

BFAAM Apprenticeship Program

Period 2

Related Training Instruction (RTI)

Module 4 – NFPA 72 – Protected Premises

Reading material associated with this
module: Chapter 21, 23 and 24 of NFPA 72,
National Fire Alarm Code, 2013 edition

Emergency Control Functions

- Includes AHU shutdown, release of held open doors, damper shutdown, elevator recall, stair pressurization, etc.
- Control to be initiated by a listed relay located within 3' of the component controlling the emergency control function

21.2.4

Emergency Control Functions

- The installation wiring to the interface device shall be Class A, B, D or X 21.2.6
- Installation wiring to relay or appliance shall be monitored for integrity 21.2.8
- The method of interconnection between the interface device and the component controlling the function shall be by electrical contacts, data communications or other listed method 21.2.10

Emergency Control Elevator Recall

- All initiating devices used to initiate the elevator recall shall be connected to the building fire alarm system 21.3.1
- In buildings without a fire alarm system, initiating devices shall be connected to a dedicated function control unit 21.3.2
- Only elevator lobby, hoistway and machine room smoke detectors shall be used to initiate elevator recall 23.3.3

Emergency Control Elevator Recall

- A lobby smoke detector shall be located on the ceiling within 21' of the centerline of each elevator door within the elevator bank under the control of the detector 21.3.5
- Smoke detectors shall not be installed in unsprinklered hoistways unless activating smoke relief equipment 21.3.6

Emergency Control Elevator Recall

- When sprinklers are installed in elevator pits, automatic fire detection shall be installed to initiate elevator recall 21.3.7
- Smoke detectors shall not be installed in elevator pits to initiate elevator recall unless listed for the environment 21.3.8
- Any detector that has initiated elevator recall shall be annunciated at the FACP and remote annunciators 21.3.10

Emergency Control Elevator Recall

- Activation of the hoistway, machine room or control room smoke detectors shall cause separate and distinct visible annunciation (fire hat icon) to alert personnel the elevators are no longer safe to use 21.3.11
- With AHJ approval, elevator recall detectors are permitted to initiate a supervisory signal instead of an alarm signal 21.3.12

Emergency Control Elevator Recall

- Where lobby detectors that are used for other than elevator recall, an alarm signal shall be initiated 21.3.13
- Designated level recall shall be initiated by lobby smoke detectors other than the designated level detector, and by machine room and hoistway detectors that are not at the designated level 21.3.14.1

Emergency Control Elevator Recall

- Alternate level recall shall be initiated by lobby smoke detector(s) at the designated level, and by machine room and hoistway detectors that are at the designated level

21.3.14.2

Emergency Control Elevator Recall

- Where heat detectors are used to shut down elevator power prior to sprinkler operation, the detector shall have both a lower temperature and higher sensitivity as compared to the sprinkler 21.4.1
- If heat detectors are used to shut down elevator power, they shall be placed within 24" of each sprinkler head 21.4.2

Emergency Control Elevator Recall

- If waterflow switches are used to shut down elevator power, the use of devices with time delay switches or time delay capability shall not be permitted 21.4.3
- Control circuits to shut down elevator power shall be monitored for the presence of operating voltage, and loss of voltage shall cause a supervisory signal 21.4.4

HVAC Systems

- Detection devices that are connected to the fire alarm system, and used to cause the operation of HVAC dampers, fan control, smoke doors and fire doors shall be monitored for integrity 21.7.2
- Connections between fire alarm systems and the HVAC system shall be monitored for integrity (trouble contacts on duct detectors) 21.7.3

HVAC Systems

- If a carbon monoxide detection system initiates a ventilation response, a smoke control response of the fire alarm system shall take precedence over the response of the CO detection during a fire alarm condition

21.7.6

HVAC Systems

- When the HVAC system and fire alarm system are interconnected as a combination system, a firefighters smoke control system (FSCS) shall be provided to perform manual control over the automatic operation programmed

