BURGLAR & FIRE ALARM ASSOCIATION OF MICHIGAN

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APPRENTICESHIP PROGRAM

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APPRENTICESHIP PROGRAM

Period 2
Related Training Instruction (RTI)
Module 2 – NFPA 72 Initiating Devices

Reading material associated with this module:
Chapter 17
NFPA 72, National Fire Alarm Code, 2022 Edition

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APPRENTICESHIP PROGRAM

NFPA 72
National Fire Alarm Code
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Initiating Devices

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Chapter 17 – Initiating Devices:

- 17.4 General Requirements:
  - Where subject to mechanical damage initiating devices shall be protected.
  - If guards or covers are provided, they shall be listed with the device.
  - The protection shall not adversely affect the use, operation, or performance of the initiating device.
  - Initiating devices shall be installed in a manner that provides accessibility for periodic inspection, testing, and maintenance.
  - Initiating devices shall be installed independent of the attachment to the circuit conductors.

17.4.2.1, 17.4.2.2, 17.4.2.3, 17.4.3, 17.4.4

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Chapter 17 – Initiating Devices:

- 17.4 General Requirements:
  - Duplicate terminals, leads, or connectors shall be provided to facilitate the monitoring of the integrity of the installation conductors.
    - Exception: Initiating devices connected to a system that provides the required monitoring, i.e. addressable devices, unless a Class A, N, or X circuit is required.
  - Where detectors are installed in concealed locations, or in arrangements where the detector's alarm or supervisory indicator is not visible to responding personnel, the detectors shall be provided with remote alarm or supervisory indicators in a location acceptable to the AHJ.
    - Exception: Where installed in a concealed location where the specific signal is indicated at the control unit (and on the drawings with its specific location and functions).

17.4.6, 17.4.7, 17.4.7.3

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Chapter 17 – Initiating Devices:

- 17.4 General Requirements:
  - The location of the detector and the area protected by the detector shall be prominently indicated at the remote indicator by a permanently attached placard or other approved means.
  - *Embossed plastic tape, pencil, ink, or crayon should not be considered to be a permanently attached placard.*
  - Remote alarm and supervisory indicators shall be installed in an accessible location acceptable to the AHJ.
  - Remote alarm and supervisory indicators shall be labeled to indicate their function and any device or equipment associated with each detector.

17.4.7.1, A17.4.7.1, 17.4.7.2, 17.4.7.4

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Chapter 17 – Initiating Devices:

- 17.4 General Requirements:
  - If the intent is to initiate action when smoke/fire threaten a specific object or space, the detector shall be permitted to be installed in close proximity to that object or space.
  - *Some applications that do not require full area protection do require detection to initiate action when specific objects or spaces are threatened by smoke or fire, such as at elevator landings and for protection of fire alarm control units. Multiple objects or a space can be protected by a single detector unit.*

17.4.8, A17.4.8

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Chapter 17 – Initiating Devices:

- 17.5 Requirements for Smoke and Heat Detectors:
  - Unless tested and listed for recessed mounting, detectors shall not be recessed into the mounting surface.
  - Where partitions extend to within 15% of the ceiling height, the spaces separated by the partitions shall be considered as separate rooms.

17.5.1, 17.5.2

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Chapter 17 – Initiating Devices:

- 17.5.3.1 Total (Complete Coverage):
  - Where total detector coverage is required, it shall include:
    - All rooms, halls, storage areas, basements, attics, lofts, spaces above suspended ceilings, and other accessible spaces.
    - Where inaccessible areas are constructed of or contain combustible material, they shall be made accessible and shall be protected by a detector(s).

17.5.3.1, 17.5.3.1.1

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Chapter 17 – Initiating Devices:

- 17.5.3.1 Total (Complete Coverage):
  - Detectors shall not be required in combustible blind spaces under any of the following conditions:
    - Where the ceiling is attached directly to the underside of the supporting beams of a combustible roof or floor deck.
    - Where the concealed space is entirely filled with a noncombustible insulation.
    - Where there are any small concealed spaces over rooms of 50sf or less.
    - In spaces formed by facing studs or solid joists spaced less than 6" apart in walls, floors or ceilings.

