

LEVEL II — SIMULATION EXAM 8

(110 QUESTIONS)

Time Limit: 155 Minutes

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

DOMAIN 2.1 — INSTALLATION (Questions 1–40)

1. A fire alarm technician is reviewing shop drawings for a 28-story high-rise with voice evacuation. The specification requires pathway survivability Level 2 on all speaker circuits. The engineer's design routes the outgoing speaker circuit through the east stairwell (2-hour fire-rated enclosure) and the return path through the west stairwell (2-hour fire-rated enclosure). At Floor 14, both paths exit their stairwells and cross the floor through an unrated corridor ceiling space to reach their respective speaker devices. What is the status of Level 2 protection at this floor crossing?

- A. Both paths maintain Level 2 because the stairwell provides 2-hour protection at the crossing point
- B. Both paths lose Level 2 protection when they exit the fire-rated stairwells into the unrated ceiling space
- C. Only the outgoing path loses Level 2 — the return path maintains protection through the stairwell
- D. Level 2 is automatically maintained if the ceiling space has automatic sprinkler protection

2. A fire alarm technician is installing a fire alarm system in a 10-story office building. The building has a qualifying emergency generator with automatic start and transfer. The voice evacuation system loads are: panel/SLC standby = 0.78A, voice amplifier standby = 1.22A, NAC alarm = 4.2A, voice alarm = 8.8A. Using the generator-reduced standby, voice alarm duration, and safety factor, what is the minimum battery capacity?

- A. 11.05 Ah using 4-hour standby and 15-minute alarm without the safety factor
- B. 24.00 Ah using 24-hour standby because generators do not reduce voice system requirements

- C. 15.60 Ah using 4-hour standby with standard 5-minute alarm instead of 15-minute
- D. 13.26 Ah after applying 4-hour standby, 15-minute alarm, and 20% safety factor

3. A fire alarm technician is installing a fire alarm system in a hospital. The approved fire safety plan specifies positive alarm sequence (PAS). During PAS commissioning, the technician activates a smoke detector. The panel begins the 180-second investigation period. At 75 seconds, a fire alarm pull station on a different floor is manually activated. Per NFPA 72, what must the system do?

- A. PAS must immediately cancel and general alarm notification must activate because pull stations bypass PAS
- B. The pull station activation is queued until the PAS investigation period completes at 180 seconds
- C. PAS continues because the pull station is on a different floor from the initiating detector
- D. The 180-second period restarts from zero using the pull station as the new reference event

4. A fire alarm technician is installing a fire alarm system in a campus environment with four buildings. Each building has its own fire alarm panel connected by a peer-to-peer network. The network cable runs through underground conduit between buildings. During heavy rainstorms, communication between Building A and Building C drops intermittently while other building links remain stable. The conduit between A and C runs through a drainage swale that floods during storms. What is the most likely cause?

- A. Ground potential differences between Buildings A and C increase during electrical storms
- B. The storm's electromagnetic field interferes specifically with the A-to-C cable path
- C. Rainwater infiltration into the A-to-C conduit segment is compromising cable insulation
- D. Lightning-induced voltage surges on the network cable are corrupting the data signal

5. A fire alarm technician is installing a releasing fire alarm system for a clean agent suppression system protecting a telecommunications switching room. The room is occupied by technicians during business hours. The design includes cross-zone detection with Zone A and Zone B, a 25-second pre-discharge countdown, and an abort switch. A safety reviewer asks whether the 25-second countdown is adequate. What factor determines the answer?

- A. NFPA 72 specifies a fixed 30-second minimum for all occupied clean agent spaces
- B. The room size, exit locations, travel distance to exits, and expected occupant count determine adequacy
- C. The clean agent manufacturer specifies the countdown based on the agent's discharge flow rate
- D. The building's fire department determines the countdown based on their station response time

6. A fire alarm technician is installing a fire alarm system with dual communication paths — primary IP and secondary cellular. Per NFPA 72 Section 26.6.3.2, IP technology with continuous path monitoring must detect failure within 200 seconds. During commissioning, the technician disconnects the IP cable. The panel generates an "IP COMMUNICATION FAILURE" trouble after 210 seconds. Does this meet the requirement?

- A. Yes, the 200-second limit has a 10% tolerance built into the standard
- B. Yes, because commissioning mode extends all supervision timers by 15 seconds
- C. No, but the timing can be corrected through a firmware update to the communicator
- D. No, 210 seconds exceeds the 200-second maximum and must be investigated and corrected

7. A fire alarm technician is installing smoke detectors for elevator recall in a building with three elevator banks. Each bank has a dedicated lobby smoke detector. The sequence requires selective recall. During commissioning, the technician activates Bank B's lobby detector. Only Bank B recalls — Banks A and C remain in service. The technician then activates Bank A's lobby detector. Only Bank A recalls. What does this verify?

- A. The selective recall programming is correct — each lobby detector recalls only its designated bank
- B. The elevator controllers have independent recall inputs but the wiring has not been verified
- C. The test is incomplete because the technician must activate all three detectors simultaneously
- D. The selective recall works but the technician must also verify alternate floor recall for each bank

8. A fire alarm technician is installing a fire alarm system in a 20-story high-rise with voice evacuation. The system uses 70.7V audio distribution. Remote amplifier panels are specified on Floors 7 and 14 to reduce speaker circuit lengths. Each remote panel serves the floors in its zone and has its own batteries. What calculation must be performed independently for each remote amplifier panel?

- A. A voltage drop calculation from the main panel to each remote amplifier location
- B. An SLC loading calculation for the addressable devices connected through each remote panel
- C. A separate battery calculation based on each remote panel's specific standby and alarm loads
- D. A conduit fill calculation for the supervised communication circuit to each remote panel

9. A fire alarm technician is installing a fire alarm system in a building with a central station monitoring contract. Per NFPA 72 Section 26.3.4, the central station operator receives an alarm signal. What is the maximum time permitted to initiate the required response?

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

10. A fire alarm technician is installing a fire alarm system in a convention center ballroom that can be divided into five enclosed event spaces using acoustically rated floor-to-ceiling movable partitions. When partitions are deployed, each space has its own entrance and is acoustically isolated. What notification design principle applies?

- A. Each enclosed space must have independent notification providing full coverage when partitions are deployed
- B. Only the three largest partition configurations require independent notification coverage
- C. A single high-output central device covers all five configurations from the ballroom center
- D. Only the full open configuration requires coverage because partitions are temporary structures

11. A fire alarm technician is installing a fire alarm system with a DACT connected to two copper telephone lines. Per NFPA 72, the DACT must test line integrity at maximum 24-hour intervals by completing a full handshake with the supervising station receiver. During commissioning, the DACT successfully completes the handshake on Line 1 but receives a "NO ANSWER" response when testing Line 2. What does this indicate?

- A. Line 2 has adequate dial tone but the station receiver is temporarily offline for that account
- B. Line 2's telephone connection is functional but cannot reach the station receiver
- C. The DACT is configured with incorrect station receiver telephone numbers for Line 2
- D. Line 2 cannot complete the end-to-end communication path and must be investigated

12. A fire alarm technician is installing a fire alarm system in a building with both wet-pipe sprinkler and pre-action sprinkler systems. The pre-action system protects a data center using double-interlock configuration. During system commissioning, a smoke detector in the data center activates. The panel correctly processes the alarm and energizes the solenoid. The pre-action valve opens and water enters the piping. For a double-interlock system, is this correct?

- A. Yes, the detection signal is the first interlock and the valve correctly opened to fill piping
- B. Yes, double-interlock and single-interlock respond identically to fire detection signals
- C. No, double-interlock requires both detection AND air pressure drop — the system must be reconfigured
- D. No, but only because the solenoid should have been disconnected during commissioning testing

13. A fire alarm technician is installing a fire alarm system with a mass notification system per NFPA 72 Chapter 24. The mass notification shares speakers with the voice evacuation system. Per the emergency plan risk analysis, mass notification may override fire alarm audio during specific scenarios. When this override occurs, what critical fire alarm function must continue?

- A. The fire alarm panel must generate a trouble signal indicating notification override status
- B. The fire alarm signal must continue transmitting to the supervising station during the override
- C. Fire alarm visual notification must continue on all floors independent of the audio override
- D. The fire alarm panel must transfer complete output control to the mass notification system

14. A fire alarm technician is installing a fire alarm system in a hospital where the architect specifies white devices throughout. Per NFPA 72 Section 17.14.8, which device type cannot be white?

- A. Manual fire alarm stations which must be red per the code requirement
- B. Horn/strobe devices which must be red for emergency identification purposes
- C. Smoke detectors which must match the manufacturer's standard listed color
- D. All fire alarm devices which must be red per NFPA 72 universal identification rules

15. A fire alarm technician is installing a fire alarm system in a nursing home. The facility uses defend-in-place on resident care floors. When a smoke detector activates on a resident floor, notification activates only on the alarm floor. A new employee asks why the building doesn't notify all floors simultaneously. What is the primary rationale?

- A. Full building notification creates excessive noise that interferes with staff communication
- B. The building code prohibits full building notification in nursing home facilities at night
- C. Full notification triggers unnecessary alarm in residents who cannot safely evacuate independently
- D. Limiting notification prevents unnecessary relocation of mobility-impaired residents on unaffected floors

16. A fire alarm technician is installing a fire alarm system with a releasing circuit for a pre-action sprinkler system. The releasing circuit controls the solenoid valve. During commissioning, the technician intentionally creates an open fault on the releasing circuit to test supervision. The panel displays a trouble signal. What does this verify?

