answer?

- A. Yes, if the iPad app displays full system status with alarm, trouble, and supervisory data
- B. Yes, but only if the iPad remains permanently docked and powered at the FCC location
- C. No, but a desktop computer with dedicated monitoring software could serve as the repeater
- D. No, the FCC requires a permanently installed fire alarm panel or dedicated repeater

14. A fire alarm designer is specifying conduit fill for a 1-inch EMT carrying eight 14 AWG THHN, six 12 AWG THHN, and four 18 AWG THHN (18 total). Mixed sizes prevent use of Annex C. What method must be used?

- A. Compare each size to its individual Annex C maximum — if all pass individually the installation complies

- B. Calculate total conductor area from Chapter 9 Table 5 and compare to the 40% fill allowance
- C. Use the Annex C table for 12 AWG as the controlling calculation since it is the largest
- D. Add all conductor counts and compare total to the smallest Annex C maximum present

15. A fire alarm designer is developing the fire pump monitoring interface per NFPA 72 Section 10.18. The controller provides pump running, power available, phase reversal, and controller trouble contacts. The building engineer questions why phase reversal needs fire alarm monitoring when the controller auto-corrects phase reversal internally. What is the correct explanation?

- A. Fire alarm monitoring provides building-wide supervisory awareness of the condition for maintenance and emergency documentation
- B. Phase reversal monitoring is optional per NFPA 72 when the controller has auto-correction
- C. The fire alarm panel must independently verify phase correction before allowing pump start
- D. Phase reversal monitoring at the panel is required only for diesel-driven fire pumps

16. A fire alarm designer is specifying visible notification for a large open office measuring 80 × 60 feet with a 12-foot ceiling. The only interior divisions are 5.5-foot cubicle partitions. Per NFPA 72, how should the designer treat these partitions for visible coverage?

- A. Each cubicle cluster must be treated as a separate room requiring its own strobe device
- B. A 50% candela increase is required to compensate for light absorption by partition fabric
- C. Partitions below wall strobe mounting height do not affect visible notification coverage
- D. Ceiling-mounted strobes are required because wall units cannot cover over the partitions

17. A fire alarm designer is developing the releasing system for a pre-action sprinkler system using double-interlock configuration. During design review, the mechanical engineer asks what happens if only the fire detection activates without a drop in supervisory air pressure. What is the correct response per NFPA 72?

- A. The valve opens on detection alone as a precautionary measure to fill piping with water
- B. The detection signal primes the pilot solenoid for faster valve response when heads fuse

- C. The panel generates an alarm signal but no release occurs — both conditions must be met
- D. The valve remains closed — double-interlock requires both detection AND pressure drop

18. A fire alarm designer is specifying the system for a nursing home using defend-in-place. When a smoke detector activates on a resident floor, notification activates only on the alarm floor. The facility administrator asks whether adjacent floors should also be notified to prepare for potential resident relocation. What determines the answer?

- A. NFPA 72 always requires notification on the alarm floor plus one above and one below
- B. The building's approved fire safety plan determines the specific notification scope
- C. Only the alarm floor receives notification in all defend-in-place implementations
- D. The fire department determines the notification scope during each individual event

19. A fire alarm designer is specifying the releasing circuit for a clean agent system in an occupied telecommunications room. Per NFPA 72 Section 23.11, the system must include pre-discharge warning, time delay, and abort capability. The design uses a 20-second countdown. What determines whether 20 seconds is adequate?

- A. The room size, exit locations, travel distance, and expected occupant count
- B. NFPA 72 specifies a fixed 30-second minimum for all occupied clean agent spaces
- C. The agent manufacturer specifies countdown based on discharge concentration rate
- D. The fire department determines delay based on their estimated response time

20. A fire alarm designer is specifying the system for a 25-story residential tower using defend-in-place. A smoke detector alarm on Floor 15 activates notification on Floors 14, 15, and 16. The HOA president asks why all 25 floors are not notified. What is the primary rationale?

- A. Residential towers are exempt from full notification per NFPA 72 Chapter 29
- B. Full notification is required only for buildings taller than 30 stories per building code
- C. Simultaneous evacuation of all floors creates dangerous stairwell congestion

D. Defend-in-place reduces system cost by requiring fewer notification appliances

21. A fire alarm designer is developing PAS for a hospital per NFPA 72 Section 23.8.1.3. During the 180-second investigation period, a manual pull station on a different floor is activated. What must the system do?

A. The pull station activation is queued until the PAS investigation period completes

B. PAS continues because the pull station is on a different floor from the detector

C. The 180-second period restarts using the pull station as the new reference event

D. PAS must immediately cancel and general alarm notification must activate

22. A fire alarm designer is specifying the architect's request for white devices throughout a building. Per NFPA 72 Section 17.14.8, which device type must remain red regardless of the architect's preference?

A. Horn/strobe devices must be red for universal emergency identification

B. Manual fire alarm stations must be red per the code requirement

C. All fire alarm devices must be red per NFPA 72 universal identification rules

D. Smoke detectors must maintain the manufacturer's standard listed color

23. A fire alarm designer is developing notification for a performing arts center. The theater has 95 dB ambient. The orchestra pit reaches 105 dB. Per NFPA 72, what minimum audible notification is required and what design implication does this create?

A. Theater 110 dB, pit 120 dB — both impractical, requiring enhanced visible notification

B. Theater 100 dB, pit 110 dB — achievable with high-output horns in both spaces

C. Theater 95 dB, pit 105 dB — matching ambient is adequate during performances

D. Theater 110 dB, pit 120 dB — achievable with speaker arrays at close spacing

24. A fire alarm designer is evaluating two voice evacuation speaker circuit approaches for a 30-story building. Option A uses centrally located amplifiers on Floor 1 with 800-foot circuit runs. Option B uses remote amplifier panels on Floors 10 and 20 with maximum 300-foot runs. What is the primary advantage of Option B?

- A. Option B eliminates the need for battery backup at the remote amplifier locations
- B. Option B allows the use of smaller gauge speaker wire throughout the building
- C. Option B reduces line losses providing consistent audio levels across all floors
- D. Option B eliminates the need for pathway survivability on the speaker circuits

25. A fire alarm designer is developing the sequence of operations for a building with a kitchen hood suppression system monitored by the fire alarm panel. When the suppression activates, what responses must the panel initiate per a typical sequence?

- A. Building notification, supervising station signal, and HVAC shutdown per the approved sequence
- B. Only supervising station signal because kitchen suppression events are supervisory
- C. Only local kitchen notification because the suppression addressed the fire
- D. No response because the suppression operates independently from fire alarm

26. A fire alarm designer is specifying fire alarm cable for a data center with a raised floor plenum distributing cold air and an overhead cable tray space with dedicated ducted HVAC return (non-plenum). What cable types are required?

- A. FPLP in both spaces because all concealed data center spaces are plenums
- B. FPL in both because data centers are general-purpose environments
- C. FPLR in both because the raised floor creates a riser application
- D. FPLP in the raised floor plenum and FPL minimum in the non-plenum overhead space

27. A fire alarm designer is specifying the system for a building with three sprinkler risers. Each riser has a waterflow switch and tamper switch. The designer places each device on its own zone — six total. During design review, the fire captain requests that each waterflow zone trigger different notification zones corresponding to the riser's coverage area. What operational advantage does this provide?

- A. Zone-specific waterflow notification is required by NFPA 72 for all buildings with multiple risers
- B. Zone-specific notification directs occupants to evacuate only the affected area while other areas continue normal operations
- C. Individual waterflow notification eliminates the need for tamper switch monitoring on the same risers
- D. Zone-specific waterflow response is prohibited because all waterflow alarms must trigger building-wide notification

28. A fire alarm designer is specifying smoke detection for a cold storage facility. The main freezer is at -25°F. Loading docks fluctuate between 0°F and 92°F. Offices are at 72°F. Heat detectors are specified for the freezer and docks. Per NFPA 72, what minimum activation temperature is required for the loading dock?

- A. 135°F because it is the universal standard commercial heat detector rating
- B. 200°F because temperature-fluctuating environments require high-temperature ratings
- C. At least 112°F to maintain the required 20°F margin above the 92°F maximum ambient
- D. 92°F to provide immediate response to any temperature exceeding normal maximum

29. A fire alarm designer is developing elevator recall for MRL elevators with drive equipment at the top of each hoistway. Per NFPA 72 Section 21.3, the drive area is treated as the machine room. When the drive area detector activates, what recall response is required?

- A. Phase I recall to an alternate floor because smoke near the drive may affect the primary floor
- B. Phase I recall to the primary floor identical to the lobby detector response
- C. Immediate shunt trip disconnecting elevator power before any recall initiates
- D. Only a supervisory signal because MRL drive area detection is informational

30. A fire alarm designer is specifying the mass notification system integrated with voice evacuation per NFPA 72 Chapter 24. The emergency plan establishes mass notification may override fire alarm audio during specific threat scenarios. When this override occurs, what fire alarm function must continue?

- A. Fire alarm visual notification must continue on all floors during the override
- B. The panel must generate a trouble signal for the duration of the override
- C. The panel must transfer all output control to the mass notification controller
- D. The fire alarm signal must continue transmitting to the supervising station

31. A fire alarm designer is developing the releasing circuit for a pre-action sprinkler system. Per NFPA 72 Section 23.11, the circuit must be supervised. If the circuit develops an open fault, what must the panel do?