21.7.7

Door Release Service

- All detection devices used for door and shutter hold open release service shall be monitored for integrity. Exception: Smoke detectors used only for door release and not for open area protection 21.8.2

Door Release Service

- All door hold-open release and integral door release and closure devices shall be monitored for integrity per 21.2 21.8.3
- Magnetic door and shutter holders that allow doors to close upon loss of operating power shall not be required to have a secondary power source 21.8.4

Door Unlocking

- Fire Alarm Control Unit batteries shall not be used to maintain exit doors in a locked condition unless the fire alarm system is designed to ensure the exits will unlock within 10 minutes after the loss of primary power

21.9.3

Door Unlocking

- Doors unlocked by the fire alarm system must be unlocked prior to, or concurrent with, activation of the alarm notification appliances 21.9.5
- Doors unlocked by the fire alarm system must remain unlocked until the fire alarm is reset 21.9.6

Exit Marking Devices

- Currently a proprietary product of System Sensor marketed as "Exit Point". Not required by codes, but permitted
- When provided, shall be activated by the fire alarm system, and shall meet the requirements in Chapter 18 - Notification Appliances

21.10.2

Protected Premises

- Required systems - based on the requirements of codes or statutes adopted by the enforcing jurisdiction 23.3.1
- Non-required systems - based on the goals and objectives intended by the system owner 23.3.2

Protected Premises

- Building fire alarm - one or more of the following functions:
 - Manual alarm initiation
 - Automatic alarm initiation
 - Monitoring of fire suppression systems
 - Activation of fire suppression systems
 - Activation of emergency control functions (AHU shutdown, closing fire doors, elevator recall)

23.3.3.1

Protected Premises

- Building fire alarm - one or more of the following functions:
 - Activation of alarm notification appliances
 - Emergency voice/alarm communications
 - Guard's tour supervision
 - Process monitoring supervision
 - Activation for off premises signals
 - Combination systems

23.3.3.1

Protected Premises

- Dedicated function fire alarm:
 - Shall be permitted in facilities without a fire alarm, and shall not be required to include other features or functions of a fire alarm
 - Shall be interconnected with building fire alarm if one is subsequently installed
 - Typical applications would be sprinkler monitoring or elevator control

23.3.3.2

General Requirements

- A single fault on a pathway connected to the addressable devices shall not cause the loss of more than 50 addressable devices

23.6.1

General Requirements

- Notification appliances, fire safety functions and annunciation at the protected premises must occur within 10 seconds of initiating device activation

23.8.1.1

General Requirements

- Presignal systems that initially only annunciate in selected locations are permitted with the approval of the AHJ
 - Where used, remote signal shall not be delayed
 - Generally used where an on-site response team is utilized
 - Generally requires additional manual activation to sound all notification appliances

23.8.1.2

General Requirements

- Positive Alarm Sequence (delayed activation of notification appliances and remote signal with AHJ approval)
 - Alarm acknowledgement within 15 seconds
 - 180 seconds for investigation; if not reset within 180 seconds, alarms activate
 - If another initiating device activates during investigation, alarms activate
 - PAS bypass means required

23.8.1.3

General Requirements

- Fire Alarm control panels within a building shall be interconnected to function as a single system
 - When there is no building fire alarm system, separate dedicated function and/or releasing systems do not have to be interconnected

23.8.2.2, .3

General Requirements

- Interconnection methods:
 - Dry contacts listed for the connected load
 - Data over the signaling line circuit
 - Other listed methods

23.8.2.5

General Requirements

- Interconnection utilizing network infrastructure - all control and transport equipment (such as servers, routers) located in a critical fire alarm signaling path must be listed for fire alarm use, or:
 - Comply with fire alarm environmental specs
 - Meet FA power and wiring supervision specs
 - Meet 10 second performance spec

23.8.2.6.1

General Requirements

- Interconnection utilizing network infrastructure - FACP must have a listed barrier gateway to prevent other systems from interfering with or controlling the fire alarm system (BACNet is a typical example of integration with other systems)