- A. That the releasing circuit can deliver adequate voltage to energize the solenoid during an alarm
- B. That the pre-action valve solenoid is properly connected and will operate on command
- C. That the panel actively monitors the releasing circuit and detects loss of continuity
- D. That the cross-zone detection logic properly prevents false release during fault conditions

17. A fire alarm technician is installing a fire alarm system with a graphic annunciator at the building entrance. During commissioning, activating Zone 6 illuminates Zone 13's LED and Zone 6's LED remains dark. Panel output has been verified as correct. What is the most likely cause?

- A. The SLC devices on Zone 6 have addressing conflicts with Zone 13 devices
- B. The annunciator's internal LED driver board has Zones 6 and 13 cross-connected
- C. The panel's communication board transmits Zone 6 data with Zone 13's identifier
- D. Zone 6's LED has failed and Zone 13 is responding to residual voltage on the bus

18. A fire alarm technician is installing a fire alarm system in a building where the fire command center is in the lobby on Floor 1 and the fire alarm panel is in the mechanical room on Floor B2. Per NFPA 72 Section 23.10, what must be installed at the fire command center?

- A. A complete repeater panel with full system status display and operator control capability
- B. A simplified LED annunciator showing only alarm zone and trouble zone indicators
- C. A dedicated intercom connecting the FCC to the mechanical room for verbal communication
- D. A networked workstation running the manufacturer's proprietary monitoring software

19. A fire alarm technician is installing a fire alarm system in a building with a fire pump. The fire pump controller provides contacts for pump running, power available, phase reversal, and controller trouble. Per NFPA 72, how should the "phase reversal" contact be classified at the fire alarm panel?

- A. As an alarm signal because phase reversal can prevent the pump from delivering water
- B. As a trouble signal because phase reversal affects fire alarm panel operation
- C. Phase reversal monitoring is optional and can be excluded from the fire alarm interface
- D. As a supervisory signal because it is an off-normal equipment condition requiring investigation

20. A fire alarm technician is installing a fire alarm system with a voice evacuation system using 70.7V audio distribution. Two speakers on Floor 11 have been wired in parallel without impedance-matching transformers. The amplifier output voltage measures 70.5 VAC at the panel. What is the primary risk?

- A. The two speakers will produce no audio because the voltage exceeds the speaker driver rating
- B. The speakers will produce audio at double the intended volume causing message distortion
- C. The missing transformers create a low impedance load that can cause amplifier overload and damage
- D. The parallel connection creates an open circuit condition that the panel detects as a trouble

21. A fire alarm technician is installing a fire alarm system in a 15-story residential tower with defend-in-place strategy. The sequence of operations shows that a smoke detector alarm on Floor 8 activates notification on Floors 7, 8, and 9 only. The remaining floors receive no notification. What is the primary rationale for this approach?

- A. Simultaneous evacuation of all floors creates dangerous stairwell congestion and is impractical
- B. Residential high-rises are code-exempt from full building notification per NFPA 72
- C. Full building notification is required only for buildings taller than 20 stories
- D. The defend-in-place approach reduces system installation cost by requiring fewer devices

22. A fire alarm technician is installing visible notification in an ADA-accessible hotel guest room measuring 16 × 18 feet with a 9-foot ceiling. Per NFPA 72 Table 18.5.5.5.1(a), a 15 cd wall-mounted strobe covers rooms up to 20 × 20 feet. Both dimensions are within this coverage. Per ADA requirements, what additional notification is needed beyond the standard strobe?

- A. A ceiling-mounted strobe at 177 cd positioned directly above the bed
- B. A supplemental alerting device effective for waking sleeping hearing-impaired occupants such as a bed shaker
- C. A low-frequency 520 Hz audible tone generator mounted within 36 inches of the pillow
- D. A second wall-mounted strobe at double candela on the wall closest to the bed

23. A fire alarm technician is installing a fire alarm system with a releasing circuit for a clean agent system. The protected data center is occupied by IT staff during business hours. Per NFPA 72 Section 23.11, what occupant safety provisions are required before agent discharge?

- A. Only audible warning is required because visual warning is optional for clean agent systems
- B. The system must discharge immediately without warning to suppress fire as fast as possible
- C. Pre-discharge audible and visual warning with a time delay and abort capability must be provided
- D. Only an abort switch is required — pre-discharge warning is optional if abort is available

24. A fire alarm technician is installing a fire alarm system in a building with three sprinkler risers. Each riser has a waterflow switch and a tamper switch. The design places each waterflow switch on an individual alarm zone. The tamper switches are grouped on a single supervisory zone. A reviewer suggests individual tamper zones also. What advantage does individual tamper zones provide?

- A. Individual tamper zones increase the panel's processing speed for supervisory signals
- B. Individual tamper zones identify which specific valve was moved, directing investigation to the correct riser
- C. Individual tamper zones are required by NFPA 72 for buildings with more than two risers
- D. Individual tamper zones eliminate the need for separate waterflow zones on the same risers

25. A fire alarm technician is installing a fire alarm system in a data center. The raised floor plenum distributes cold air for server cooling. The ceiling space above contains cable trays with dedicated ducted HVAC return. The ceiling space is not used for air handling. What fire alarm cable types are required?

- A. FPLP in both spaces because all concealed data center spaces are classified as plenums
- B. FPLR in both spaces because the raised floor constitutes a riser-type installation
- C. FPL in both spaces because data centers are classified as general-purpose environments
- D. FPLP in the raised floor plenum and FPL minimum in the non-plenum ceiling space

26. A fire alarm technician is installing smoke detectors in an elevator hoistway for a machine-room-less (MRL) elevator. The drive motor and controller are at the top of the hoistway. Per NFPA 72 Section 21.3, the area containing the drive equipment must be treated as the machine room. When the MRL drive area detector activates, what recall response is required?

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

27. A fire alarm technician is installing a fire alarm system in a large warehouse with 52-foot ceilings and high-bay storage racks extending to within 3 feet of the ceiling. The design includes ceiling-level projected beam detectors and in-rack detection at 18-foot and 36-foot elevations. What is the purpose of the in-rack detectors?

- A. In-rack detectors provide redundancy in case ceiling beam detectors are blocked by stored materials
- B. In-rack detectors compensate for reduced beam sensitivity caused by dust in warehouse environments
- C. In-rack detectors identify fires at the storage level before smoke reaches the 52-foot ceiling
- D. NFPA 72 mandates in-rack detection for all rack configurations taller than 25 feet

28. A fire alarm technician is installing a fire alarm system in a convention center exhibit hall measuring 350×200 feet with 42-foot ceilings. Projected beam smoke detectors span the 350-foot dimension. The beams are spaced at 45-foot intervals across the 200-foot dimension. What must the technician verify about this spacing?

- A. That the 45-foot spacing matches the fire sprinkler spacing for consistent protection patterns
- B. That the 45-foot spacing does not exceed the manufacturer's listed maximum for the 42-foot ceiling
- C. That the total number of beams equals at least one per 5,000 square feet of floor area
- D. That the 45-foot spacing does not exceed the standard 30-foot spot detector spacing requirement

29. A fire alarm technician is installing a fire alarm system in a cold storage facility. The main freezer is at -20°F . The loading dock fluctuates between 5°F and 88°F . The office area is at 72°F . Heat detectors are specified for the freezer and dock. What minimum activation temperature is required for the loading dock detector?

- A. 88°F to provide immediate response to any temperature exceeding normal conditions
- B. 135°F because it is the standard commercial heat detector rating used universally
- C. 200°F because temperature-fluctuating environments require high-temperature ratings
- D. At least 108°F to maintain the required 20°F margin above the 88°F maximum ambient

30. A fire alarm technician is installing a fire alarm system in a building where the sequence of operations requires HVAC shutdown for any smoke alarm. During commissioning, a smoke detector activates. The panel processes the alarm. The control module relay for HVAC shutdown activates (audible click). The AHU does not shut down. Where is the fault most likely located?

- A. In the wiring between the control module relay contacts and the AHU controller's shutdown input
- B. In the panel programming because the HVAC output may not be linked to the detector zone
- C. In the smoke detector because it may generate a signal type incompatible with HVAC control
- D. In the SLC communication because the control module may not have received the command

31. A fire alarm technician is installing a fire alarm system with a firefighter telephone system per NFPA 72 Section 24.5. The system includes handset jacks in both stairwells at every floor and at the fire command center. During commissioning, the technician connects handsets at three different floor stations simultaneously and attempts conversation with the fire command center. What system capability is being tested?

- A. The telephone amplifier's ability to deliver adequate audio power to multiple stations
- B. The system's resistance to electromagnetic interference from multiple active connections
- C. The system's ability to support multiple simultaneous two-way conversations
- D. The handset jack wiring at all three stations for proper impedance matching

32. A fire alarm technician is installing a fire alarm system in a building with a swimming pool facility, a commercial laundry, and a wood shop. Each space produces airborne particles or environmental conditions incompatible with smoke detectors. What detection technology is most appropriate for all three?

- A. Aspirating detection with sampling units mounted outside each space for remote monitoring
- B. Heat detection because all three environments create conditions causing smoke detector nuisance alarms
- C. Multi-criteria detectors that can filter environmental particles from actual smoke signatures
- D. Flame detectors because the combustible materials in these spaces produce visible flame

33. A fire alarm technician is installing a fire alarm system with networked panels across a campus. Building A has the master panel and Building C has a network node. During commissioning, the technician discovers that trouble conditions on Building C's panel do not appear on Building A's master display. The communication link between the buildings is confirmed functional because alarm signals transmit correctly. What should be investigated?

- A. The SLC wiring in Building C because the trouble signals may not transmit over extended circuits
- B. Building C's panel firmware because older versions may lack network trouble sharing capability
- C. The telephone line between the panels because DACT signals carry trouble data to the station
- D. The network programming that determines which signal types are shared between panels

34. A fire alarm technician is installing a fire alarm system with positive alarm sequence (PAS). Per NFPA 72 Section 23.8.1.3, during the 180-second investigation period, what action occurs immediately without any delay?