17.5.3.1.2

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Chapter 17 – Initiating Devices:

- 17.5.3.1 Total (Complete Coverage):
  - Detectors shall not be required below open grid ceilings if all of the following exist:
    - Grid openings are 1/4 inch or larger in the least dimension.
    - Thickness of the material does not exceed the least dimension.
    - Openings constitute at least 70% of the area of the ceiling material.

17.5.3.1.3

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Chapter 17 – Initiating Devices:

- 17.5.3.1 Total (Complete Coverage):
  - Where concealed combustible spaces above suspended ceilings are used as a return air plenum, detection shall be provided by one of the following means:
    - Smoke detectors listed for the anticipated environment (ambient temperature, relative humidity, and air velocity).
    - Smoke detection, listed for the air velocity present, at each connection from the return air plenum to the central air handling system.

17.5.3.1.4

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Chapter 17 – Initiating Devices:

- 17.5.3.1 Total (Complete Coverage):
  - Detectors shall not be required underneath open loading docks or platforms and their covers, and for accessible under floor spaces if all the following conditions exist:
    - Space is not accessible for storage or entry of unauthorized persons and is protected against the accumulation of windborne debris.
    - Space contains no equipment such as steam pipes, electric wiring, shafts, or conveyors.
    - Floor over space is tight.
    - No flammable liquids are processed, handled or stored on the floor above.

17.5.3.1.5

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Chapter 17 – Initiating Devices:

- Coverage Definitions:

  Where other governing laws, codes, or standards require the protection of selected areas only, the specified areas shall be protected in accordance with this code.

  - Partial coverage:
    - When coverage other than total coverage is required, partial coverage can be provided in common areas and workspaces such as corridors, lobbies, storage rooms, equipment rooms, and other tenantless spaces.
  - Selective coverage:
    - The intent of selective coverage is to address a specific hazard only.

17.5.3.2, A17.5.3.2

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Chapter 17 – Initiating Devices:

- Coverage Definitions:

  Where other governing laws, codes, or standards require the protection of selected areas only, the specified areas shall be protected in accordance with this code.

  - Nonrequired coverage:
    - Detection installed for reasons of achieving specific fire safety objectives, but not required by any laws, codes, or standards, shall meet the requirements of this code with the exception of the prescriptive spacing criteria.
    - Additional detectors not necessary to achieve the objective shall not be required.

17.5.3.3.1, 17.5.3.3.2

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Chapter 17 – Initiating Devices:

- 17.6 Heat-Sensing Fire Detectors:
  - Spot-type heat detectors shall include in their installation instructions, technical data, and listing documentation, the operating temperature and response time index (RTI).
  - Operating temperature and RTI are used to predict the response of a heat detector for fire modeling programs. Spot-type heat detectors manufactured prior to July 1, 2008, were not required to be marked with an RTI.
  - Heat detectors of the fixed-temperature or rate-compensated spot type shall be classified as to the temperature of operation in accordance with Table 17.6.2.1.
  - Table 17.6.2.1 establishes maximum ceiling temperature for installation of each classification of heat detector (~20°F below operating temperature).

17.6.1.5, A17.6.1.5, 17.6.2.1

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Chapter 17 – Initiating Devices:

- 17.6 Heat-Sensing Fire Detectors:
  - Non-field programmable heat detectors of the fixed-temperature or rate-compensated type shall be marked with a color code in accordance with Table 17.6.2.1.
  - Heat detectors shall be marked with their listed operating temperature.
  - Heat detectors where the alarm threshold is field adjustable shall be marked with the temperature range.
  - The temperature rating of detectors shall be at least 20° F above the maximum expected temperature at the ceiling.