23.8.2.6.2

General Requirements

- System silence and reset limited to protected premises, unless AHJ approves remote silence and reset

23.8.2.9

- Interconnection between building fire alarm and household fire alarm permitted (think hotels, apartments)

23.8.3

General Requirements

- Activation of dwelling unit smoke alarms shall only be permitted to display at the protected premises control unit as supervisory signals 23.8.3.2
- An alarm condition in a dwelling unit fire warning system shall not cause an alarm condition at the protected premises fire alarm system 23.8.3.5

Combination Systems

- Fire alarms permitted to share equipment and wiring with other systems 23.8.4.1
- Operation of other system shall not interfere with required fire alarm operation* 23.8.4.2
- Shorts, opens and grounds in other systems shall not interfere with the required fire alarm operation 23.8.4.3.2
*MNS exception

Combination Systems

- Non-fire alarm components shall be listed for fire alarm use, or the removal, replacement, maintenance or failure of the components shall not interfere with the fire alarm system operation

23.8.4.4

Combination Systems

- Fire Alarm Signal priority:
 - Signals associated with life safety
 - Signals associated with property protection
 - Trouble signals associated with life and / or property protection
 - All other signals
- 23.8.4.5

Combination Systems

- System annunciation - if the AHJ finds the annunciation of combined systems confusing or leading to a delayed response, the AHJ is permitted to require separate annunciation for fire alarm components

23.8.4.7

Combination Systems

- Carbon monoxide detectors and carbon monoxide detection systems transmitted to a fire alarm systems shall be indicated as a carbon monoxide alarm signal 23.8.4.8
- Signals from a fire extinguisher electronic monitoring device transmitted to a fire alarm system shall be permitted to be supervisory signals 23.8.4.9

System Inputs

- If automatic fire detectors or sprinkler waterflow devices are used, at least one pull station is required

23.8.5.1.2

- Devices employing trouble contacts must be wired so that a trouble condition does not impair the alarm initiation on the circuit

23.8.5.3.1

System Inputs

- Alarm verification feature permitted if:
 - Not initially enabled, unless conditions present to create nuisance alarms
 - Shall not delay activation by more than 1 min
 - Activation of any device other than a smoke detector causes an alarm without delay
 - Must be recorded on Certificate of Completion

23.8.5.4.1

System Inputs

- When drift compensation is provided, it shall identify at the control the affected detector at compensation limit 23.8.5.4.2
- Systems requiring operation of two automatic detectors for system operation shall:
 - Have at least two detectors in each protected space
 - Not utilize alarm verification 23.8.5.4.3

System Inputs

- Where duct smoke detectors are not resettable from the protected premises fire alarm system, a listed alarm/supervisory indicator with an integral reset switch shall be provided in an accessible location

23.8.5.4.6.4

System Inputs

- Sprinkler flow and tamper switches, if required to be monitored, shall be connected to:
 - Building Fire Alarm system, or
 - Dedicated Function Sprinkler Waterflow and Supervisory System 23.8.5.5.1
- Maximum of 5 waterflow switches and 20 supervisory devices per initiating circuit 23.8.5.5.2, 23.8.5.6.2

System Inputs

- Fire Pump "Pump Running" signals shall be permitted to be either a supervisory or an alarm* signal 23.8.5.9.1
- Other fire pump signals shall be supervisory signals 23.8.5.9.2

*Caution - NFPA 25 requires weekly automatic testing of fire pumps...

System Inputs

- Suppression system alarm and supervisory devices and circuits shall be designed and installed so that they will initiate a signal if tampered with. Trouble signals are required when junction box covers and device covers installed outside buildings are removed. As an alternate to tampering covers, tamper resistant screws may be used.