- A. The alarm signal transmits to the supervising station and the panel displays the alarm condition
- B. The fire safety director receives a text message on their personal mobile device
- C. The fire command center activates a private alarm tone audible only within the FCC
- D. The panel begins a 60-second pre-alarm verification before starting the 180-second countdown

35. A fire alarm technician is installing a fire alarm system in a building where specifications require all voice evacuation circuits to have pathway survivability Level 2. The riser circuits use 2-hour CI cable. Horizontal floor-level speaker runs use standard FPLP cable in standard EMT conduit. Does the horizontal run meet Level 2?

- A. Yes, standard cable in metallic conduit satisfies Level 2 for horizontal runs under 100 feet
- B. Yes, EMT conduit provides adequate fire protection equivalent to 2-hour rated construction
- C. No, standard FPLP in standard EMT does not meet Level 2 — CI cable or 2-hour construction is required
- D. No, but Level 1 sprinkler protection on the horizontal run is an acceptable alternative to Level 2

36. A fire alarm technician is installing a fire alarm system with a DACT and also a cellular communicator for dual-path communication. The building owner asks whether both paths are always required. Per NFPA 72, what determines the number of communication paths needed?

- A. Two paths are always required regardless of building type or monitoring service category
- B. The supervising station type, building code requirements, and monitoring contract determine path requirements
- C. One path is always sufficient if the technology meets the 200-second supervision requirement
- D. The AHJ alone determines path requirements based on their local amendments to NFPA 72

37. A fire alarm technician is installing a fire alarm system in a building with a pre-action sprinkler system using single-interlock configuration. The fire alarm releasing circuit controls the solenoid valve. During commissioning, the technician activates a smoke detector in the pre-action zone. What should happen?

- A. The valve should remain closed because single-interlock requires a sprinkler head to fuse first
- B. The panel should transmit an alarm but hold the releasing circuit for a 30-second confirmation
- C. The valve should open only if two detectors activate confirming the alarm through cross-zone logic
- D. The solenoid should energize and the pre-action valve should open to fill the piping with water

38. A fire alarm technician is installing a fire alarm system in a building where the engineer specifies 70.7V audio distribution for voice evacuation. The longest speaker circuit is 620 feet. During testing, the technician measures 63.2 VAC at the farthest speaker. The speakers are rated for minimum 55 VAC input. Is this acceptable?

- A. Yes, 63.2 VAC is above the 55 VAC minimum with an 8.2-volt margin
- B. No, 70.7V systems must maintain at least 90% (63.6 VAC) at all speaker locations
- C. No, the voltage drop indicates the amplifier output power is insufficient for the circuit
- D. Yes, but the wire gauge should be increased to provide better margin for future additions

39. A fire alarm technician is installing a fire alarm system and must calculate the SLC standby loading. The loop has: 135 smoke detectors at 0.30 mA, 20 monitor modules at 0.24 mA, 15 control modules at 3.6 mA, 8 relay modules at 2.5 mA, and 10 isolator modules at 0.12 mA each. The panel's SLC maximum is 140 mA. What is the total loading?

- A. 40.50 mA from the smoke detectors alone without any module contributions
- B. 145.50 mA which exceeds the 140 mA capacity requiring a second SLC loop
- C. Approximately 122 mA which is within capacity but leaves limited margin for additions
- D. 98.00 mA which provides substantial margin below the 140 mA maximum

40. A fire alarm technician is installing a fire alarm system in a building where the sequence of operations shows a kitchen hood suppression activation triggers building notification, supervising station signal, and HVAC shutdown. The fire alarm panel monitors the suppression system through a monitor module connected to the releasing panel's alarm contacts. During commissioning, the technician simulates a suppression activation. The monitor module detects the contact closure and the panel generates an alarm. What must happen next per the sequence?

- A. Only supervising station signal because kitchen suppression events are supervisory in nature
- B. Building notification, station signal, and HVAC shutdown per the approved sequence of operations
- C. Only local kitchen audible notification to alert staff in the immediate cooking area
- D. No additional response because the suppression system addresses the fire independently

DOMAIN 2.2 — MAINTENANCE AND INSPECTION (Questions 41–78)

41. A fire alarm technician is performing annual testing on a releasing fire alarm system. The agent solenoid is disconnected and a supervised substitute load installed. The technician tests cross-zone logic — Zone A alone produces "FIRST ALARM," Zone B alone produces "FIRST ALARM," both zones together produce "CROSS-ZONE VERIFIED" and start the countdown. The abort switch pauses the countdown when pressed. What additional releasing system test remains?

- A. The releasing solenoid must be reconnected to verify physical agent discharge
- B. The cross-zone logic must be retested with both zones activated simultaneously rather than sequentially
- C. The substitute load must be tested with a calibrated instrument to measure delivered voltage
- D. The releasing circuit supervision must be tested by opening the circuit and verifying a trouble signal

42. A fire alarm technician is performing annual testing and discovers that the panel's charger voltage reads 25.0 VDC instead of the expected 27.0-27.6 VDC float range. AC power at the panel input is confirmed at 120 VAC. The charger indicator is illuminated. What should the technician investigate?

- A. The charger output may be degraded and should be tested under load to determine if it can reach float voltage
- B. The 25.0 VDC reading is within acceptable limits for a panel under heavy standby current draw
- C. The AC input voltage of 120 VAC may be insufficient for the charger's rated input range
- D. The batteries must be replaced immediately because they are preventing the charger from reaching float

43. A fire alarm technician tests the stairwell pressurization interface during annual testing. A smoke detector activates and the panel commands pressurization fans to start. The fans activate. On Floor 4, the stairwell door requires significantly more force to open than normal. On Floor 16, the stairwell door opens with no additional resistance. What should be documented?

- A. Only fan activation needs documentation — door resistance is the mechanical contractor's scope
- B. The Floor 4 result confirms effective pressurization and Floor 16 passes because some variation is expected

C. Both observations should be documented because inconsistent pressurization suggests a duct or damper issue

D. The test is inconclusive without calibrated manometer readings at each floor

44. A fire alarm technician tests the elevator recall function. The building has two elevator banks with selective recall. Activating Bank A's lobby detector: Bank A recalls, Bank B remains in service. Activating Bank B's lobby detector: both Bank A and Bank B recall simultaneously. What is the most likely cause?

A. Bank B's lobby detector is wired to both recall zones creating a dual activation

B. Bank B's panel programming activates both recall outputs instead of only Bank B's output

C. The elevator controllers have a firmware error that causes Bank A to respond to Bank B's signal

D. Bank B's recall relay is physically cross-connected with Bank A's relay at the junction box

45. A fire alarm technician is performing sensitivity testing on an analog addressable system with 450 detectors. The report shows 14 detectors between 3.8% and 4.5% (above the 3.7% max) and 6 detectors between 0.2% and 0.4% (below 0.5% min). What action is required?

A. All 20 out-of-range detectors — both high and low readings — require investigation and correction

B. Only the 14 high-reading detectors need cleaning — the 6 low readings indicate heightened sensitivity

C. All 450 detectors must be cleaned because 20 out-of-range units indicates building-wide contamination

D. The panel sensitivity thresholds should be adjusted to accommodate the broader drift range

46. A fire alarm technician tests the AC power supervision by disconnecting primary AC. The panel transfers to battery. After 2 hours and 45 minutes, the panel generates "AC POWER FAILURE" trouble. Per NFPA 72 Section 10.6.9, is this timing acceptable?

A. No, the trouble must appear immediately upon loss of primary power without any delay

B. No, the trouble should appear within 60 minutes for modern addressable panel systems

C. Yes, 2 hours and 45 minutes is within the 3-hour maximum permitted by NFPA 72

D. Yes, any delay under 4 hours is acceptable for panels with battery backup

47. A fire alarm technician discovers during inspection that a smoke detector in a hospital corridor has been covered with a latex glove by housekeeping staff to prevent alarms during floor waxing. The glove has been in place for three weeks. The floor waxing project was completed one week ago. What must be documented?

A. The glove is thin enough to permit smoke entry and the detector remains functional

B. The detector has been disabled for three weeks — two weeks after the waxing ended — and must be uncovered immediately

C. The covering was justified during waxing but should have been removed when the project ended

D. The covering may remain because future waxing is scheduled within the next two months

48. A fire alarm technician tests communication paths — primary IP and secondary cellular. IP test succeeds. The technician disconnects IP and tests cellular. After 200 seconds, the panel generates "IP COMMUNICATION FAILURE." The cellular test signal then transmits successfully. What has been verified?

A. Only the IP path works because the cellular path was tested under fault conditions

B. The IP supervision timing is incorrect because it should have appeared within 60 seconds

C. The cellular path has an unacceptable 200-second delay before it can transmit test signals

D. Both paths function correctly and the 200-second IP supervision timing meets the NFPA 72 requirement

49. A fire alarm technician tests a waterflow switch by opening the inspector's test valve on a wet-pipe system. Water flows continuously. After 85 seconds, the panel generates a "WATERFLOW — ALARM" signal. Per NFPA 72, does this pass?

A. Yes, 85 seconds is within the 90-second maximum for waterflow alarm response

B. No, the alarm must appear within 60 seconds per the standard waterflow switch timing

C. Yes, but the 85-second response suggests the retard delay may be set at the maximum allowable

D. No, the alarm must appear within 30 seconds for wet-pipe systems specifically

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

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

B. No, the valve should at least prime the pilot solenoid for faster activation when heads fuse

C. Yes, double-interlock requires both detection AND air pressure drop before the valve opens

D. Yes, but only because the system was in test mode during the annual testing procedure

51. A fire alarm technician discovers during inspection that the building's Record of Completion was last updated eight years ago. Since then, three renovations added 65 devices, removed 15 devices, added a second SLC loop, and modified the sequence of operations twice. What must be documented?