- A. Immediately open the pre-action valve as a precautionary safety measure
- B. Generate a trouble signal indicating the releasing circuit has lost continuity
- C. Transmit an alarm signal because releasing circuit faults are emergency conditions
- D. Disable detection in the pre-action zone to prevent unmonitored release

32. A fire alarm designer is specifying detection for a building with a swimming pool, a commercial laundry, and a woodworking shop. Each space produces conditions incompatible with smoke detectors. What detection is most appropriate for all three?

- A. Aspirating detection with sampling units outside each space for remote analysis
- B. Multi-criteria detectors with particle discrimination algorithms
- C. Heat detection because all three environments cause smoke detector problems
- D. Flame detection because combustible materials produce visible flame first

33. A fire alarm designer is specifying visible notification for an ADA-accessible hotel guest room measuring 16×18 feet with a 9-foot ceiling. Per NFPA 72, a 15 cd wall strobe covers up to 20×20 feet. What additional notification is required beyond the standard strobe?

- A. A supplemental device effective for waking sleeping hearing-impaired occupants
- B. A ceiling-mounted strobe at 177 cd directly above the bed location
- C. A low-frequency 520 Hz audible tone generator near the bed
- D. A second wall strobe at double candela on the wall nearest the bed

34. A fire alarm designer is specifying voice evacuation using 70.7V distribution. Two speakers on Floor 7 are wired in parallel without impedance-matching transformers. What is the primary risk?

- A. The speakers produce distorted audio at double the intended volume level
- B. The speakers produce no audio because 70.7V requires transformers for output
- C. The parallel connection creates a supervision gap the panel cannot detect
- D. The low impedance load can cause amplifier distortion, overheating, and damage

35. A fire alarm designer is specifying the system for a convention center exhibit hall measuring 400×250 feet with 48-foot ceilings. Projected beam detectors span the 400-foot dimension with 50-foot lateral spacing. What must be verified about this spacing?

- A. That the 50-foot spacing does not exceed the 30-foot standard spot detector requirement
- B. That the 50-foot spacing does not exceed the manufacturer's listed maximum for the 48-foot ceiling
- C. That the beam count equals at least one per 5,000 square feet of floor area
- D. That the spacing matches the fire sprinkler spacing for consistent protection patterns

36. A fire alarm designer is developing the fire alarm system for a phased construction project. Phase 1 (Floors 1-15) will be operational while Phase 2 (Floors 16-30) is under construction. During Phase 2, construction activities including cutting, drilling, and drywall finishing will generate dust. What coordination is required for the Phase 1 system during Phase 2 construction?

- A. Phase 1 zones adjacent to construction must be bypassed with the monitoring station notified of the impairment
- B. Phase 1 must be shut down completely during Phase 2 construction for safety
- C. No coordination is needed because Phase 1 and Phase 2 are on separate SLC loops
- D. Phase 1 detectors near the construction boundary should be temporarily replaced with heat detectors

37. A fire alarm designer is evaluating three candidate approaches for adding 35 new devices to an existing system. The panel has three SLC loops. SLC 1 = 190 devices/142 mA, SLC 2 = 175 devices/128 mA, SLC 3 = 95 devices/68 mA. Each loop maximum is 198 devices/150 mA. Which distribution approach creates the most balanced system with the best future flexibility?

- A. All 35 on SLC 3 because it has the most remaining device and current capacity
- B. 8 on SLC 1 (reaching 198), 23 on SLC 2 (reaching 198), and 4 on SLC 3
- C. Place all 35 on SLC 3 giving it 130 devices/94 mA — preserving margin on all three loops
- D. Split 12/12/11 evenly across all three loops for balanced device counts

38. A fire alarm designer is specifying the central station monitoring connection per NFPA 72 Section 26.3.4. What is the maximum time for the central station operator to initiate the required response after receiving an alarm signal?

- A. 60 seconds from receipt to acknowledgment at the operator console
- B. 120 seconds from receipt to completion of fire department notification
- C. 30 seconds from receipt to first contact with emergency dispatch
- D. 90 seconds from receipt to initiation of the required response action

39. A fire alarm designer is specifying the system for a building with an emergency generator. Per NEC Article 700, what is the maximum transfer time for the automatic transfer switch?

- A. 30 seconds for all emergency loads per the standard requirement
- B. 10 seconds per NEC Article 700 for all emergency system loads
- C. 60 seconds with panel batteries bridging the extended transfer
- D. 120 seconds because panels have internal batteries for the transition

40. A fire alarm designer is developing the notification design for a warehouse with 50-foot ceilings and high-bay racks to within 4 feet of the ceiling. The design includes ceiling beam detectors and in-rack detection at 17-foot and 34-foot elevations. What is the purpose of in-rack detection?

- A. In-rack detectors identify fires at storage levels before smoke reaches the 50-foot ceiling
- B. In-rack detectors provide redundancy for ceiling beam detector malfunctions
- C. In-rack detectors compensate for beam sensitivity reduction from warehouse dust
- D. NFPA 72 mandates in-rack detection for all rack configurations above 25 feet

DOMAIN 3.2 — MAINTENANCE AND INSPECTION (Questions 41–78)

41. A fire alarm technician performs annual releasing system testing. The solenoid is disconnected and a substitute load installed. Cross-zone logic, countdown, abort switch, and releasing circuit supervision are all verified. What additional test remains in the protected space?

- A. The releasing solenoid must be reconnected for a live discharge verification
- B. The cross-zone test must be repeated with zones in the opposite activation order
- C. The pre-discharge warning appliances must be verified for adequate audible and visual output
- D. The substitute load must be tested with a calibrated meter to verify delivered voltage

42. A fire alarm designer reviews a sensitivity test report for an 8-year-old system with 600 detectors. The report shows 22 detectors between 3.8% and 5.2% (above 3.7% max) and 8 detectors between 0.1% and 0.4% (below 0.5% min). What action is required?

- A. Only the 22 high-reading detectors require cleaning — low readings indicate superior sensitivity
- B. All 600 detectors must be cleaned because 30 out-of-range indicates building-wide contamination
- C. The panel sensitivity thresholds should be expanded to accommodate the 8-year drift
- D. All 30 out-of-range detectors — both high and low — require investigation and correction

43. A fire alarm technician tests elevator recall in a building with four banks and selective recall. Activating Bank A: only Bank A recalls. Activating Bank D: Banks C and D both recall. Only Bank D's control module relay activated. Where is the problem?

- A. The panel programming activates both Bank C and D outputs for Bank D's zone
- B. The elevator controllers for Banks C and D share a common recall input
- C. Bank D's SLC communication interferes with Bank C's control module
- D. Bank D's detector generates a building-wide alarm code

44. A fire alarm technician tests the voice evacuation live microphone from the FCC. Audio is heard on Floors 1-15 but not Floors 16-28. The pre-recorded message plays on all 28 floors. What is the most likely cause?

- A. The live microphone routing is programmed to broadcast only to Floors 1-15
- B. The amplifiers for Floors 16-28 have a fault blocking live audio
- C. The microphone output power is insufficient for the upper floor speaker load
- D. Speaker circuits on Floors 16-28 have frequency-dependent impedance faults

45. A fire alarm technician tests AC power supervision. AC is disconnected. After 2 hours 45 minutes, the panel generates "AC POWER FAILURE" trouble. Per NFPA 72 Section 10.6.9, is this acceptable?

- A. No, the trouble must appear immediately upon primary power disconnection
- B. No, the trouble should appear within 60 minutes for modern panel systems
- C. Yes, 2 hours 45 minutes is within the 3-hour maximum per NFPA 72
- D. Yes, any delay under 4 hours is acceptable for panels with battery backup

46. A fire alarm technician discovers a smoke detector covered with a surgical mask by nursing staff during renovation. The covering has been in place for eight weeks. What must be documented?

- A. Surgical masks are porous enough to permit smoke entry and the detector remains functional
- B. The covering is acceptable during active renovation if logged in maintenance records
- C. The mask may remain until renovation completes to prevent construction alarms
- D. The detector has been disabled for eight weeks — a significant impairment requiring correction

47. A fire alarm technician tests communication paths — IP primary, cellular secondary. IP test succeeds. Technician disconnects IP. After 205 seconds, the panel generates "IP COMMUNICATION FAILURE." The cellular test then succeeds. Per NFPA 72, does the IP supervision timing pass?

- A. Yes, the 200-second limit has a built-in 5% tolerance for measurement variation
- B. No, 205 seconds exceeds the 200-second maximum and must be corrected
- C. Yes, because commissioning mode extends supervision timers by 10 seconds
- D. No, but a firmware update can correct the timing to meet the requirement

48. A fire alarm technician tests a double-interlock pre-action system. A detector activates. The panel processes the alarm. The valve does not open. Is this correct?

- A. No, detection should open the valve as the first interlock for all pre-action types

- B. No, detection should at least energize the pilot solenoid for faster response
- C. Yes, but only because the system was in maintenance mode during the test
- D. Yes, double-interlock requires both detection AND air pressure drop

49. A fire alarm technician discovers the panel's event log has been full for ten months, overwriting entries. Building management was unaware. What is the impact?

- A. Ten months of diagnostic history has been lost — the log must be downloaded and cleared
- B. The full log causes panel processing delays reducing alarm response speed
- C. The panel must be replaced with a model having larger log capacity
- D. The log has no operational impact because the panel functions independently

50. A fire alarm technician tests semiannual detectors on Floor 10. Six adjacent detectors take 32 to 45 seconds to activate with aerosol smoke. Other Floor 10 detectors activate in 3 to 8 seconds. What does the delayed response indicate?