17.6.2.2.1.1, 17.6.2.2.2.1, 17.6.2.2.2.2, 17.6.2.3.2

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Chapter 17 – Initiating Devices:

- 17.6 Heat-Sensing Fire Detectors:
  - Smooth Ceilings:
    - The distance between detectors shall not exceed their listed spacing, and there shall be detectors within one half the listed spacing, measured at right angles, from all walls and partitions extending to within the top 15% of ceiling height.
    - All points on the ceiling shall have a detector within a distance equal to or less than 0.7 times the listed spacing.
    - For irregularly shaped areas, the spacing between detectors may exceed the listed spacing if the maximum distance from a detector to the furthest point of coverage is not greater than .7 times the listed spacing.

17.6.3.1.1, 17.6.3.1.2

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Chapter 17 – Initiating Devices:

- 17.6 Heat-Sensing Fire Detectors:
  - Smooth Ceilings:
    - An example of this type of irregular area spacing would be:
      - Given a corridor 10’ wide x 80’ long utilizing detectors listed for 30’ spacing.
      - The detectors would be permitted to be 40’ apart, as the distance to the furthest point of coverage would not exceed 21’ (30’ spacing x 0.7 = 21’).

17.6.3.1.2

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Chapter 17 – Initiating Devices:

- 17.6 Heat-Sensing Fire Detectors:
  - Smooth Ceilings:
    - Spot-type heat detectors shall be located:
      - On the ceiling not less than 4” from the sidewall or other sidewalls.
      - On the sidewalls between 4” and 12” from the ceiling to the top of the detector.
    - Line-type heat detectors shall be located on the ceiling or on the sidewalls not more than 20” from the ceiling.

17.6.3.1.3.1, 17.6.3.1.3.2

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Chapter 17 – Initiating Devices:

- 17.6 Heat-Sensing Fire Detectors:
  - Solid Joist Construction:
    - Joists are solid projections, whether structural or not, that extend downward from the ceiling more than 4” in depth and spaced on centers of **36” or less**.
    - Solid joists differ from bar joists in that a bar joist is actually an open-web beam. If the upper web member of an open-web beam is less than 4” deep, the beam is ignored. If more than 4” deep it is either a joist or a beam, depending on the center-to-center spacing.
    - The design spacing of heat detectors in solid joist construction shall be reduced by 50% of the listed spacing in the direction perpendicular to the solid joist.
    - The detector shall be mounted on the bottom of the joist.

17.6.3.2

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Chapter 17 – Initiating Devices:

- 17.6 Heat-Sensing Fire Detectors:
  - Beam Construction:
    - Beams are solid projections, whether structural or not, that extend downward from the ceiling more than 4" in depth and spaced on centers of **more than 36"**.
    - The design spacing of heat detectors in beam construction shall be reduced by 33% of the listed spacing in the direction perpendicular to the beam.
    - Where beams project more than 18" below the ceiling and are more than 8' on center, each bay formed by the beams shall be treated as a separate area *(i.e. each bay gets a detector(s))*.
    - Where beams are less than 12" in depth and less than 8' on center, detectors shall be permitted to installed on the bottom of beams.

17.6.3.3

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Chapter 17 – Initiating Devices:

- 17.6 Heat-Sensing Fire Detectors:
  - Sloping Ceilings (Peaked and Shed):
    - A row of detectors shall first be located at or within 36” of the peak.
    - Spacing of additional detectors shall be based on the horizontal projection of the ceiling in accordance with the type of ceiling construction.
    - If the slope of the ceiling is less than 30 degrees, all detectors shall be spaced based on the height at the peak.
    - If the slope of the ceiling is greater than 30 degrees, all detectors, other than those located at the peak, shall be spaced using the average slope height or the height of the peak.

17.6.3.4

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Chapter 17 – Initiating Devices:

- 17.6 Heat-Sensing Fire Detectors:
  - High Ceilings:
    - Heat detector spacing on ceilings up to and including 10' tall will use 100% of the listed detector spacing for placement.
    - Heat detector spacing on ceilings greater than 10', up to and including 30', shall use Table 17.6.3.5.1 to derate the listed spacing to compensate for the high ceiling.
    - This derating is utilized **prior** to any additional reduction for beams, joists, or slope.
    - The minimum spacing of heat detectors shall not be required to be less than .4 times the height of the ceiling (when applying reduction factors for height, slope, and ceiling construction).
    - Line-type electrical conductivity detectors and pneumatic rate-of-rise tubing heat detectors are exempt from Table 17.6.3.5.1 and the manufacturer's instructions shall be followed for alarm point and spacing.