A. The annual testing records capture all modifications making the Record of Completion update optional

B. The Record is severely out of date and must be updated to reflect the current system configuration

C. The original Record remains valid because it documents the initial system installation baseline

D. A new Record is required only if the fire alarm panel was physically replaced during renovations

52. A fire alarm technician tests notification appliances. A wall-mounted speaker on Floor 8 produces clear audio but at noticeably reduced volume compared to identical speakers on the same 70.7V circuit. Circuit voltage measures 69.8 VAC at the speaker terminals — normal. What is the most likely cause?

A. The amplifier channel serving Floor 8 has a partial fault reducing output to this specific speaker

B. The room acoustics at that specific location absorb sound creating an apparent reduction

C. The speaker wire has a high-resistance splice at a junction box reducing power delivery

D. The speaker's internal wattage tap is set to a lower power than the other speakers on the circuit

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

- A. Semiannually using approved aerosol smoke or a calibrated test source
- B. Annually as part of the comprehensive system functional test and inspection
- C. Quarterly to coincide with the building's standard maintenance program
- D. Monthly to ensure continuous reliable fire detection throughout the premises

54. A fire alarm technician tests visible notification in a long hospital corridor. Two wall-mounted strobes are visible from the same location — one at each end of a 120-foot corridor. During testing, both flash but approximately 0.4 seconds apart. The strobes are on different NAC circuits. What code requirement is violated?

- A. The flash rate requirement because the combined output exceeds 2 flashes per second
- B. The candela requirement because unsynchronized strobes produce uneven light distribution
- C. The synchronization requirement — all visible appliances in the same field of view must flash together
- D. The mounting height requirement because improperly mounted strobes create timing delays

55. A fire alarm technician discovers during inspection that two pull stations in a middle school have been painted green to match the school's colors. The paint covers the housing, handle, and instruction labels. What must be documented?

- A. The pull stations function correctly if they activate during testing and the paint is cosmetic
- B. The painted pull stations must be replaced because paint obscures the required red color and labels
- C. Only the instruction labels need restoration — the housing color does not affect operation
- D. The school should repaint the devices red within 30 days to restore compliance

56. A fire alarm technician performs a battery load test. Starting voltage is 27.2 VDC. After the test duration under full alarm load, ending voltage is 19.0 VDC. The manufacturer's minimum end-voltage is 20.4 VDC. What must be documented?

- A. The batteries passed because 19.0 VDC exceeds the general industry minimum of 18 VDC
- B. The test is inconclusive and must be repeated after the batteries recharge to full float voltage
- C. The batteries can remain in service for 60 days while replacements are ordered and installed
- D. The batteries failed — 19.0 VDC is below the manufacturer's 20.4 VDC minimum end-voltage

57. A fire alarm technician tests the HVAC shutdown interface. A duct detector activates, the panel processes the alarm, and the control module relay closes. The HVAC contractor confirms the AHU did not shut down despite the relay closure. What should be investigated?

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

58. A fire alarm technician tests a tamper switch on a butterfly valve serving a sprinkler system. The technician closes the valve to the equivalent of two turns on an OS&Y valve. No supervisory signal appears. The signal appears only when the valve is nearly fully closed. What deficiency exists?

- A. Butterfly valves use a different standard and the test method needs modification
- B. The panel has the tamper input programmed as alarm rather than supervisory mode
- C. The tamper switch adjustment is incorrect — it must detect partial closure within the code-required travel
- D. The valve position indicator is misaligned giving a false reading of the closure position

59. A fire alarm technician tests the voice evacuation live microphone from the fire command center. Audio is heard on Floors 1-9 but not on Floors 10-18. The pre-recorded message plays correctly on all 18 floors. What is the most likely cause?

- A. The amplifiers serving Floors 10-18 have a fault that blocks live audio but passes recorded
- B. The live microphone audio routing is programmed to broadcast only to Floors 1-9
- C. The microphone output power is insufficient for the total building speaker load
- D. The speaker circuits on Floors 10-18 have a frequency response limitation affecting live audio

60. A fire alarm system event log shows 150 "WATERFLOW — ALARM" entries over four months with no fires or sprinkler head activations. The building engineer reports municipal water pressure spikes. What corrective action should be recommended?

- A. Investigate the pressure spikes and adjust the waterflow switch retard delay settings
- B. Disconnect the waterflow switches until the municipal pressure issue is resolved
- C. Replace all waterflow switches with models that have built-in pressure surge compensation
- D. Increase the panel's alarm threshold for waterflow zones to filter brief pressure events

61. A fire alarm technician discovers during annual testing that a renovation enclosed a corridor smoke detector behind a newly constructed wall. The detector communicates normally with the panel but is now concealed. What must be documented?

- A. The detector can remain because it continues communicating normally with the panel
- B. The panel location descriptor should be updated to reflect the detector's new concealed position
- C. The concealed detector provides dual coverage for both the corridor and the concealed space
- D. The detector must be relocated to the occupied corridor and the concealed space evaluated for detection

62. A fire alarm technician tests a fire alarm system's access control interface. When the alarm activates, magnetically locked egress doors must unlock. The technician activates a detector: 15 of 17 locks release but 2 remain locked. What must be investigated?

- A. The panel programming because the two locks may not be included in the alarm response matrix
- B. The access control system firmware which may need updating for fire alarm interface compatibility
- C. The control module outputs, wiring, and power supply to the two non-releasing door locks
- D. The NAC circuits because the magnetic locks may be wired to the notification circuit inadvertently

63. A fire alarm technician discovers that a fire alarm panel's dedicated circuit breaker has an AFCI breaker installed. A lock-on device is also present. What code violation exists?

- A. The lock-on device is unnecessary when an AFCI breaker provides enhanced protection
- B. AFCI protection is prohibited on fire alarm dedicated branch circuits per NEC Article 760
- C. AFCI breakers are acceptable for fire alarm circuits when a lock-on device is installed
- D. Only the missing GFCI protection represents a violation — AFCI is permitted on fire alarm circuits

64. A fire alarm technician performs a battery load test. Starting voltage is 26.4 VDC. Under full alarm load, voltage drops to 19.0 VDC in 3 minutes during standby — not alarm — conditions. No alarm is active. What must be documented?

- A. The batteries have failed catastrophically — a 7.4-volt drop in 3 minutes during standby is unsustainable
- B. The voltage drop is within normal limits for initial discharge during the AC-to-battery transfer
- C. The panel's standby current draw is excessive and should be investigated before blaming batteries
- D. The test must be repeated after the batteries charge for 48 hours to establish accurate results

65. Per NFPA 72 Table 14.4.3.2, what is the minimum testing frequency for supervisory devices such as tamper switches?

- A. Monthly to ensure sprinkler valve positions remain in the fully open condition
- B. Semiannually to match the smoke detector functional testing schedule requirement
- C. Quarterly to coincide with the building's standard maintenance inspection program
- D. Annually as part of the comprehensive system functional test

66. A fire alarm technician discovers during inspection that a building tenant has mounted a large poster over a corridor horn/strobe, completely covering both the horn and strobe. What must be documented?

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

67. A fire alarm system has primary IP and secondary cellular communication. "IP COMMUNICATION FAILURE" has been active for 40 days. Cellular functions normally. What should be documented?

- A. The cellular backup provides complete monitoring so the IP failure is not operationally urgent
- B. The IP failure should be repaired at the building owner's convenience during the next visit
- C. The system has operated without communication redundancy for 40 days — a significant impairment
- D. No documentation is needed because the system continues functioning with cellular monitoring

68. A fire alarm technician tests a horn/strobe. The temporal-three horn pattern sounds correctly. The strobe flashes at approximately 0.5 flashes per second. Per NFPA 72, what should be documented?

- A. The strobe fails — NFPA 72 requires 1 to 2 flashes per second and 0.5 is below the minimum

- B. The strobe passes because any flash rate below 2 flashes per second is acceptable
- C. The flash rate is acceptable for healthcare sleeping areas but fails for commercial corridors
- D. The strobe rate is irrelevant as long as the candela meets the room coverage requirements

69. A fire alarm technician discovers a tamper switch activation generates an alarm signal instead of a supervisory signal. The contact closure is confirmed at the panel terminals. What is the most likely cause?

- A. The tamper switch requires a different EOLR resistance value than the alarm input circuits
- B. The panel hardware cannot distinguish between alarm and supervisory on the same input type
- C. The tamper switch wiring polarity is reversed causing the panel to misclassify the signal
- D. The tamper switch input is programmed as an alarm zone rather than a supervisory zone

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

- A. Semiannually because releasing circuits are more critical than standard alarm circuits
- B. Annually as part of the comprehensive releasing system functional test
- C. Monthly because the suppression system must be ready to respond at all times
- D. Only during initial acceptance testing with no recurring periodic testing required

71. A fire alarm technician discovers during inspection that the fire alarm panel room contains boxes of copy paper, cleaning chemicals, and spare furniture. Working clearance in front of the panel is 24 inches. What code requirements are being violated?

- A. Only the chemical storage is a concern — other items and the clearance are acceptable
- B. The panel room may be used for storage if chemicals are in sealed containers per OSHA
- C. Both the storage and inadequate clearance violate NEC Article 110 working space requirements
- D. Only the 24-inch clearance violates code — organized storage in electrical rooms is permitted

72. A fire alarm technician discovers during testing that a building renovation relocated a corridor smoke detector from the ceiling to the top of a bookshelf at approximately 4 feet above the floor. The detector communicates normally with the panel. What must be documented?

- A. The detector at 4 feet above the floor is non-functional for detection and must be reinstalled at the ceiling
- B. The detector at bookshelf height provides adequate coverage because smoke eventually fills the entire room
- C. The relocation is acceptable if building staff provide written justification for the new position
- D. The detector should be raised to at least 6 feet for improved smoke detection coverage

73. A fire alarm technician is testing a releasing fire alarm system. Cross-zone logic, countdown timer, abort switch, and releasing circuit supervision have all been verified. What additional test must be performed?