- A. The SLC polling rate for those addresses is configured slower than others
- B. The aerosol can was running low during those six consecutive tests
- C. The six detectors likely have contaminated sensing chambers reducing responsiveness
- D. HVAC airflow is diluting smoke at those locations before reaching the detectors

51. A fire alarm technician tests primary-to-secondary power transfer. After disconnecting AC, voltage: 0 min = 26.8V, 5 min = 26.4V, 10 min = 26.0V, 15 min = 25.6V. After reconnecting AC, charger activates. Are these acceptable?

- A. No, the 1.2V drop over 15 minutes indicates batteries are near end of life
- B. No, voltage should remain constant during standby
- C. Yes, but only if voltage recovers above 27.0V within 30 minutes
- D. Yes, the gradual decline is normal for batteries under standby load

52. A fire alarm technician discovers a smoke detector covered with a clear plastic bag with holes by kitchen staff. What must be documented?

- A. The holes allow smoke entry and the modification is acceptable
- B. The unauthorized modification renders the detector non-compliant and must be removed
- C. The bag may remain if the detector activates during functional testing
- D. The bag may remain if kitchen staff sign an acknowledgment form

53. Per NFPA 72 Table 14.4.3.2, what is the required testing frequency for smoke detectors?

- A. Semiannually using approved aerosol smoke or calibrated test source
- B. Annually as part of the comprehensive system functional test
- C. Quarterly to coincide with building maintenance schedules
- D. Monthly for continuous reliable detection throughout the building

54. A fire alarm technician tests visible notification in a hospital corridor. Two strobes visible from the same location flash 0.3 seconds apart on different NAC circuits. What code requirement is violated?

- A. Flash rate requirement because combined output exceeds 2 flashes per second
- B. Candela requirement because unsynchronized output produces uneven coverage
- C. Synchronization requirement — strobes in the same field of view must flash together
- D. Mounting height requirement because improperly mounted strobes create offsets

55. A fire alarm technician discovers two pull stations painted green to match school colors. Paint covers housing, handle, and labels. What must be documented?

- A. Pull stations function if they activate during testing and paint is cosmetic
- B. Only labels need restoration — housing color does not affect operation

- C. School should repaint red within 30 days per a correction schedule
- D. Painted pull stations must be replaced because paint obscures required red color and labels

56. A fire alarm technician performs a battery load test. Starting 27.2 VDC. After test under full alarm load, ending 19.2 VDC. Manufacturer minimum is 20.4 VDC. What must be documented?

- A. Batteries passed because 19.2 VDC exceeds industry minimum of 18 VDC
- B. Batteries failed — 19.2 VDC is below the manufacturer's 20.4 VDC minimum
- C. Test is inconclusive and must be repeated after batteries fully recharge
- D. Batteries can remain in service for 60 days while replacements are ordered

57. A fire alarm technician tests HVAC shutdown. A duct detector activates, panel processes alarm, control module relay closes. AHU does not shut down. Where is the fault?

- A. In the wiring between the control module relay and the AHU controller shutdown input
- B. In the duct detector because it may generate an incorrect signal type
- C. In the panel programming because the output may not be linked to the duct zone
- D. In the SLC communication because the module may not have received the command

58. A fire alarm technician discovers the Record of Completion was last updated seven years ago. Four renovations added 70 devices and changed the sequence three times. What is needed?

- A. Annual testing records adequately capture modifications making updates optional
- B. The original Record remains valid as the initial compliance baseline
- C. The Record must be updated to reflect the current system per NFPA 72 Section 7.8
- D. A new Record is needed only if the panel was physically replaced

59. A fire alarm system log shows 160 "WATERFLOW — ALARM" entries over five months with no fires and no sprinkler activations. Building engineer reports municipal pressure surges. What should be recommended?

- A. Replace all switches with models having built-in pressure compensation
- B. Disconnect switches until the pressure issue is permanently resolved
- C. Increase panel alarm threshold for waterflow zones to filter brief events
- D. Investigate pressure surges and adjust waterflow switch retard delay settings

60. A fire alarm technician discovers a renovation enclosed a corridor smoke detector behind a new wall. The detector communicates normally. What must be documented?

- A. The detector can remain because it communicates normally
- B. The detector must be relocated to the occupied corridor and the concealed space evaluated
- C. The panel descriptor should be updated to reflect the concealed position
- D. The concealed detector provides dual coverage for both spaces

61. A fire alarm technician tests a tamper switch on an OS&Y valve. After two revolutions from fully open, the supervisory signal appears. Per NFPA 72, does this pass?

- A. Yes, activation within two revolutions meets the NFPA 72 requirement
- B. No, the switch must activate after one revolution for OS&Y valves
- C. No, the requirement is activation within one and a half revolutions
- D. Yes, but only for OS&Y valves — butterfly valves have stricter requirements

62. A fire alarm technician tests a horn/strobe. Temporal-three sounds correctly. Strobe flashes at 0.6 flashes per second. Per NFPA 72, what should be documented?

- A. The strobe passes because any rate below 2 per second is acceptable

- B. Flash rate is irrelevant if candela meets room coverage requirements
- C. The strobe fails — NFPA 72 requires 1 to 2 flashes per second
- D. Rate is acceptable for sleeping areas but fails for commercial applications

63. A fire alarm technician discovers a tamper switch generates alarm instead of supervisory. Contact closure confirmed at panel. What is the most likely cause?

- A. Tamper switch requires different EOLR than alarm circuits
- B. Panel cannot distinguish alarm from supervisory on the same input
- C. Tamper wiring polarity is reversed causing misclassification
- D. The tamper input is programmed as alarm rather than supervisory

64. A fire alarm system has IP primary and cellular secondary. "IP COMMUNICATION FAILURE" active 55 days. Cellular functions. What should be documented?

- A. Cellular provides complete monitoring so IP failure is not urgent
- B. The system has operated without redundancy for 55 days — a significant impairment
- C. IP trouble should be repaired at owner's convenience during next visit
- D. No documentation needed because system functions with cellular

65. A fire alarm technician discovers a poster mounted over a corridor horn/strobe completely blocking both outputs. What must be documented?

- A. The poster obstructs both audible and visible notification and must be removed
- B. Only strobe obstruction matters because horn sound travels around obstacles
- C. Device is functional if it activates during testing regardless of obstruction
- D. Building management may apply for AHJ variance to keep the poster

66. A fire alarm technician performs a battery load test. Starting 26.4 VDC. After test, ending 19.8 VDC. Manufacturer minimum is 20.4 VDC. What must be documented?

- A. Batteries passed because 19.8 VDC exceeds industry minimum of 18 VDC
- B. Test is inconclusive and must be repeated after batteries recharge
- C. Batteries failed — 19.8 VDC is below the 20.4 VDC minimum
- D. Batteries can remain in service for 90 days while replacements are ordered

67. A fire alarm technician discovers a smoke detector relocated from ceiling to a filing cabinet at 36 inches above floor. What must be documented?

- A. Detector at cabinet height may detect smoke faster because smoke fills entire room
- B. Relocation is acceptable if building staff document the reason
- C. Detector should be raised to at least 60 inches for improved coverage
- D. Detector at filing cabinet height is non-functional and must be reinstalled at the ceiling

68. Per NFPA 72 Table 14.4.3.2, supervisory devices must be tested at what minimum frequency?

- A. Monthly to ensure valve positions remain correct
- B. Annually as part of the comprehensive system functional test
- C. Semiannually to match smoke detector testing frequency
- D. Quarterly to coincide with building maintenance schedules

69. A fire alarm technician discovers the FCC graphic annunciator has seven burned-out LED indicators. What must be documented?

- A. The burned-out LEDs prevent firefighters from identifying alarms in those zones and must be repaired
- B. LEDs are cosmetic and do not affect system operation

- C. Only LEDs in occupied zones need repair
- D. Annunciator must be replaced entirely

70. Per NFPA 72 Table 14.4.3.2, releasing device circuits must be tested at what frequency?

- A. Annually as part of the comprehensive releasing system functional test
- B. Semiannually because releasing circuits are more critical
- C. Monthly to ensure the suppression system is always ready
- D. Only during initial acceptance with no recurring testing required

71. A fire alarm technician discovers the panel room contains paint, chemicals, and boxes. Working clearance is 18 inches. What violations exist?

- A. Only chemical storage is a concern — other items and clearance are acceptable
- B. Room may be used for storage if chemicals are in sealed containers
- C. Both storage and inadequate clearance violate NEC Article 110 working space requirements
- D. Only the 18-inch clearance violates code — organized storage is permitted

72. A fire alarm technician tests stairwell pressurization. Detector activates, fans start. Floor 4 door requires more force. Floor 18 door opens normally. What should be documented?

- A. Only fan activation requires documentation — door resistance is mechanical scope
- B. Some variation is expected and both floors pass
- C. Only Floor 4 observation matters because it confirms positive pressure
- D. Both observations should be documented because inconsistent pressurization suggests a duct or damper issue

73. A fire alarm technician discovers the panel clock shows 2:00 PM when actual time is 3:48 PM — a 108-minute discrepancy. What must be documented?

- A. Time discrepancies under 2 hours are within acceptable tolerance
- B. The 108-minute discrepancy affects event log accuracy and must be corrected
- C. Clock error only affects display and has no operational significance
- D. Only the AHJ can determine whether correction is required

74. A fire alarm technician tests access control interface. Alarm activates. 16 of 18 locks release but 2 remain locked. What must be investigated?