23.8.5.11.1

System Outputs

- Systems provided for evacuation or relocation of occupants shall have at least one notification appliance on each floor, located in compliance with Chapter 7 23.8.6.1
- Strobes are not required in exit stairs and elevator cars 23.8.6.2.1, .2
- Evacuation signals not required in exit stairs and elevator cars 23.8.6.2.3, .4

System Outputs

- Notification zones shall match building outer walls, fire or smoke compartments, floor separations, or other fire safety subdivisions

23.8.6.3.2

System Outputs

- When addressable notification appliances are used, a single open, short or ground on the installation conductors shall not affect the operation of more than one notification zone

23.8.6.4.2

EVACS

- In-building fire emergency voice alarm communications systems (EVACS) shall meet the requirements of Chapter 24 23.9.1
- Fire alarm systems used for partial evacuation and relocation shall be designed so that attack by fire within a signaling zone shall not impair operation of notification appliances outside the signaling zone 23.10.2

Suppression Systems

- Fire alarm control panels used for activation of a fire suppression system shall be listed for releasing service 23.11.1
- Fire alarm control panels shall be listed with the releasing device 23.11.2
- Each releasing device shall be monitored for integrity 23.11.3

Suppression Systems

- Releasing systems shall be provided with a disconnect switch to allow the system to be tested without activating the suppression system 23.11.5
- Operation of the disconnect switch shall cause a supervisory signal 23.11.5.1
- Disconnect shall be a physical switch, and not be accomplished via software 23.11.5.2

Suppression Systems

- Software disconnects, even if activated by dedicated buttons, shall not be permitted as a method to secure a suppression system from inadvertent discharge 23.11.5.3
- Suppression systems shall be controlled by a single releasing panel that monitors the initiating devices, actuates the releasing devices and controls the notification appliances 23.11.8

Suppression Systems

- If multiple control units are listed for releasing device service, and if a trouble condition on either control unit causes a trouble or supervisory signal, the initiating device on one control unit shall be permitted to actuate releasing devices on another control unit in lieu of 23.11.8

23.11.9

Guard's Tour Supervision

- Reporting stations shall be listed for the purpose 23.13.1
- A permanent record of reporting station activations shall be made at the FACP 23.13.3
- "Exception Reporting" systems permitted (no news is good news...) and must generate a signal when a tour is 15 minutes late 23.14.4

Low Power Radio Systems

- Compliance with Section 23.16 shall require the use of low-power radio equipment specifically listed for the purpose

23.16.1

Low Power Radio Systems

- Dry cell battery permitted as the sole power source for a transmitter if:
 - Transmitter serves only one device and is individually identified at control panel
 - Must power device for 1 year, then support alarm transmission for 7 days after low battery signal is sent. Low battery signal shall resound every 4 hours

23.16.2

Low Power Radio Systems

- Dry cell battery permitted as the sole power source for a transmitter if :
 - Battery failure must cause a trouble signal at FACP that resounds every 4 hours
 - Any mode of battery failure on one transmitter shall not affect any other transmitter

23.16.2

Low Power Radio Systems

- Alarm transmissions must be repeated every 60 seconds until the initiating device is restored to normal
- Maximum delay from device activation to display at FACP is 10 seconds
- Alarms signals must latch at the FACP until manually reset

23.16.3

Low Power Radio Systems

- Any fault condition that disables communications between the initiating device and FACP shall be annunciated within 200 seconds, unless prevented by FCC regulations, in which case the trouble shall be annunciated within 4 hours for an initiating device and within 4 hours for a repeater where its failure does not prevent any receipt of signals 23.16.4

Low Power Radio Systems

- Removal of a transmitter from its installed location shall immediately cause a supervisory signal for that device 23.16.4.5
- Receiving any RF interference for a period of 20 seconds or more shall cause a trouble signal identifying interference as the trouble 23.16.4.6

Low Power Radio Systems

- Notification appliance power supplies shall comply with the requirements of Chapter 10 or the requirements for dry cell batteries
- Supervision requirements of Chapters 10, 12, and 23 shall apply, or the requirements for dry cell batteries
- Maximum delay from activation of initiating device to NAC activation is 10 seconds