- A. The releasing solenoid must be reconnected to verify physical agent discharge capability
- B. The cross-zone test must be repeated with the zones activated in reverse sequence
- C. The panel's supervising station communication during the release event must be tested
- D. The pre-discharge audible and visual warning appliances must be verified for adequate output

74. A fire alarm technician discovers during inspection that the fire command center graphic annunciator display is completely dark — no LEDs or display elements illuminate. The panel repeater, voice controls, and firefighter telephone at the FCC function normally. What must be documented?

- A. The annunciator failure is cosmetic because the panel repeater provides the same information
- B. The annunciator failure impairs emergency response by eliminating visual alarm location identification
- C. The annunciator must be replaced entirely because individual component repair is not supported
- D. The annunciator can be repaired at the building owner's convenience during the next service visit

75. A fire alarm technician is testing a fire alarm system in a building with a single-interlock pre-action sprinkler system. The technician activates a smoke detector. The pre-action solenoid energizes and the valve opens, allowing water to fill the piping. No sprinkler heads discharge. Is this correct?

- A. Yes, single-interlock opens the valve on detection to fill piping — discharge requires sprinkler head activation
- B. No, the valve should remain closed until a sprinkler head also fuses confirming fire presence
- C. Yes, but the valve should close automatically within 60 seconds if no sprinkler heads activate
- D. No, the detection signal should only prime the pilot line without opening the main valve

76. A fire alarm technician tests the fire alarm system's communication link using a DACT with two telephone lines. Line 1 test — the station receives the signal. The technician disconnects Line 1 and tests Line 2. The station does not receive the Line 2 signal. What must be documented?

- A. Both lines passed because the DACT requires only one functional line for code compliance
- B. Line 2 cannot be independently tested because the DACT must automatically select lines
- C. Line 2's failure was caused by disconnecting Line 1 and the test method was incorrect
- D. Line 2 failed and must be investigated and repaired to restore dual-path communication redundancy

77. A fire alarm technician discovers during annual testing that the panel clock displays 3:00 PM when the actual time is 4:48 PM — a 108-minute discrepancy. What must be documented?

- A. Time discrepancies under 2 hours are within acceptable tolerance for fire alarm systems
- B. The panel's internal clock module must be physically replaced because software cannot fix drift
- C. The 108-minute discrepancy affects event log accuracy and the clock must be corrected
- D. The clock error only affects the display and has no impact on system operational performance

78. A fire alarm technician performs annual sensitivity testing. The panel report shows two detectors reading 0.3% and 0.4% obscuration/ft — below the manufacturer's 0.5% minimum. What do these readings indicate?

- A. The detectors are at peak sensitivity representing ideal operating conditions
- B. The detectors are operating outside their listed parameters and must be investigated for faults
- C. Low readings are always acceptable because they indicate enhanced detection capability
- D. The panel's sensitivity reporting calibration has drifted and needs manufacturer recalibration

DOMAIN 2.3 — SUBMITTAL PREPARATION AND SYSTEM LAYOUT (Questions 79–100)

79. A fire alarm voltage drop calculation shows a NAC using 14 AWG copper ($3.14 \Omega/1000 \text{ ft}$), round-trip distance 900 feet, alarm current 2.6 amps on a 24 VDC system. What is the end-of-circuit voltage?

- A. 21.50 VDC providing generous margin above the minimum
- B. 19.50 VDC providing comfortable margin above 16 VDC
- C. 16.65 VDC barely meeting the minimum but technically compliant
- D. 16.65 VDC — while compliant, the margin is dangerously thin and redesign should be considered

80. A fire alarm battery calculation: panel/SLC standby = 0.85A, voice standby = 1.15A, NAC alarm = 3.8A, voice alarm = 7.5A. Building has a qualifying generator. Using 4-hour standby, 15-minute alarm, 20% safety factor. What is the minimum battery capacity?

- A. Approximately 12.9 Ah after applying 4-hour standby, 15-minute alarm, and 20% safety factor
- B. 24.00 Ah using 24-hour standby because voice systems are exempt from generator reduction
- C. 15.60 Ah using 4-hour standby with 5-minute alarm instead of 15-minute duration
- D. 10.63 Ah using 4-hour standby and 15-minute alarm without the 20% safety factor

81. A fire alarm sequence of operations matrix shows a duct detector triggering HVAC shutdown only — no building notification, no elevator recall, no supervising station signal. A reviewer flags the missing station signal. What is the correct assessment?

- A. Duct detectors never transmit to the station because they are classified as supervisory devices
- B. The reviewer is incorrect — duct detector signals transmit automatically regardless of the matrix
- C. The duct detector signal should transmit to the supervising station even without building notification
- D. Station transmission applies only when the duct detector input is programmed as an alarm type

82. A fire alarm conduit schedule shows 1-inch EMT containing nine 14 AWG THHN and seven 16 AWG THHN (16 total). Annex C max for 14 AWG alone is 22 and 16 AWG alone is 31. Mixed sizes are present. How must fill be verified?

- A. Compare each size individually — since both are below maximums, it passes
- B. Calculate total conductor area from Chapter 9 Table 5 and compare to the 40% fill limit
- C. Add the counts ($9+7=16$) and compare to the smaller Annex C maximum of 22
- D. Use the Annex C table for 14 AWG only since the larger conductor controls fill

83. A fire alarm floor plan shows a 90-degree L-shaped corridor with a 160-foot longer leg and a 110-foot shorter leg. Detectors at 30-foot spacing with a detector at the corner. Is the corner detector necessary?

- A. No, detectors along each leg provide adequate coverage through the 90-degree transition
- B. No, corner detectors create unnecessary redundant coverage that increases project cost
- C. Yes, but only if the corridor width exceeds 10 feet at the intersection point
- D. Yes, the corner detector ensures smoke detection at the direction change where coverage from either leg may be limited

84. A fire alarm device schedule shows 193 devices on SLC 1 (max 198). A renovation adds 14 new devices. How should the technician advise?

- A. All 14 should go on a new SLC to preserve remaining capacity on SLC 1 for future flexibility
- B. Add 5 to SLC 1 and place 9 on a new loop — but note SLC 1 at max has zero flexibility
- C. All 14 can be added by requesting the manufacturer to extend capacity beyond 198
- D. Install monitor modules to consolidate existing devices freeing addresses for the new devices

85. A fire alarm riser diagram shows remote NAC power supply panels on Floors 6, 12, and 18 of a 22-story building. Each panel has its own batteries. What must be calculated separately?

- A. A voltage drop calculation from the main panel to each remote panel's communication circuit
- B. A combined battery calculation averaging loads across all three remote panels
- C. A separate battery calculation based on each remote panel's specific standby and alarm loads
- D. A conduit fill calculation for the supervised circuit between the main panel and each remote

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

- A. Only the installer's license and signature certifying code compliance
- B. System specifications, circuit details, device counts, power supply data, and required signatures
- C. Only the AHJ's inspection report and the acceptance test pass/fail determination
- D. The design engineer's original calculations and specification reference documents

87. A fire alarm technician reviews a specification requiring all fire alarm cable above suspended ceilings to be in conduit throughout the building. The ceiling spaces are non-plenum with ducted return. NEC does not require conduit in non-plenum spaces for listed fire alarm cable. What should the technician do?

- A. Install conduit as specified because the project specification is a contractual obligation

- B. Ignore the specification and install per minimum NEC requirements to save costs
- C. Install conduit only in corridor ceiling spaces and omit it in individual rooms
- D. Request the AHJ to override the specification and reduce it to code minimum

88. A fire alarm voltage drop calculation for a 70.7V speaker circuit shows 62.0 VAC at the farthest speaker. The manufacturer's minimum input is 55 VAC. Does the circuit pass?

- A. No, 70.7V systems must maintain at least 90% (63.6 VAC) at all speaker locations
- B. No, speakers require exactly 70.7 VAC for proper impedance matching and quality
- C. Yes, but only if the amplifier output can be increased to compensate for line loss
- D. Yes, 62.0 VAC exceeds the 55 VAC minimum with a 7.0-volt margin

89. A fire alarm shop drawing shows a releasing system with a 20-second pre-discharge timer. The reviewing engineer notes it may not provide adequate evacuation time. What determines the appropriate delay?

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

90. A fire alarm as-built drawing shows 165 devices on SLC 1. Panel programming shows 174. The Record of Completion shows 160. What must be corrected?

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

91. A fire alarm floor plan shows a 210-foot straight corridor with detectors at 30-foot spacing. First detector at 15 feet: positions at 15, 45, 75, 105, 135, 165, 195. Seven detectors with the last at 15 feet from the far end. Is this correct?

- A. Yes, 7 detectors with 30-foot spacing and both end distances at 15 feet provide complete coverage
- B. No, 8 detectors are required because the inter-detector gap near the center creates a coverage hole
- C. No, the first and last detectors must be exactly at the corridor ends for complete coverage
- D. Yes, but additional detectors must be placed at every corridor intersection regardless of spacing

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

- A. NFPA 72 requires Class A for all circuits above Floor 6 in buildings over 8 stories
- B. Both loops must use identical classifications for consistent panel performance
- C. The designer determined upper floors benefit from Class A fault tolerance due to longer egress times
- D. Class B circuits are prohibited above Floor 6 per NEC Article 760 for life safety wiring

93. A fire alarm shop drawing shows a NAC with 9 horn/strobes at 0.300A each, 5 speakers at 0.155A each, and 6 strobes at 0.180A each. The NAC output is rated at 3.0 amps. What is the total load?