- A. The control module outputs, wiring, and power supply to the two non-releasing locks
- B. Panel programming because the two locks may not be in the response matrix
- C. Access control firmware needing updates for fire alarm compatibility
- D. NAC circuits because locks may be wired to the notification circuit

75. A fire alarm technician tests a waterflow switch. Inspector's test valve open. Water flows. After 86 seconds, "WATERFLOW — ALARM" appears. Per NFPA 72, does this pass?

- A. No, alarm must appear within 60 seconds per standard timing
- B. No, alarm must appear within 30 seconds for wet-pipe systems
- C. Yes, 86 seconds is within the 90-second maximum
- D. Yes, but the 86-second response indicates retard delay may be at maximum

76. A fire alarm technician performs sensitivity testing. One detector reads 0.4% — below the 0.5% minimum. What does this indicate?

- A. Detector is at peak sensitivity representing ideal conditions

- B. Low readings are always acceptable because they indicate enhanced capability
- C. Panel sensitivity calibration has drifted and needs manufacturer adjustment
- D. Detector is outside listed parameters and must be investigated for a fault

77. A fire alarm technician tests DACT communication. Line 1 succeeds. Technician disconnects Line 1 and tests Line 2. Station does not receive signal. What must be documented?

- A. Line 2 cannot be tested independently — DACT selects lines automatically
- B. Line 2 failed and must be investigated and repaired for dual-path redundancy
- C. Both lines passed because DACT needs only one functional line
- D. Line 2's failure was caused by disconnecting Line 1

78. A fire alarm technician discovers the FCC graphic annunciator is completely dark. Panel repeater, voice controls, and telephone function normally. What must be documented?

- A. The annunciator failure impairs emergency response and must be documented as a deficiency
- B. Annunciator is supplementary and failure has no operational significance
- C. Annunciator can be repaired at owner's convenience during next visit
- D. Annunciator must be replaced entirely because component repair is not supported

DOMAIN 3.3 — SUBMITTAL PREPARATION AND SYSTEM LAYOUT (Questions 79–100)

79. A fire alarm designer calculates NAC voltage drop: 14 AWG ($3.14 \Omega/1000 \text{ ft}$), round-trip 900 feet, 2.8 amps on 24 VDC. What is the end-of-circuit voltage?

- A. 21.50 VDC providing generous margin above minimum
- B. 19.50 VDC providing comfortable margin above 16 VDC
- C. 16.09 VDC — barely above the 16 VDC minimum with dangerously thin margin

D. 14.80 VDC falling below 16 VDC minimum requiring redesign

80. A fire alarm designer calculates battery capacity: panel/SLC standby = 0.88A, voice standby = 1.12A, NAC alarm = 4.2A, voice alarm = 8.8A. Building has generator. Using 4-hour standby, 15-minute alarm, 20% safety factor. What is minimum capacity?

- A. 15.60 Ah using 4-hour standby with 5-minute alarm instead of 15-minute
- B. 10.85 Ah using correct durations without the safety factor
- C. 24.00 Ah using 24-hour standby because generators do not reduce voice requirements
- D. Approximately 13.5 Ah after applying all three factors correctly

81. A fire alarm sequence of operations shows duct detector triggering HVAC shutdown only — no notification, no recall, no station signal. A reviewer flags missing station transmission. What is correct?

- A. Duct detectors never transmit because they are supervisory-class devices
- B. The duct detector signal should transmit to the supervising station even without notification
- C. Reviewer is incorrect — duct signals transmit automatically regardless of matrix
- D. Station transmission applies only when duct detectors are configured as alarm inputs

82. A fire alarm conduit schedule shows 1-inch EMT with ten 14 AWG THHN and eight 18 AWG THHN (18 total). Annex C max: 14 AWG = 22, 18 AWG = 40. Mixed sizes. How must fill be verified?

- A. Calculate total conductor area from Chapter 9 Table 5 and compare to 40% fill limit
- B. Compare each size individually — since both are below maximums, it passes
- C. Add counts (10+8=18) and compare to smaller Annex C max of 22
- D. Use Annex C for 14 AWG only since the larger conductor controls fill

83. A fire alarm floor plan shows a 90-degree L-shaped corridor — 190 feet longer leg, 120 feet shorter leg. Detectors at 30-foot spacing with detector at corner. Is the corner detector necessary?

- A. No, detectors along each leg provide adequate coverage through the direction change
- B. No, corner detectors create unnecessary redundant coverage
- C. Yes, the corner detector ensures detection at the turn where coverage may be limited
- D. Yes, but only if corridor width exceeds 10 feet at the intersection

84. A fire alarm device schedule shows 196 devices on SLC 1 (max 198). Renovation adds 14 devices. How should the designer advise?

- A. Add 2 to SLC 1 reaching 198 and place 12 on new loop — noting SLC 1 at max has zero flexibility
- B. All 14 can be added by requesting firmware extending capacity beyond 198
- C. Install monitor modules consolidating devices to free addresses
- D. All 14 should go on a new SLC to preserve remaining capacity on SLC 1

85. A fire alarm riser shows remote NAC power supplies on Floors 7, 14, and 21 of a 28-story building. Each has own batteries. What must be calculated separately?

- A. Voltage drop from main panel to each remote location
- B. A separate battery calculation based on each remote panel's specific standby and alarm loads
- C. Combined calculation averaging loads across all three remotes
- D. Conduit fill for supervised circuit to each remote

86. A fire alarm specification requires Record of Completion per NFPA 72. What must it contain?

- A. System specifications, circuit details, device counts, power supply data, and required signatures
- B. Only installer's license and signature certifying compliance

- C. Only AHJ's inspection report and acceptance test determination
- D. Design engineer's calculations and specification references

87. A fire alarm specification requires all cable above suspended ceilings in conduit. Spaces are non-plenum. NEC does not require conduit. What should the designer do?

- A. Ignore specification because it exceeds code requirements
- B. Install conduit only in corridors and omit in rooms
- C. Install conduit as specified because the specification is a contractual obligation
- D. Request AHJ to override the specification to reduce costs

88. A fire alarm voltage drop for a 70.7V speaker circuit shows 62.5 VAC at the farthest speaker. Manufacturer minimum is 55 VAC. Does the circuit pass?

- A. No, 70.7V must maintain at least 90% (63.6 VAC) at all locations
- B. No, speakers require exactly 70.7 VAC for impedance matching
- C. Yes, but only if amplifier can be increased to compensate for loss
- D. Yes, 62.5 VAC exceeds the 55 VAC minimum with 7.5-volt margin

89. A fire alarm shop drawing shows a releasing system with 18-second pre-discharge timer. Engineer notes it may not provide adequate evacuation. What determines the delay?

- A. NFPA 72 specifies a fixed 30-second minimum for all clean agent spaces
- B. Room size, exit count, travel distance, and expected occupant count
- C. Agent manufacturer specifies delay based on concentration rate
- D. Fire department determines delay based on response time

90. A fire alarm as-built shows 175 devices on SLC 1. Panel programming shows 183. Record of Completion shows 168. What must be corrected?

- A. All three must be reconciled against a physical field count to show the same number
- B. Only as-built needs updating since it is closest to the panel count
- C. Only the Record needs updating because it has the most outdated count
- D. Panel must be reprogrammed to match as-built as design reference

91. A fire alarm corridor shows a 220-foot straight corridor with detectors at 30-foot spacing. First detector at 10 feet: positions at 10, 40, 70, 100, 130, 160, 190, 220. Eight detectors. The last is at the far end. Is this correct?

- A. No, 9 detectors are needed because a gap exists near the center
- B. No, first and last detectors must be within 15 feet of each end, not at the ends
- C. Yes, 8 detectors with 30-foot spacing and end distances within 15 feet provide coverage
- D. Yes, but additional detectors are needed at every corridor intersection

92. A fire alarm shop drawing shows SLC 1 (Class B, Floors 1-6) and SLC 2 (Class A, Floors 7-22). Reviewer questions different classifications. What is valid rationale?

- A. NFPA 72 requires Class A above Floor 6 in buildings taller than 7 stories
- B. Designer determined upper floors benefit from Class A fault tolerance due to longer egress
- C. Class B is prohibited above Floor 6 per NEC Article 760
- D. Both loops must use identical classifications for consistent performance

93. A fire alarm shop drawing shows NAC with 12 horn/strobes at 0.310A, 6 speakers at 0.150A, and 5 strobes at 0.195A on a 3.0-amp output. What is the total load?

- A. 3.72 amps from horn/strobes alone exceeding the rating

- B. 2.68 amps total providing margin within the rating
- C. 4.58 amps based on averaging device currents and multiplying by count
- D. 5.59 amps total from all devices significantly exceeding the 3.0-amp rating

94. A fire alarm riser shows "PATHWAY SURVIVABILITY LEVEL 2" on voice circuits. What satisfies Level 2?

- A. Standard FPLP in standard EMT without additional fire rating
- B. Either 2-hour fire-rated cable (CI cable) or installation within 2-hour fire-rated construction
- C. Standard FPLR in a 1-hour fire-rated stairwell
- D. Any listed cable in rigid metal conduit with firestop at each floor

95. A fire alarm specification requires acceptance testing per NFPA 72 before CO. Spec requires 7 business days' notice to AHJ. GC demands testing in 3 days. How should contractor respond?