23.16.5

Low Power Radio Systems

- FACP must repeat alarm transmission to wireless output devices every 60 seconds, or until confirmation that the output device has received the signal
- Notification appliance must continue to operate until manually reset

23.16.5

EVACS

- Speakers may be used for non-emergency purposes if permitted by the AHJ and:
- Fire Command Center is constantly attended by trained personnel, or
- Speakers are protected against tampering or misadustment, and
- Monitoring integrity maintained while in non-emergency use (such as background music)

24.3.5.2

EVACS Survivability

- Pathway survivability levels shall be as described in Section 12.4 24.3.6.1
- For systems employing relocation or partial evacuation, a Level 2 or 3 pathway survivability shall be required 24.3.6.4.1
- For systems that do not employ relocation or partial evacuation, a Level 0, 1, 2 or 3 pathway survivability shall be required 24.3.6.4.2

EVACS

- Evacuation messages shall be preceded and followed by at least two cycles of a Code 3 temporal signal 24.4.2.2.1
- Controls shall be secured to only allow access by trained and authorized people 24.4.2.5.2

EVACS

- Operating controls shall be clearly identified 24.4.2.5.3
- If multiple EVAC control locations are provided, only one shall be in control, and it shall be indicated by a visible indication at that location 24.4.2.5.4, .5
- Manual controls shall have visible indication of on/off status for EVAC zones 24.4.2.5.4.6

EVACS for Relocation and Partial Evacuation

- Selective and all call voice paging capability required 24.4.2.8.2
- 1 to 3 second alert tone required prior to automatic messages, sequence to be repeated 3 times 24.4.2.8.3, .4
- Enclosed stairway speakers to be configured for paging only 24.4.2.8.4

EVACS for Relocation and Partial Evacuation

- Attack by fire within a notification zone shall not impair control and operation of notification appliances outside the zone
24.4.2.8.5.1
- All circuits necessary for the operation of the notification appliances shall be protected until they enter the evacuation zone they serve (could include SLC, strobe, speaker, amplifier audio circuits)
24.4.2.8.5.3

EVACS for Relocation and Partial Evacuation

- Where separation of EVACS control equipment locations results in portions of the system controlled by one location being dependent upon the control equipment at other locations, the circuits between the dependent locations shall be protected

24.4.2.8.5.4

EVACS for Relocation and Partial Evacuation

- Methods of circuit protection:
 - 2 hour fire rated enclosure
 - 2 hour fire rated room
 - Performance alternative approved by the AHJ

24.4.2.8.5.6

Evacuation Signals

- Undivided areas shall not be divided into multiple evacuation signaling zones (circuits and zones are different) 24.4.2.9.1
- When multiple notification appliance circuits are provided within a single evacuation zone, all notification appliances in the zone shall activate and deactivate together

24.4.2.9.2

Evacuation Signals

- Exception to simultaneous activation and deactivation of NAC's is when the NAC's perform different functions, such as pre-discharge alarm and general alarm signals

24.4.2.9.3

Firefighter Phone System

- Shall be located with EVACS 24.5.1.2
- Required to support simultaneous operations of 5 telephone stations 24.5.1.6
- Distinctive notification required at control for off hook phone condition 24.5.1.7
- Common talk (party line) system shall be permitted 24.5.1.10

Firefighter Phone System

- If used by fire wardens, the system shall be a selective talk system, where phones are selected from the control location 24.5.1.12
- If the control equipment does not identify the location of the caller, the phone or jack shall be labeled to permit the caller to identify their location by voice 24.5.1.14

Firefighter Phone System

- If phone jacks are provided, at least two portable handsets shall be provided and stored at the FCC 24.5.1.15
- All circuits necessary for the operation of phone system shall be installed with the pathway survivability requirements of 24.3.6.7 24.5.1.19

BFAAM Apprenticeship Program

Period 2

Reading Assignment for
Module 5 – NFPA 72 – Notification Appliances

Reading material associated with this
module: Chapter 26 of NFPA 72, *National Fire
Alarm Code*, 2013 edition