- A. 2.70 amps from horn/strobes alone which is within the 3.0-amp rating
- B. 4.55 amps total from all devices which exceeds the 3.0-amp output rating
- C. 3.08 amps total which marginally exceeds the 3.0-amp rating by 0.08 amps
- D. 5.85 amps based on doubling the total for inrush current estimation

94. A fire alarm riser diagram shows "PATHWAY SURVIVABILITY LEVEL 2" on all voice evacuation circuits. What cable or construction method satisfies Level 2?

- A. Standard FPLP cable in standard EMT conduit without additional fire rating

- B. Standard FPLR cable installed in a 1-hour fire-rated stairwell enclosure
- C. Any listed fire alarm cable in rigid metal conduit with firestop at each penetration
- D. Either 2-hour fire-rated cable (CI cable) or installation within 2-hour fire-rated construction

95. A fire alarm specification requires acceptance testing per NFPA 72 before the CO is issued. The spec requires 7 business days' advance notice to the AHJ. The general contractor demands testing in 3 days. How should the fire alarm contractor respond?

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

96. A fire alarm floor plan shows a conference room measuring 48×36 feet with a 10-foot ceiling. One wall-mounted strobe at 75 cd is shown on the 48-foot wall. Per NFPA 72 Table 18.5.5.5.1(a), a 75 cd strobe covers rooms up to 45×45 feet. The 48-foot dimension exceeds the 45-foot maximum. What is the assessment?

- A. The room passes because the 3-foot overage is within standard installation tolerance
- B. The 75 cd strobe is adequate because the 36-foot width compensates for the excess length
- C. The room requires a higher candela strobe or additional strobes because one dimension exceeds the 45-foot max
- D. The room passes if the strobe is mounted on the 36-foot wall instead of the 48-foot wall

97. A fire alarm technician reviews as-built drawings showing 150 devices on SLC 1. Physical count reveals 158 devices. Panel programming confirms 158. What documentation action is required?

- A. The 8-device discrepancy is within acceptable tolerance and no update is needed
- B. The as-built drawings must be updated to reflect the 158 devices currently installed

- C. The panel must be reprogrammed to match the 150-device as-built drawing count
- D. Only the Record of Completion needs updating since the drawings were the original design

98. A fire alarm battery calculation: standby = $0.60\text{A} \times 24\text{hr} = 14.40\text{ Ah}$, alarm = $5.2\text{A} \times 0.083\text{hr} = 0.432\text{ Ah}$, subtotal = 14.832 Ah , $\times 1.20 = 17.80\text{ Ah}$. The drawing specifies 18 Ah batteries. Is this adequate?

- A. No, the 20% safety factor should be applied to each component separately not the subtotal
- B. No, 18 Ah is too close to the 17.80 Ah minimum — the next standard size must be used
- C. Yes, but only if the building has a qualifying generator reducing the standby requirement
- D. Yes, 18 Ah exceeds the calculated minimum of 17.80 Ah with 0.20 Ah margin

99. A fire alarm sequence of operations for a hospital shows smoke detector alarms on patient floors trigger alarm-floor-only notification while pull station alarms trigger full building notification. Both trigger elevator recall and station signal. Is this valid for a defend-in-place hospital?

- A. Yes, defend-in-place hospitals may have differentiated responses per the approved fire safety plan
- B. No, all alarm types must trigger identical building-wide notification responses
- C. No, smoke detectors must always produce broader notification than manually activated devices
- D. Yes, but only if the hospital has an approved fire safety plan with AHJ concurrence

100. A fire alarm as-built drawing captures the panel's dedicated branch circuit: 20A breaker, 12 AWG, 165-foot run, labeled, lock-on device, no GFCI/AFCI. What additional detail should be documented?

- A. The voltage at panel terminals for baseline comparison during future service visits
- B. The electrician's name and license number for warranty and liability documentation
- C. The conduit type, size, and routing path from the electrical panel to the fire alarm panel
- D. The circuit breaker manufacturer and catalog number for replacement parts ordering

DOMAIN 2.4 — MANAGEMENT (Questions 101–110)

101. A fire alarm project supervisor discovers that a subcontractor pulled cable with excessive force on 20 runs totaling 3,000 feet. Internal conductor insulation may be damaged. What must the supervisor require?

- A. Visual inspection at each junction box is sufficient to identify any pulling damage
- B. Megger testing on all 20 cable runs to verify insulation integrity before connecting devices
- C. The cable can be connected and tested — damage will be detected during functional testing
- D. The subcontractor must certify in writing that proper pulling technique was maintained

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

- A. Only the fire alarm contractor attends because the test covers fire alarm equipment exclusively
- B. The general contractor solely coordinates and attends the test on behalf of all trade contractors
- C. Only the AHJ and fire alarm contractor need to be present — other trades submit results independently
- D. The elevator, HVAC, controls, and door hardware contractors must be present to verify their equipment

103. A fire alarm project manager receives a change request to convert from horn/strobe to voice evacuation at 80% completion. What is the correct response?

- A. A formal change order documenting the engineering revision, cost, and schedule impact must be processed
- B. Install speakers on remaining floors only and retain horn/strobes on completed floors
- C. Refuse the change because voice evacuation conversion at 80% is technically impossible
- D. Absorb the additional cost to maintain the client relationship and avoid project delays

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. Accept the breaker because AFCI/GFCI provides enhanced protection beyond minimum code
- B. Replace the breaker directly since fire alarm compliance is the fire alarm contractor's responsibility
- C. Notify the general contractor to direct the electrical contractor to replace it with a standard breaker
- D. Contact the building owner to authorize the additional cost of replacing the non-compliant breaker

105. A fire alarm contractor receives 300 smoke detectors — 280 with one date code and 20 with a different date code. All are the same model listed for the panel. Should the contractor be concerned?

- A. Yes, all detectors on the same SLC must have identical date codes for firmware consistency
- B. No, date code variations are normal in large orders and do not affect compatibility or performance
- C. Yes, the 20 different units should be installed on a separate SLC loop from the other 280
- D. No, but the 20 units should be placed in non-critical locations as a precautionary measure

106. A fire alarm technician asks whether a service call to retighten a wire nut — resolving a ground fault trouble — requires a formal written service report. What is the correct answer?

- A. No, minor repairs under 15 minutes can be documented with verbal confirmation to the owner
- B. Reports are required only when devices are replaced or panel programming is modified
- C. Reports are required only when the repair resolves an active alarm condition at the panel
- D. Every service activity must be documented in a written report regardless of repair scope

107. A fire alarm project's field technicians produced messy but accurate installation markup drawings during construction. The project is nearing closeout. What should the contractor do?

- A. Create clean professional as-built drawings incorporating all field markup information accurately

- B. Submit the messy field markups as-is because they represent actual installed conditions
- C. Submit the original approved shop drawings since the installation followed the approved design
- D. Have technicians recreate drawings from memory to produce cleaner documentation

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

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

109. A fire alarm contractor schedules acceptance testing for a hospital. Infection control requires 48-hour notice before aerosol testing in patient care areas. The general contractor requests testing tomorrow. How should the contractor proceed?

- A. Proceed with testing tomorrow because fire code requirements override hospital protocols
- B. Provide the 48-hour notice and coordinate patient care testing per infection control requirements
- C. Test only non-patient areas tomorrow and skip patient areas until a future unscheduled date
- D. Use non-aerosol methods exclusively in patient areas without providing advance notice

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

- A. Conduct testing in 5 days and submit results to the AHJ for retroactive review and approval
- B. Request the AHJ waive the notice period due to the project's critical construction deadline
- C. Perform a preliminary test in 5 days and schedule the formal AHJ test with proper notice
- D. Maintain the 10-day notice requirement and reschedule with proper AHJ notification

LEVEL II — SIMULATION EXAM 8: ANSWER KEY AND EXPLANATIONS

1. B — Standard FPLP cable inside a 2-hour fire-rated stairwell has Level 2 protection while inside the stairwell. When both paths exit their respective stairwells into the unrated corridor ceiling space, they lose the 2-hour construction protection that provided Level 2. The cable itself is not CI cable — it depends on the surrounding construction for its fire rating.
2. D — Standby = $(0.78 + 1.22) \times 4 = 8.0$ Ah. Alarm = $(4.2 + 8.8) \times 0.25 = 3.25$ Ah. Subtotal = 11.25 Ah. With 20% safety factor: $11.25 \times 1.20 = 13.50$ Ah, approximately 13.26 Ah with minor rounding variations. The generator reduces standby to 4 hours. Voice evacuation requires 15-minute alarm duration.
3. A — 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 without further delay.
4. C — Intermittent communication drops during heavy storms affecting only the conduit segment running through a flooding drainage swale strongly indicates rainwater infiltration into that specific conduit section. Water entering through unsealed joints or damaged conduit contacts the cable insulation and creates intermittent resistance paths disrupting the digital signal.
5. B — 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 25 seconds is sufficient — not a fixed code value.
6. D — NFPA 72 Section 26.6.3.2 requires IP technology with continuous monitoring to detect path failure within 200 seconds. At 210 seconds, the panel exceeds this maximum by 10 seconds. The communicator's supervision timing must be investigated and corrected to ensure detection within the 200-second requirement.
7. A — The test verified that Bank B's detector recalls only Bank B and Bank A's detector recalls only Bank A — each lobby detector activates only its designated elevator bank. This confirms the selective recall programming is correctly configured in the panel's input/output matrix.
8. C — Each remote amplifier panel has its own backup batteries that must sustain the loads it serves during AC power failure. A separate battery calculation must be performed for each remote panel

using its specific standby and alarm currents, applying the same NFPA 72 duration and safety factor requirements as the main panel.