- A. Conduct testing in 3 days and submit for AHJ retroactive approval
- B. Contact AHJ to request expedited waiver of notice period
- C. Maintain 7-day notice requirement and reschedule with proper notification
- D. Perform preliminary test in 3 days and schedule formal test with notice

96. A fire alarm floor plan shows a conference room 48×36 feet with 10-foot ceiling. One 75 cd wall strobe on the 48-foot wall. Per NFPA 72, 75 cd covers up to 45×45 feet. The 48-foot dimension exceeds 45. What is the assessment?

- A. The room requires higher candela or additional strobes because one dimension exceeds the table maximum
- B. The 75 cd is adequate because the 36-foot width compensates for the excess length
- C. The room passes if the strobe is on the 36-foot wall instead
- D. The 3-foot overage is within standard installation tolerance

97. A fire alarm technician reviews as-built showing 152 devices on SLC 1. Physical count: 160. Panel confirms 160. What is required?

- A. No action — 8-device discrepancy is within tolerance
- B. Panel must be reprogrammed to match the 152-device drawing count
- C. Only Record of Completion needs updating since drawings were original design
- D. As-built drawings must be updated to reflect 160 devices currently installed

98. A fire alarm battery calculation: standby = $0.62\text{A} \times 24\text{hr} = 14.88\text{ Ah}$, alarm = $5.2\text{A} \times 0.083\text{hr} = 0.432\text{ Ah}$, subtotal = 15.312 Ah , $\times 1.20 = 18.37\text{ Ah}$. Drawing specifies 18 Ah batteries. Is this adequate?

- A. Yes, 18 Ah is close enough for practical purposes
- B. No, 18 Ah is below the 18.37 Ah minimum — the next standard size must be used
- C. Yes, but only if building has a generator reducing standby
- D. No, the 20% factor should be applied to each component separately

99. A fire alarm sequence for hospital shows smoke detector alarms trigger alarm-floor-only notification while pull stations trigger full building notification. Both trigger recall and station signal. Is this valid?

- A. No, all alarm types must produce identical building-wide responses
- B. No, smoke detectors must trigger broader notification than pull stations
- C. Yes, defend-in-place hospitals may have differentiated responses per the fire safety plan
- D. Yes, but only if hospital has fewer than 200 beds

100. A fire alarm as-built captures the panel's dedicated branch circuit: 20A breaker, 12 AWG, 190-foot run, labeled, lock-on, no GFCI/AFCI. What additional detail should be documented?

- A. The conduit type, size, and routing path from the electrical panel to the fire alarm panel

- B. Voltage at panel terminals for baseline comparison
- C. Electrician's name and license for warranty documentation
- D. Breaker manufacturer and catalog number for replacement

DOMAIN 3.4 — MANAGEMENT (Questions 101–115)

101. A fire alarm project supervisor discovers a subcontractor pulled cable with excessive tension on 24 runs totaling 3,500 feet. Internal insulation may be damaged. What must the supervisor require?

- A. Visual inspection at each pull point is sufficient to identify damage
- B. The cable can be connected — damage will be found during functional testing
- C. The subcontractor must certify in writing that proper technique was used
- D. Megger testing on all 24 runs to verify insulation integrity before connecting devices

102. A fire alarm contractor is coordinating acceptance testing for a building with elevator recall, HVAC shutdown, pressurization, smoke control, and door release. Which trade contractors must participate?

- A. Only fire alarm contractor because the test covers fire alarm equipment exclusively
- B. Elevator, HVAC, controls, and door hardware contractors must verify their equipment
- C. General contractor solely coordinates and attends on behalf of all trades
- D. Only AHJ and fire alarm contractor — other trades submit results separately

103. A fire alarm project manager receives a change request to convert from horn/strobe to voice evacuation at 85% completion. What is the correct response?

- A. Install speakers on remaining areas and retain horn/strobes in completed areas
- B. Refuse because conversion at 85% is technically impossible
- C. A formal change order documenting engineering revision, cost, and schedule impact must be processed

D. Absorb cost to maintain client relationship and timeline

104. A fire alarm contractor discovers the electrical contractor installed an AFCI/GFCI breaker on the fire alarm dedicated circuit. What is the correct action?

- A. Notify the general contractor to direct the electrical contractor to replace it with a standard breaker
- B. Accept the breaker because it provides enhanced protection beyond code minimum
- C. Replace the breaker directly since fire alarm compliance is the contractor's scope
- D. Contact building owner to authorize cost of breaker replacement

105. A fire alarm contractor receives 400 detectors — 375 with one date code and 25 with a different code. Same model listed for panel. Should the contractor be concerned?

- A. Yes, all detectors must have identical date codes for firmware consistency
- B. Yes, the 25 different units must go on a separate SLC loop
- C. No, but the 25 should be placed in non-critical locations as precaution
- D. No, date code variations are normal in large orders and do not affect compatibility

106. A fire alarm technician asks whether tightening a loose wire nut — resolving a ground fault — requires a formal service report. What is correct?

- A. Reports needed only when devices are replaced or programming changed
- B. Every service activity must be documented in a written report regardless of scope
- C. Reports required only when repair resolves an active alarm condition
- D. Minor repairs under 15 minutes can be documented verbally

107. A fire alarm project's field technicians produced messy but accurate markup drawings. Closeout approaching. What should the contractor do?

- A. Create clean professional as-built drawings incorporating all field markup information
- B. Submit messy markups as-is because they represent actual conditions
- C. Submit original shop drawings since installation followed the design
- D. Have technicians recreate drawings from memory for cleaner documentation

108. Per NFPA 72, what minimum documentation must contractor deliver to building owner at closeout?

- A. Only panel manufacturer's manual and warranty documents
- B. Only as-built drawings and contractor's completion certificate
- C. As-built drawings, Record of Completion, sequence of operations, and operating instructions
- D. Complete bid documents, shop drawings, and quality worksheets

109. A fire alarm contractor schedules acceptance testing for a hospital. Infection control requires 72-hour notice before aerosol testing in patient care areas. GC wants testing in 48 hours. How should contractor proceed?

- A. Proceed in 48 hours because fire code overrides hospital protocols
- B. Use non-aerosol methods exclusively in patient areas without notice
- C. Test only non-patient areas in 48 hours and skip patient areas
- D. Provide 72-hour notice and coordinate patient testing per infection control

110. A fire alarm project supervisor schedules acceptance testing. AHJ requires 10 business days' notice. GC demands testing in 5 days. How should supervisor respond?

- A. Conduct testing in 5 days and submit for AHJ retroactive approval

- B. Maintain the 10-day notice requirement and reschedule with proper notification
- C. Request AHJ waive notice period due to critical timeline
- D. Perform preliminary test in 5 days and schedule formal test later

111. A fire alarm project manager discovers that the building's HVAC contractor has not completed the smoke control system installation. The fire alarm acceptance test is scheduled in two weeks. The smoke control interface is a critical part of the fire alarm acceptance test. How should the project manager handle this?

- A. Coordinate with the GC to ensure the HVAC contractor completes smoke control before the acceptance test date
- B. Proceed with acceptance testing for all non-smoke-control interfaces and schedule a follow-up test
- C. Delay the entire acceptance test until all building systems are complete and operational
- D. Test the fire alarm panel's smoke control outputs using simulated loads without the actual HVAC equipment

112. A fire alarm contractor is managing a project where the building owner requests that the fire alarm system be connected to a cloud-based monitoring dashboard accessible from a smartphone app. The owner wants real-time alarm and trouble notifications on their phone. What should the contractor advise?

- A. Cloud monitoring replaces the central station contract and satisfies NFPA 72 monitoring requirements
- B. The cloud dashboard must be the same manufacturer as the fire alarm panel for compatibility
- C. Cloud-based monitoring may supplement but does not replace the required supervising station connection
- D. Cloud monitoring is prohibited by NFPA 72 because it creates unauthorized access to fire alarm data

113. A fire alarm project supervisor discovers that a junior technician has been programming device location descriptors using unofficial abbreviations not found in the approved abbreviation list. The descriptors read "3FL-NW-CORR-SMK" instead of "FLOOR 3 NORTHWEST CORRIDOR SMOKE DETECTOR." What concern does this create?

- A. Unofficial abbreviations are acceptable if the installing contractor maintains an abbreviation key
- B. Abbreviated descriptors save panel memory and are the preferred programming method
- C. The descriptors must be corrected to use approved panel location naming standards
- D. Non-standard abbreviations may confuse responding firefighters and maintenance personnel who rely on panel descriptors

114. A fire alarm project manager is overseeing installation in a building where the architect specifies recessed-mount notification appliances throughout all corridors. The fire alarm manufacturer does not offer a recessed version of the specified horn/strobe model. How should the project manager resolve this conflict?

- A. Submit a substitution request with an equivalent recessed-mount device from a compatible manufacturer
- B. Install surface-mount devices and request the architect approve a deviation from the specification
- C. Install surface-mount devices without notifying the architect since the code does not require recessed mounting
- D. Notify the architect and engineer of the conflict and request direction before proceeding

115. A fire alarm contractor completes installation and testing of a fire alarm system. The building owner asks the contractor to provide a written guarantee that the system will prevent all fire-related injuries and property damage. How should the contractor respond?

- A. Provide the guarantee because a properly installed system significantly reduces fire risk
- B. Decline and instead provide the Record of Completion certifying code-compliant installation and the manufacturer's warranty
- C. Provide a modified guarantee limiting liability to the installation workmanship only
- D. Provide the guarantee with standard industry disclaimer language limiting financial exposure

LEVEL III — SIMULATION EXAM 2: ANSWER KEY AND EXPLANATIONS

1. D — CI cable maintains its 2-hour fire rating independently regardless of surrounding construction, so Level 2 is preserved at the crossing. However, both the outgoing and return paths sharing the same 80-foot mechanical chase creates a single point of failure — a fire in that chase could damage both paths simultaneously, compromising Class A pathway diversity even though Level 2 remains intact.
2. B — Each power source calculates its own battery requirements based on the loads it serves. The main panel batteries serve only the loads directly connected to the main panel — panel/SLC, voice amplifier, network communication, NAC, and voice alarm. Each remote power supply has its own dedicated batteries and its own separate calculation based on its specific loads.
3. A — Routing the network cable through an aerial pathway between Buildings 2 and 3 completely eliminates the flood zone as a failure point. Three previous underground repairs have failed, demonstrating that the underground path through the retention pond area is inherently unreliable. Aerial routing avoids the problem permanently rather than attempting to waterproof a vulnerable underground path.
4. C — NFPA 72 does not mandate different detection technologies in each cross-zone. Cross-zoning requires two separate and independent zones to both activate before the panel initiates agent release. The detection technology in each zone does not affect the cross-zone function — the requirement is two independent confirmations regardless of technology.
5. D — Aspirating smoke detection with sampling pipes concealed within architectural trim at multiple heights addresses both stratification and aesthetics simultaneously. The sampling pipes can be hidden in moldings, columns, and balcony railings while drawing air from different elevations. The detection unit is located remotely in a mechanical space, leaving no visible equipment in the atrium.
6. B — A 0.87-volt margin above the 16 VDC minimum is insufficient for long-term reliable operation. Connection resistance increases with aging, conductor resistance increases with temperature, and any future device additions increase current draw. All three factors erode the margin over time, potentially pushing the end-of-circuit voltage below the device minimum operating voltage.
7. A — At minimum five distinct alarm response profiles are needed: patient care floors (defend-in-place with limited notification), surgical suites (restricted audible with visual-only in ORs),

emergency department (immediate notification for transient occupants), neonatal ICU (heightened restriction due to infant vulnerability), and administrative offices (standard notification). Each has unique notification and control requirements.

8. C — When acoustically rated floor-to-ceiling partitions create ten enclosed spaces, each is isolated from the others. Sound and light from notification appliances in one space cannot reach occupants in adjacent enclosed spaces. Each possible configuration must have independent notification coverage when partitions are deployed.
9. D — IP primary with cellular secondary provides dual-path communication with continuous monitoring on both paths. Each path independently meets the 200-second failure detection requirement per NFPA 72 Section 26.6.3.2. Dual-path provides the redundancy that single-path options cannot — if one path fails, the other maintains monitoring without interruption.
10. B — Different elevator banks may recall to different alternate floors based on their operational function. When the machine room detector activates, all banks must recall to alternate floors — but each bank's alternate can be selected based on where its passengers are best served during an emergency. The freight elevator to the loading dock and garage elevator to parking level are functionally appropriate alternates.
11. A — Aspirating smoke detection with sampling pipes threaded through existing architectural cavities — crown moldings, column interiors, and millwork gaps — provides effective detection without visible surface-mounted equipment. The detection unit is in a concealed mechanical space, satisfying both fire code detection requirements and landmark preservation restrictions simultaneously.
12. C — The boiler room with ambient noise exceeding 110 dB presents the most impractical intelligibility challenge. Even maximum speaker output with acoustic treatment cannot overcome noise levels that high to deliver intelligible speech at 0.50 STI. The design must address this limitation through alternative notification means.
13. D — NFPA 72 Section 23.10 requires the fire command center to have a permanently installed fire alarm control panel or a dedicated fire alarm repeater panel. An iPad — even permanently docked — is a portable consumer device that could be disconnected, have its app crash, lose power, or be removed. The FCC requires permanent, dedicated equipment.
14. B — When different conductor sizes share the same conduit, pre-calculated Annex C tables cannot be used because they assume uniform sizes. The actual cross-sectional area of each conductor from NEC Chapter 9 Table 5 must be calculated and the total compared to the conduit's internal area using the 40% fill allowance for three or more conductors.
15. A — Fire alarm monitoring of phase reversal provides building-wide supervisory awareness of the condition. While the pump controller may auto-correct phase reversal locally, the fire alarm panel's

supervisory signal ensures building management, the monitoring station, and emergency responders are informed for documentation, investigation, and maintenance awareness.

16. C — Cubicle partitions at 5.5 feet are below the typical wall-mounted strobe mounting height of 80-96 inches above the floor. Since strobes are mounted above the partition height, the partitions do not obstruct strobe light output. The visible notification coverage calculation treats the space as an open room without interior walls.
17. D — A double-interlock pre-action system requires BOTH fire detection AND a drop in supervisory air pressure before the valve opens. Neither condition alone is sufficient to open the valve. If only detection activates, the panel generates an alarm signal and transmits to the station, but the valve remains closed until the second interlock condition is also satisfied.
18. B — The building's approved fire safety plan determines the specific notification scope for defend-in-place facilities. Some plans notify only the alarm floor, while others include one or two adjacent floors. The notification strategy is a design decision documented in the fire safety plan and approved by the AHJ — not a universal code mandate.
19. A — The pre-discharge countdown must provide adequate evacuation time based on the room's specific characteristics: physical dimensions, number and location of exits, maximum travel distance to the nearest exit, and expected occupant count during business hours. These factors determine whether 20 seconds is sufficient.
20. C — Simultaneous evacuation of all 25 floors into the stairwells creates dangerous congestion that slows evacuation and can cause crush injuries at stairwell entrances. Defend-in-place notifies only affected floors, allowing controlled evacuation while remaining floors shelter safely in fire-rated compartments.
21. D — Manual pull station activation is not subject to PAS delay. NFPA 72 Section 23.8.1.3 applies PAS only to automatic detection signals. A manually activated pull station represents a human-confirmed emergency requiring immediate response. PAS must cancel and general building notification must activate.
22. B — NFPA 72 Section 17.14.8 specifically requires manual fire alarm stations to be red. This is the only fire alarm device type with a mandatory code-specified color requirement. Smoke detectors, horn/strobes, and speakers may be any color acceptable to the manufacturer and project specifications.
23. A — NFPA 72 Section 18.4.4.1 requires audible notification at 15 dB above ambient. Theater: $95 + 15 = 110$ dB. Orchestra pit: $105 + 15 = 120$ dB. Both levels are impractical to achieve with standard appliances. The design must compensate with enhanced visible notification to ensure occupant awareness when audible levels cannot be met.
24. C — Remote amplifier panels at intermediate floors shorten speaker circuit distances, directly addressing the root cause of line losses. Centralized amplifiers on Floor 1 with 800-foot runs

experience significant cumulative resistance losses. Distributing amplifiers with 300-foot maximum runs maintains consistent audio levels across all floors.

25. A — When the kitchen suppression system activates, the fire alarm panel must execute the full approved sequence: building notification, supervising station signal, and HVAC shutdown. A suppression activation confirms a fire condition requiring coordinated building-wide response per the approved sequence of operations.
26. D — The raised floor space used for air distribution is classified as a plenum, requiring FPLP cable. The overhead cable tray space with dedicated ducted return — not used for air handling — is not a plenum and accepts FPL as the minimum cable type. Each space's cable requirement depends on its air-handling function.
27. B — Zone-specific waterflow notification directs occupants to evacuate only the area served by the activated riser while other building areas continue normal operations. This targeted response reduces unnecessary disruption and allows responders to focus on the specific affected area rather than the entire building.
28. C — NFPA 72 Section 17.6.3.1.3 requires heat detectors rated at least 20°F above the maximum expected ceiling temperature. The loading dock maximum is 92°F, so the minimum activation temperature is 112°F ($92 + 20 = 112$). Any detector rated at or above 112°F satisfies the code minimum.
29. A — When the MRL drive area detector activates, smoke near the motor and controller at the top of the hoistway may travel down the shaft to the primary recall floor. Recalling elevators to a potentially smoke-contaminated floor endangers passengers. NFPA 72 Section 21.3 requires recall to an alternate floor for machine room detection.
30. D — When mass notification overrides fire alarm audible notification, the fire alarm signal must continue transmitting to the supervising station for fire department dispatch. The override affects only in-building audio — not external alarm communication. Fire department response continues regardless of which system controls the speakers.
31. B — When a supervised releasing circuit develops an open fault, the panel detects the loss of continuity and generates a trouble signal. This alerts building management that the releasing circuit cannot deliver the release signal to the valve solenoid. Detection continues to function, but the valve-opening capability is impaired until the circuit is repaired.
32. C — All three environments — swimming pool (humidity/chlorine), commercial laundry (lint/steam), and woodworking shop (sawdust/particles) — create conditions causing smoke detector nuisance alarms or degradation. Heat detection responds only to abnormal temperature increases unaffected by environmental contaminants.
33. A — ADA-accessible sleeping rooms require both a wall-mounted strobe meeting NFPA 72 room coverage and a supplemental alerting device effective for waking sleeping hearing-impaired

occupants. A bed shaker or pillow-level strobe directly alerts a sleeping person who cannot hear alarms or see a wall strobe with eyes closed.