9. B — 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.
10. A — When acoustically rated floor-to-ceiling partitions divide the ballroom into five enclosed spaces, each space is isolated from the others. Sound and light from appliances in one space cannot reach occupants in adjacent enclosed spaces. Each configuration must have independent notification coverage.
11. D — A "NO ANSWER" response means the DACT seized Line 2, obtained dial tone, and dialed the station receiver number — but the receiver did not respond. The line is active but the complete end-to-end path from DACT to station receiver is not functional. Line 2 must be investigated to determine why the connection fails.
12. C — A double-interlock pre-action system requires BOTH fire detection AND a drop in supervisory air pressure before the valve opens. The valve opening on detection alone means the system is functioning as single-interlock rather than double-interlock. The releasing panel, valve controller, or interlock wiring must be reconfigured.
13. B — 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 must continue regardless of which system controls the speakers.
14. A — 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.
15. D — Defend-in-place limits notification to the alarm floor to prevent unnecessary relocation of mobility-impaired nursing home residents on unaffected floors. Moving residents — many of whom require wheelchairs, walkers, or assistance — poses physical risk. Staff on the alarm floor manage the response while other floors continue uninterrupted care.
16. C — When the technician intentionally opens the releasing circuit and the panel generates a trouble signal, this confirms the panel actively monitors the releasing circuit for continuity. If a real wiring failure occurred — a broken conductor or loose connection — the panel would detect it and alert building management before a fire event requires the circuit.

17. B — The panel sends correct zone data, but the annunciator displays Zone 6's alarm on Zone 13's LED position while Zone 6's LED stays dark. The most likely cause is a cross-connection on the annunciator's internal LED driver board where the wiring for Zones 6 and 13 are swapped.
18. A — NFPA 72 Section 23.10 requires the fire command center to have a complete fire alarm control panel or a complete repeater panel with full system status display and operator control capability. A simplified annunciator, intercom, or software workstation does not satisfy this requirement.
19. D — Phase reversal on the fire pump's electrical service is a supervisory condition — an off-normal equipment status requiring investigation. Phase reversal can cause the pump motor to run backward, rendering it unable to deliver water. NFPA 72 Section 10.18 requires this condition to be reported as a supervisory signal.
20. C — In a 70.7V audio system, impedance-matching transformers convert the high-voltage line 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 audio distortion, and potential amplifier overload or permanent damage.
21. A — Simultaneous evacuation of all 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 their fire-rated compartments.
22. B — ADA-accessible hotel 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 audible alarms or see a wall strobe with eyes closed.
23. C — NFPA 72 Section 23.11 requires releasing fire alarm systems protecting occupied spaces to provide pre-discharge audible and visual warning, a time delay for evacuation, and abort capability. All three provisions protect occupant safety before agent discharge in the data center.
24. B — Individual tamper zones identify which specific valve was moved from its normal position, directing investigation to the correct riser and area of the building. Grouping all tamper switches on a single zone eliminates this specificity, forcing maintenance personnel to investigate all three riser areas.
25. D — The raised floor space used for air distribution is 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 requirement depends on its air-handling function.
26. 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.

27. C — In-rack detectors at intermediate heights identify fires where they originate — among stored materials on shelves and pallets — before smoke travels the full 52 feet to ceiling-level detectors. Early detection at the storage level provides significantly faster alarm response and enables quicker suppression activation.
28. B — Beam detector spacing must not exceed the manufacturer's listed maximum for the specific ceiling height at the installation. At 42 feet, the manufacturer's listing establishes the allowable lateral distance between beams based on tested performance. NFPA 72 requires compliance with the manufacturer's listed spacing.
29. D — NFPA 72 Section 17.6.3.1.3 requires heat detectors to be rated at least 20°F above the maximum expected ceiling temperature. The loading dock maximum is 88°F, so the minimum activation temperature is 108°F (88 + 20 = 108). Any detector rated at or above 108°F satisfies the code minimum.
30. A — The smoke detector activated, the panel processed the alarm, and the control module relay for HVAC shutdown closed (confirmed by audible click). The AHU not shutting down despite relay closure indicates the fault is downstream — in the wiring between the relay contacts and the AHU controller's shutdown input.
31. C — Firefighter telephone systems must support multiple simultaneous two-way conversations from different floor stations to the fire command center. Connecting three handsets simultaneously tests whether the system can handle concurrent communications — essential during multi-floor fire operations where the commander coordinates with multiple teams.
32. B — All three environments — swimming pool (humidity/chlorine), commercial laundry (lint/steam), and wood shop (sawdust/particles) — generate airborne contaminants causing smoke detector nuisance alarms. Heat detection avoids these problems because it responds only to abnormal temperature increases unaffected by particles, humidity, or chemicals.
33. D — Alarm signals transmit correctly between buildings, confirming the communication link is functional. Trouble signals not appearing on the master panel indicates a network programming issue — the configuration that determines which signal types are shared between panels must be reviewed. Trouble sharing may not be enabled in the network programming.
34. A — NFPA 72 Section 23.8.1.3 requires that during the PAS investigation period, the alarm signal must transmit immediately to the supervising station and the panel must display the alarm condition. PAS delays only general building notification — signal transmission and panel display occur without delay upon initial detector activation.
35. C — Standard FPLP cable in standard EMT conduit does not meet Level 2 pathway survivability. Level 2 requires either 2-hour fire-rated cable (CI cable) or installation within 2-hour fire-rated

construction. Standard EMT conduit does not provide 2-hour fire protection regardless of the cable type installed inside it.

36. B — The number of communication paths required depends on the supervising station type, building code requirements, and the monitoring contract terms. NFPA 72 Chapter 26 establishes different requirements for different station categories. The technology type and contract terms determine whether single or dual paths are needed.
37. D — In a single-interlock pre-action system, fire alarm detection is the single interlock. When detection activates, the solenoid energizes and the pre-action valve opens, allowing water to fill the piping. Water does not discharge until a sprinkler head fuses from heat. Detection must confirm a fire condition before water enters the piping.
38. A — The speakers are rated for minimum 55 VAC input. The measured 63.2 VAC at the farthest speaker exceeds this minimum by 8.2 volts, ensuring the speakers operate within their listed parameters. The voltage drop from 70.7 to 63.2 VAC represents normal line loss over the 620-foot circuit.
39. C — Total: $135 \times 0.30 = 40.5$, $20 \times 0.24 = 4.8$, $15 \times 3.6 = 54.0$, $8 \times 2.5 = 20.0$, $10 \times 0.12 = 1.2$. Sum = 120.5 mA, approximately 121 mA. This is within the 140 mA capacity but leaves only about 19 mA margin. Future device additions could approach the limit, requiring careful planning.
40. B — When the kitchen suppression system activates and the monitor module reports the contact closure, the fire alarm panel must execute the full approved sequence: building notification, supervising station signal transmission, and HVAC shutdown. A suppression activation confirms a fire condition requiring coordinated building-wide response.
41. D — After verifying cross-zone logic (both individual zone and combined activation), countdown timing, and abort switch function, the releasing circuit supervision must be tested. Opening the releasing circuit and confirming a trouble signal verifies the panel actively monitors circuit integrity and would detect a wiring failure.
42. A — A charger voltage of 25.0 VDC — below the expected 27.0-27.6 VDC float range — while AC power is normal and the charger indicator is lit suggests the charger output may be degraded. The charger should be tested under load to determine if it can reach and maintain proper float voltage. Possible causes include a failing charger circuit or degraded batteries.
43. C — Floor 4 requiring significantly more force (effective positive pressure) while Floor 16 opens normally (no pressure) indicates the pressurization system is not distributing air evenly across all floors. A duct obstruction, closed damper, or balancing issue is preventing adequate pressure on upper floors. Both observations should be documented for mechanical investigation.
44. B — Bank A's detector correctly recalls only Bank A. Bank B's detector incorrectly recalls both banks. Since the control modules were not mentioned as both activating, the most likely cause is

a programming error where the panel activates both Bank A and Bank B recall outputs when Bank B's detector zone alarms.

45. A — Both high-reading detectors (above 3.7%) and low-reading detectors (below 0.5%) are outside the manufacturer's listed acceptable range. The 14 high-reading detectors require cleaning. The 6 low-reading detectors must be investigated for faults. All 20 out-of-range detectors require corrective action.
46. 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 permitted 3-hour window. The timing meets the code requirement.
47. B — The detector has been covered for three weeks — including two full weeks after the floor waxing was completed. The glove prevents smoke from entering the sensing chamber, leaving the corridor unprotected. The covering must be removed immediately. The impairment should have ended when the waxing project concluded one week ago.
48. D — Three functions were verified: the IP path transmitted successfully, the panel detected IP failure within 200 seconds (meeting NFPA 72 supervision timing), and the cellular backup transmitted successfully when the primary was unavailable. Both communication paths and the supervision timing function correctly.
49. A — NFPA 72 requires waterflow alarm signals at the panel within 90 seconds of sustained flow. The alarm appeared at 85 seconds, which is within the 90-second maximum. The waterflow switch passes the functional test. The timing suggests the retard delay may be near the maximum, but the result is compliant.
50. C — 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 — the air pressure interlock was not triggered.
51. B — Three renovations over eight years adding 65 devices, removing 15, adding a second SLC, and modifying the sequence twice have fundamentally changed the system. The Record of Completion must reflect the current configuration per NFPA 72 Section 7.8. An eight-year-old document describing a substantially different system is severely outdated.
52. D — Circuit voltage at the speaker terminals is normal at 69.8 VAC — within the expected range for a 70.7V system. The reduced volume from one speaker while all others are normal and circuit voltage is adequate points to the speaker's internal wattage tap being set to a lower power level than the other speakers.
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 0.4-second offset violates this requirement.
55. B — 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 who cannot read operating instructions. The painted stations must be replaced.
56. D — The batteries ended at 19.0 VDC — below the manufacturer's 20.4 VDC minimum end-voltage. Panel components may malfunction or shut down at this voltage during an actual alarm event. The batteries cannot sustain the required alarm 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, or in the controller's response to the relay signal.
58. C — The tamper switch adjustment is incorrect. NFPA 72 requires tamper switches to detect partial valve closure within the code-required travel distance — equivalent to two turns on an OS&Y valve. A butterfly valve switch that activates only when nearly fully closed fails to detect partial closure that could impair sprinkler performance.
59. B — The pre-recorded message plays on all 18 floors, confirming amplifiers and speakers function throughout. The live microphone reaching only Floors 1-9 indicates the audio routing is programmed to broadcast to a subset of zones rather than all zones. The programming must be verified against the approved design.
60. A — One hundred fifty nuisance waterflow alarms over four months with no fires indicates water pressure spikes causing brief paddle movements. The corrective approach should address both the root cause (investigating pressure spikes) and the switch response (adjusting retard delay to filter pressure-related activations within the 90-second maximum).
61. D — 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 for effective warning. The detector must be relocated to the occupied side, and the concealed space should be evaluated for its own detection needs.
62. C — The panel correctly processed the alarm and 15 of 17 locks released. 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 non-releasing locks must be investigated.
63. B — AFCI protection is prohibited on fire alarm panel dedicated branch circuits per NEC Article 760. AFCI breakers can trip during conditions unrelated to fire — disconnecting primary power

from the panel. The AFCI breaker must be replaced with a standard thermal-magnetic breaker with a lock-on device.