34. D — In a 70.7V audio system, impedance-matching transformers convert the high-voltage signal to each speaker driver's low impedance. Without transformers, parallel speakers present very low impedance directly to the amplifier, causing excessive current draw, severe distortion, and potential amplifier overload or permanent damage.
35. B — Beam detector spacing must not exceed the manufacturer's listed maximum for the specific ceiling height at the installation. At 48 feet, the manufacturer's listing establishes the allowable lateral distance between beams based on tested performance. NFPA 72 requires compliance with the manufacturer's listing.
36. A — During Phase 2 construction above operational Phase 1 floors, cutting, drilling, and drywall finishing generate dust that can cause nuisance alarms on Phase 1 devices near the construction boundary. Phase 1 zones affected by construction must be bypassed with the monitoring station notified of the impairment.
37. C — SLC 3 has the most remaining capacity: 103 device addresses and 82 mA of current headroom. Placing all 35 devices on SLC 3 (reaching 130 devices/94 mA) preserves the remaining margin on SLC 1 and SLC 2 — both of which are near capacity. This approach provides the best overall system flexibility for future growth.
38. D — NFPA 72 Section 26.3.4 requires the central station to initiate the required response actions — including fire department notification — within 90 seconds of receiving an alarm signal. This window encompasses signal receipt, operator processing, account verification, and dispatch initiation.
39. B — NEC Article 700.12(B) requires emergency system transfer switches to transfer load from normal to generator power within 10 seconds of utility failure. This rapid transfer minimizes battery-only operation for fire alarm panels and ensures all emergency loads receive generator power promptly.
40. A — In-rack detectors at intermediate heights identify fires where they originate — among stored materials on shelves and pallets — before smoke travels the full 50 feet to ceiling detectors. Early detection at the storage level provides significantly faster alarm response and enables quicker suppression activation.
41. C — Cross-zone logic, countdown, abort switch, and releasing circuit supervision have all been verified. The remaining test is verifying the pre-discharge warning appliances in the protected space produce adequate audible and visual output. Occupants must hear and see the warning to evacuate before agent discharge.
42. D — Both high-reading detectors (above 3.7%) and low-reading detectors (below 0.5%) are outside the manufacturer's listed acceptable range. The 22 high-reading detectors require cleaning.

The 8 low-reading detectors must be investigated for faults. All 30 out-of-range detectors require corrective action.

43. B — Bank A's selective recall tested correctly. When Bank D's detector activated, both C and D recalled despite only Bank D's relay activating. The elevator controllers for Banks C and D share a common recall input wired in parallel — when Bank D's relay closes, both controllers receive the signal through the shared circuit.
44. A — The pre-recorded message plays on all 28 floors, confirming amplifiers and speakers function throughout. The live microphone reaching only Floors 1-15 indicates the audio routing is programmed to broadcast to a subset of zones. The programming must be verified against the approved design.
45. C — NFPA 72 Section 10.6.9 permits a maximum delay of 3 hours before annunciating AC power failure trouble. At 2 hours and 45 minutes, the panel generated the trouble within the 3-hour window. The timing meets the code requirement.
46. D — A smoke detector covered with a surgical mask for eight weeks has been effectively disabled. The mask prevents adequate smoke entry to the sensing chamber, leaving the corridor without reliable detection coverage. This is a significant impairment requiring immediate correction.
47. B — NFPA 72 Section 26.6.3.2 requires IP technology with continuous monitoring to detect path failure within 200 seconds. At 205 seconds, the panel exceeds this maximum by 5 seconds. The communicator's supervision timing must be investigated and corrected to meet the requirement.
48. D — A double-interlock pre-action system requires both fire detection AND a supervisory air pressure drop before the valve opens. Neither condition alone is sufficient. The valve correctly remained closed because only the detection interlock was satisfied.
49. A — Ten months of historical event data has been permanently lost due to the log overwriting entries. This impairs troubleshooting, incident investigation, and maintenance compliance documentation. The log must be downloaded to external storage and cleared to restore full recording capacity.
50. C — Six adjacent detectors with significantly longer activation times (32-45 seconds versus 3-8 seconds) compared to identical detectors on the same floor strongly suggests contaminated sensing chambers. An environmental factor specific to that corridor section accelerated contamination. The detectors should be cleaned and retested.
51. D — A gradual voltage decline from 26.8 to 25.6 VDC over 15 minutes of standby — a 1.2-volt drop — is normal for batteries under standby load. The voltage remains well above the minimum threshold and the decline is steady. The charger activating after AC restoration confirms a successful test.

52. B — Any unauthorized modification to a smoke detector — including homemade covers with holes — renders the detector non-compliant with its listing. The container alters the sensing chamber's aerodynamic characteristics, potentially delaying or preventing smoke entry. Only manufacturer-approved covers are acceptable.
53. A — NFPA 72 Table 14.4.3.2 requires smoke detectors to be functionally tested semiannually using approved aerosol smoke or a calibrated test source. Each test verifies detector activation and proper panel response with correct identification, notification, and signal transmission.
54. C — NFPA 72 Section 18.5.5.5.7 requires all visible notification appliances within the same field of view to flash in synchronization. Two strobes visible from the same corridor location must be synchronized regardless of circuit assignment. The 0.3-second offset violates this requirement.
55. D — NFPA 72 Section 17.14.8 requires manual fire alarm stations to be red. Painting pull stations green violates this requirement. Additionally, paint covering instruction labels renders the devices unusable by occupants. The painted stations must be replaced.
56. B — The batteries ended at 19.2 VDC — below the manufacturer's 20.4 VDC minimum end-voltage. Panel components may malfunction at this voltage during an actual alarm event. The batteries cannot sustain the required load and must be replaced.
57. A — The duct detector activated, the panel processed the alarm, and the control module relay closed. The AHU did not shut down despite relay closure. The fault is downstream — in the wiring between the relay contacts and the AHU controller's shutdown input.
58. C — Four renovations adding 70 devices and modifying the sequence three times over seven years represent significant changes. NFPA 72 Section 7.8 requires the Record of Completion to reflect the current configuration. A seven-year-old document describing a substantially different system must be updated.
59. D — One hundred sixty nuisance waterflow alarms over five months with no fires indicates water pressure surges causing brief paddle movements. The corrective approach should address both the root cause (investigating surges) and the switch response (adjusting retard delay within the 90-second maximum).
60. B — The detector behind the new wall is in a concealed space separated from the occupied corridor. Smoke from a corridor fire may not reach the concealed detector in time. The detector must be relocated to the occupied side, and the concealed space should be evaluated for its own detection needs.
61. A — NFPA 72 requires tamper switches to generate a supervisory signal within two revolutions of the valve wheel from fully open. The switch activated at exactly two revolutions, meeting the code requirement. The tamper switch passes the functional test.

62. C — NFPA 72 Section 18.5.5.5.3 requires visible notification appliances to flash between 1 and 2 flashes per second. At 0.6 flashes per second, the strobe is below the minimum required rate. The device must be investigated and repaired or replaced.
63. D — When a tamper switch activation generates an alarm instead of supervisory, the input is programmed as an alarm zone rather than supervisory. The panel programming must be corrected to classify the input as supervisory for valve position changes.
64. B — Fifty-five days without communication redundancy means the system operates with a single path. If the cellular also fails, the building has no monitoring. This is a significant impairment requiring prompt corrective action with documentation for the building owner and AHJ.
65. A — A poster completely blocking both the horn opening and strobe lens eliminates both audible and visible notification output. The poster must be removed and building management informed that notification appliances must remain unobstructed.
66. C — The batteries ended at 19.8 VDC — below the manufacturer's 20.4 VDC minimum end-voltage. Panel components may malfunction at this voltage. The batteries cannot sustain the required load and must be replaced.
67. D — A smoke detector at 36 inches above the floor is completely ineffective for fire detection. Smoke rises to the ceiling and accumulates there first. A filing-cabinet-height detector will not sense smoke until the room is heavily filled. The detector must be reinstalled at the ceiling.
68. B — NFPA 72 Table 14.4.3.2 requires supervisory devices including tamper switches to be functionally tested annually as part of the comprehensive system functional test.
69. A — Burned-out LEDs at the fire command center graphic annunciator prevent firefighters from identifying active alarms in those zones. This impairs emergency response by eliminating visual alarm identification. All non-functioning LEDs must be repaired.
70. A — NFPA 72 Table 14.4.3.2 requires releasing device circuits to be functionally tested annually as part of the comprehensive releasing system test.
71. C — Storage of paint, chemicals, and boxes combined with only 18 inches of working clearance violates NEC Article 110.26. The minimum clearance is typically 30 inches wide and 36 inches deep. All storage must be removed and required space maintained.
72. D — Floor 4 requiring more force (positive pressure) while Floor 18 opens normally (no pressure) indicates inconsistent pressurization. A duct, damper, or balancing issue prevents adequate air distribution to upper floors. Both observations should be documented for mechanical investigation.
73. B — A 108-minute discrepancy between the panel clock and actual time significantly affects event log accuracy. Timestamps nearly two hours off create confusion when correlating events with security footage, dispatch records, and other building logs. The clock must be corrected immediately.

74. A — The panel processed the alarm and 16 of 18 locks released correctly. The two non-releasing locks indicate a fault specific to those devices. The control module outputs, interface wiring, and power supply to the two specific locks must be investigated.
75. C — NFPA 72 requires waterflow alarm signals at the panel within 90 seconds of sustained flow. The alarm appeared at 86 seconds, within the 90-second maximum. The waterflow switch passes the functional test.
76. D — A sensitivity reading of 0.4% falls below the manufacturer's minimum acceptable range of 0.5%. The detector is operating outside its listed parameters and may produce nuisance alarms or indicate a sensor fault. The detector must be investigated and corrected.
77. B — The primary line tested successfully. Line 2 — tested independently by disconnecting Line 1 — failed to deliver the signal to the station. Line 2 has failed its functional test and must be investigated and repaired to restore dual-path redundancy.
78. A — A dark graphic annunciator at the fire command center means firefighters cannot use the building floor plan display to identify alarm locations. This visual reference tool directly affects emergency response efficiency. The failure must be documented as a deficiency requiring repair.
79. C — $R = 900 \times (3.14/1000) = 2.826 \Omega$. $V_{\text{drop}} = 2.8 \times 2.826 = 7.913\text{V}$. End voltage = $24 - 7.91 = 16.09\text{VDC}$. While technically above the 16 VDC minimum, the 0.09-volt margin is dangerously thin. Any connection aging or temperature change would push voltage below minimum.
80. D — Standby = $(0.88 + 1.12) \times 4 = 8.0\text{ Ah}$. Alarm = $(4.2 + 8.8) \times 0.25 = 3.25\text{ Ah}$. Subtotal = 11.25 Ah. With 20% safety factor: $11.25 \times 1.20 = 13.50\text{ Ah}$. The generator reduces standby to 4 hours. Voice evacuation requires 15-minute alarm duration.
81. B — Even when duct detectors are configured for HVAC shutdown only without building notification, the detection signal should still transmit to the supervising station. This ensures building management and the monitoring service are aware of the event for investigation and follow-up.
82. A — When different conductor sizes share the same conduit, pre-calculated Annex C tables cannot be used. The actual cross-sectional area of each conductor from NEC Chapter 9 Table 5 must be calculated and the total compared to the conduit's internal area using the 40% fill limit.
83. C — A detector at the 90-degree corridor turn ensures detection at the direction change where coverage from detectors in either leg may be limited. Smoke traveling along one leg may not effectively reach detectors beyond the turn. The corner detector catches smoke at the intersection.
84. D — SLC 1 at 196 of 198 has only 2 remaining addresses. Adding any devices maxes it with zero flexibility. Placing all 14 on a new SLC preserves SLC 1's remaining capacity and provides a new loop with substantial expansion room for future growth.

85. B — Each remote NAC power supply panel has its own batteries sustaining the loads it serves during AC failure. A separate battery calculation using each panel's specific standby and alarm currents must be performed applying the same NFPA 72 duration and safety factor requirements.
86. A — NFPA 72 Section 7.8.2 requires the Record of Completion to include system specifications, circuit information, device counts by type, power supply data, communication details, test results, and signatures from installer, designer, and AHJ.
87. C — Project specifications are contractual documents the contractor must follow. Even though NEC does not require conduit in non-plenum spaces, the specification is a binding obligation. Deviating without formal approval exposes the contractor to contractual liability.
88. D — The speaker circuit delivers 62.5 VAC at the farthest speaker, exceeding the manufacturer's minimum of 55 VAC by 7.5 volts. The speakers operate within their listed parameters at this voltage, producing acceptable audio quality and volume.
89. B — The pre-discharge time delay must provide adequate evacuation time based on the room's specific characteristics: physical size, exit count and locations, maximum travel distance, and expected occupant count. These factors determine adequacy.
90. A — Three different device counts across three documents indicate modifications were not consistently documented. All three must be verified against a physical field count and reconciled to reflect the same accurate, verified number.
91. C — Eight detectors at positions 10, 40, 70, 100, 130, 160, 190, 220 provide 30-foot inter-detector spacing. The first detector is 10 feet from one end (within 15 feet) and the last is at the 220-foot end (0 feet from the end). Both end distances comply with NFPA 72.
92. B — Using Class A for upper floors (7-22) provides enhanced fault tolerance where it benefits most — longer egress distances, more difficult firefighter access, and greater vulnerability during extended evacuation. The designer's risk assessment determined lower floors can accept Class B.
93. D — Horn/strobes: $12 \times 0.310 = 3.72A$. Speakers: $6 \times 0.150 = 0.90A$. Strobes: $5 \times 0.195 = 0.975A$. Total = 5.595 amps, which significantly exceeds the 3.0-amp NAC output rating. The circuit must be redesigned across multiple outputs.
94. B — NFPA 72 Section 12.4.4 defines pathway survivability Level 2 as requiring either 2-hour fire-rated cable (CI cable) or installation within 2-hour fire-rated construction. Standard cable in standard conduit, FPLR in 1-hour enclosures, and cable in RMC with firestop do not satisfy Level 2.
95. C — The specification requires 7 business days' advance notice to the AHJ before acceptance testing. This is a regulatory and contractual obligation that cannot be waived by construction schedule pressure. The contractor must maintain the requirement and reschedule.

96. A — Per NFPA 72 Table 18.5.5.5.1(a), a 75 cd wall-mounted strobe covers rooms up to 45 × 45 feet. The 48-foot dimension exceeds the 45-foot maximum. A higher candela rating matching the room's actual dimensions must be selected, or additional strobes added.
97. D — The as-built drawings show 152 devices but 160 are physically installed and confirmed by programming. NFPA 72 requires as-built drawings to reflect the current configuration. The drawings must be updated to show all 160 devices with correct addresses and locations.
98. B — The calculated minimum battery capacity is 18.37 Ah. The specified 18 Ah batteries fall below this minimum by 0.37 Ah. Batteries must equal or exceed the calculated minimum. The next standard size above 18.37 Ah must be selected.
99. C — Hospitals using defend-in-place may have differentiated fire alarm responses for different alarm types per the approved fire safety plan. Pull stations triggering building-wide notification while smoke detectors trigger floor-only notification is valid when documented and accepted by the AHJ.
100. A — As-built drawings for the dedicated branch circuit should capture the conduit type, size, and routing path from the electrical panel to the fire alarm panel. This information is essential for future maintenance, troubleshooting, and modifications.
101. D — Excessive pulling tension can damage conductor insulation internally without visible jacket damage. Megger testing all 24 runs verifies insulation integrity and catches latent damage before devices are connected. Visual inspection alone cannot detect internal insulation failure.
102. B — Emergency control function interfaces require respective trade contractors to be present. The elevator contractor verifies recall, the HVAC contractor verifies shutdown and smoke control, the controls contractor verifies automation, and the door hardware contractor verifies holder release.
103. C — Converting from horn/strobe to voice evacuation is a fundamental design change requiring amplifiers, speaker circuits, intelligibility analysis, and panel reconfiguration. A formal change order must document the engineering revision, cost, and schedule extension before work proceeds.
104. A — The fire alarm contractor should not modify the electrical contractor's work directly. The general contractor coordinates all trades and should be notified of the non-compliant AFCI/GFCI breaker so they can direct the electrical contractor to replace it.
105. D — Different date codes within the same detector model indicate different production runs. As long as all 400 are the same model and listed as compatible with the panel, date code variations do not affect compatibility, communication, or detection performance.
106. B — Every service activity must be documented in a written service report regardless of scope. Even a wire nut tightening resolves a trouble condition that should be recorded for maintenance history, compliance, and building owner records.

107. A — Field markups contain actual as-installed information. The contractor must create clean, professional as-built drawings accurately incorporating all field data. Submitting messy markups, originals, or memory-based recreations fails to provide accurate, legible documentation.
108. C — NFPA 72 Section 7.7 requires the contractor to deliver as-built drawings, the completed Record of Completion, the approved sequence of operations, and operating and maintenance instructions. These four documents constitute the minimum closeout package.
109. D — Hospital infection control requirements for 72-hour notice must be respected. The contractor should provide the required notice and coordinate testing with both the general contractor and hospital administration. Patient safety protocols cannot be overridden by construction schedules.
110. B — The AHJ's 10-business-day notice requirement is a regulatory obligation that cannot be waived by construction deadlines. Testing without proper notice may be invalidated, requiring a complete retest. The supervisor must maintain the requirement and reschedule.
111. A — The fire alarm acceptance test requires verification of all emergency control function interfaces including smoke control. The project manager should coordinate with the GC to ensure the HVAC contractor completes the smoke control system before the scheduled acceptance test so all interfaces can be tested together.
112. C — Cloud-based monitoring dashboards may provide supplemental real-time notifications to building owners but do not satisfy NFPA 72 supervising station requirements. The code-required connection to a listed central station, remote station, or proprietary station must remain in place regardless of any cloud-based supplemental monitoring.
113. D — Non-standard abbreviations in panel location descriptors may confuse firefighters, maintenance technicians, and monitoring station operators who rely on clear descriptors to identify alarm locations. Standard naming conventions ensure anyone interacting with the panel — especially during emergencies — can immediately understand where the alarm originated.
114. A — Submitting a substitution request proposing an equivalent recessed-mount device from a compatible listed manufacturer is the standard construction practice when the specified product is not available in the required configuration. The substitution must demonstrate equivalent performance and listing compatibility.
115. B — No fire alarm system can guarantee prevention of all fire injuries or property damage. Providing such a guarantee would be a false representation creating significant legal liability. The contractor should instead provide the Record of Completion certifying code-compliant installation and the manufacturer's standard equipment warranty.