64. A — A voltage drop from 26.4 to 19.0 VDC in only 3 minutes during standby — not alarm — conditions represents catastrophic battery failure. Standby current is far less than alarm current, yet the batteries cannot maintain voltage under this lighter load. The batteries have negligible remaining capacity and must be replaced immediately.
65. D — 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. Each device must be physically activated and the panel's supervisory response verified.
66. B — A poster completely covering both the horn opening and strobe lens eliminates both audible and visible notification output from the device. The poster must be removed immediately and building management informed that notification appliances must remain unobstructed at all times.
67. C — Forty days without communication redundancy means the system operates with a single cellular 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 per impairment procedures.
68. A — NFPA 72 Section 18.5.5.5.3 requires visible notification appliances to flash between 1 and 2 flashes per second. At 0.5 flashes per second, the strobe is well below the minimum required rate. The device must be investigated and repaired or replaced to achieve a compliant flash rate.
69. D — When a tamper switch activation generates an alarm signal instead of a supervisory signal, the input is programmed as an alarm zone rather than a supervisory zone. The panel programming must be corrected to classify the tamper switch input as supervisory for valve position changes.
70. B — NFPA 72 Table 14.4.3.2 requires releasing device circuits to be functionally tested annually as part of the comprehensive releasing system test. This includes cross-zone logic, countdown timers, abort switches, releasing circuit supervision, and pre-discharge notification.
71. C — Storage of copy paper, chemicals, and furniture combined with only 24 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 clear working space maintained for safe panel access.
72. A — A smoke detector at 4 feet above the floor is completely ineffective for fire detection. Smoke rises to the ceiling and accumulates there. A bookshelf-height detector will not sense smoke until the room is heavily filled with a life-threatening concentration. The detector must be reinstalled at its approved ceiling location.
73. D — After verifying cross-zone logic, countdown timer, abort switch, and releasing circuit supervision, the pre-discharge warning appliances in the protected space must be independently

verified. Occupants must hear and see adequate audible and visual warning during the countdown to evacuate before agent discharge.

74. B — A dark graphic annunciator at the fire command center means arriving 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.
75. A — In a single-interlock pre-action system, fire detection is the single interlock. When detection activates, the solenoid energizes and the valve opens, allowing water to fill the piping. Water does not discharge until a sprinkler head fuses from heat. This design prevents water damage from accidental head damage alone.
76. D — 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 communication redundancy.
77. C — 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 fire alarm events with security footage, dispatch records, and other building system logs. The clock must be corrected immediately.
78. B — Sensitivity readings of 0.3% and 0.4% fall below the manufacturer's minimum acceptable range of 0.5%. The detectors are operating outside their listed parameters — they are abnormally sensitive and may produce nuisance alarms or indicate sensor faults. Both detectors must be investigated and the cause determined.
79. D — $R = 900 \times (3.14/1000) = 2.826 \Omega$. $V_{\text{drop}} = 2.6 \times 2.826 = 7.348\text{V}$. End voltage = $24 - 7.35 = 16.65\text{VDC}$. While technically above the 16 VDC minimum, the 0.65-volt margin is dangerously thin. Connection aging, temperature changes, or any future device addition would push voltage below minimum. Redesign with larger conductors is strongly recommended.
80. A — Standby = $(0.85 + 1.15) \times 4 = 8.0\text{ Ah}$. Alarm = $(3.8 + 7.5) \times 0.25 = 2.825\text{ Ah}$. Subtotal = 10.825 Ah . With 20% safety factor: $10.825 \times 1.20 = 12.99\text{ Ah}$, approximately 12.9 Ah. The generator reduces standby to 4 hours. Voice evacuation requires 15-minute alarm duration.
81. C — Even when duct detectors are configured for HVAC shutdown only without general 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. B — When different conductor sizes share the same conduit, pre-calculated Annex C tables cannot be used because they assume uniform conductor 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 limit.

83. D — A detector at the 90-degree corridor turn ensures smoke 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 regardless of approach direction.
84. A — SLC 1 at 193 of 198 has only 5 remaining addresses. Adding any of the 14 new devices would bring it closer to maximum with minimal future flexibility. Placing all 14 on a new SLC preserves SLC 1's remaining margin and provides a new loop with substantial capacity for future growth.
85. C — Each remote NAC power supply panel has its own backup batteries that must sustain the loads it serves during AC power failure. A separate battery calculation using each remote panel's specific standby and alarm currents must be performed, applying the same NFPA 72 duration and safety factor requirements.
86. B — 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 path details, acceptance test results, and signatures from the installer, designer, and AHJ.
87. A — Project specifications are contractual documents the contractor must follow. Even though NEC does not require conduit in non-plenum spaces for listed fire alarm cable, the specification is a binding contractual obligation. Deviating without formal approval exposes the contractor to liability.
88. D — The speaker circuit delivers 62.0 VAC at the farthest speaker, exceeding the manufacturer's minimum of 55 VAC by 7.0 volts. The speakers will 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 whether the countdown is sufficient — not a fixed code value.
90. D — 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. A — Seven detectors at positions 15, 45, 75, 105, 135, 165, and 195 feet provide 30-foot inter-detector spacing. The first detector is 15 feet from one end and the last is 15 feet from the opposite end ($210 - 195 = 15$). Both end distances are within the 15-foot maximum. The layout complies with NFPA 72.
92. C — 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 occupant vulnerability during extended evacuation. The designer's risk assessment determined lower floors can accept Class B's reduced redundancy.

93. B — Horn/strobes: $9 \times 0.300 = 2.70A$. Speakers: $5 \times 0.155 = 0.775A$. Strobes: $6 \times 0.180 = 1.08A$. Total = 4.555 amps, approximately 4.55 amps, which significantly exceeds the 3.0-amp NAC output rating. The circuit must be redesigned across multiple NAC outputs.
94. D — NFPA 72 Section 12.4.4 defines pathway survivability Level 2 as requiring either 2-hour fire-rated cable (circuit integrity cable) or installation within 2-hour fire-rated construction. Standard cable in standard conduit, FPLR in 1-hour enclosures, and standard cable in RMC with firestop do not satisfy Level 2.
95. A — 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 provide the required notice and reschedule accordingly.
96. C — 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 must be added to provide complete coverage.
97. B — The as-built drawings show 150 devices but 158 are physically installed and confirmed by panel programming. NFPA 72 requires as-built drawings to accurately reflect the current installed configuration. The drawings must be updated to show all 158 devices with correct addresses and locations.
98. D — The calculated minimum is 17.80 Ah. The specified 18 Ah batteries exceed this minimum by 0.20 Ah. While the margin is slim, the batteries meet the calculated requirement. Select the next available standard battery size at or above the calculated minimum.
99. A — Hospitals using defend-in-place may have differentiated fire alarm responses for different alarm types per the approved fire safety plan. Pull station alarms triggering building-wide notification while smoke detector alarms trigger floor-only notification is valid when documented in the plan and accepted by the AHJ.
100. C — 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 — technicians need to know where the circuit runs and how to access it.
101. B — Excessive pulling tension can damage conductor insulation internally without visible external jacket damage. Megger testing all 20 cable runs verifies insulation integrity and catches latent damage before devices are connected and the system energized. Visual inspection alone cannot detect internal insulation failure.
102. D — 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 interfaces, and the door hardware contractor verifies holder release. Each trade confirms correct equipment response.

103. A — Converting from horn/strobe to voice evacuation is a fundamental design change requiring new amplifiers, speaker circuits, intelligibility analysis, and panel reconfiguration. A formal change order must document the engineering revision, cost impact, and schedule extension before any work proceeds.
104. C — 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 with a standard breaker and lock-on device.
105. B — Different date codes within the same detector model indicate different production runs. As long as all 300 detectors are the same model and listed as compatible with the panel, date code variations do not affect compatibility, communication protocols, or detection performance.
106. D — Every service activity must be documented in a written service report regardless of repair scope. Even a simple wire nut tightening resolves a trouble condition that should be recorded. Documentation supports troubleshooting, demonstrates compliance, and provides records for the building owner and AHJ.
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, unmarked originals, or memory-based recreations fails to provide accurate, legible documentation for the permanent record.
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 required closeout package.
109. B — Hospital infection control requirements for 48-hour notice must be respected. The contractor should provide the required notice and coordinate patient care testing with both the general contractor and hospital administration. Patient safety protocols cannot be overridden by construction schedule pressure.
110. D — 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 with proper notification.