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Chapter 17 – Initiating Devices:

- 17.6 Heat-Sensing Fire Detectors:
  - A heat sensing detector integrally mounted on a smoke detector shall be listed for not less than 50 ft. spacing.

17.6.3.6

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Chapter 17 – Initiating Devices:

- 17.7 Smoke-Sensing Fire Detectors:
  - Unless otherwise designed and listed for the expected conditions, smoke detectors shall not be installed if any of the following conditions exist:
    - Temperature below 32°F.
    - Temperature above 100°F.
    - Relative humidity above 93%.
    - Air velocity greater than 300ft/min.
  - The location of smoke detectors shall be based on an evaluation of potential ambient sources of smoke, moisture, dust or fumes, and electrical and mechanical influences, to minimize nuisance alarms.

17.7.1.8, 17.7.1.10

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Chapter 17 – Initiating Devices:

- 17.7 Smoke-Sensing Fire Detectors:
  - Where detectors are installed for operation during construction, they shall be cleaned and verified to be operating in accordance with the listed sensitivity, or they shall be replaced prior to final acceptance of the system.
  - Where detectors are installed but not operational during construction, they shall be cleaned and verified to be operating in accordance with the listed sensitivity, or they shall be replaced prior to final acceptance of the system.
  - Where detection is not required during construction, detectors shall not be installed until after all other construction trades have completed cleanup.

17.7.2

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Chapter 17 – Initiating Devices:

- 17.7 Smoke-Sensing Fire Detectors:
  - Spot type detectors shall be located on the ceiling or, if mounted on a sidewall, between the ceiling and 12" down from the ceiling to the top of the detector.
    - *Note that the requirement to mount the detector no closer than 4" from the sidewall if ceiling mounted, or no closer than 4" from the ceiling if sidewall mounted was removed following the publication of the 2013 edition of this code. The 4" prohibition still applies to heat detectors.*
  - To minimize dust contamination, smoke detectors, where installed under raised floors shall be mounted only in an orientation for which they have been listed (wall or ceiling mount……not upside down).

17.7.4.2.1, 17.7.4.2.2

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Chapter 17 – Initiating Devices:

- 17.7 Smoke-Sensing Fire Detectors:
  - Smooth Ceilings:
    - As there is an absence of a listed coverage for smoke detectors, spot-type smoke detectors shall be permitted to use a nominal spacing of 30’.
    - The distance between detectors shall not exceed a nominal spacing of 30’ and there shall be detectors within one half the nominal spacing, measured at right angles, from all walls and partitions extending to within the top 15% of ceiling height.
    - All points on the ceiling shall have a detector within a distance equal to or less than 0.7 times the nominal 30’ spacing.
    - In all cases, the manufacturer’s published instructions shall be followed.

17.7.4.2.3.1, 17.7.4.2.3.2

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Chapter 17 – Initiating Devices:

- 17.7 Smoke-Sensing Fire Detectors:
  - Smooth Ceilings:
    - Other spacing shall be permitted to be used depending on ceiling height, different conditions, or response requirements.
    - For the detection of flaming fires, the guidelines in Annex B shall be permitted to be used.

17.7.4.2.3.3, 17.7.4.2.3.4

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Chapter 17 – Initiating Devices:

- 17.7 Smoke-Sensing Fire Detectors:
  - Solid Joist and/or Beam Construction – Level Ceiling:
    - Solid joists shall be equivalent to beams for smoke detector spacing.
    - If beam depths are less than 10% of the ceiling height (0.1H):
      - Smooth ceiling spacing is permitted.
      - Spot-type smoke detectors shall be permitted to be located on ceilings or on the bottom of beams.

17.7.4.2.4.1, 17.7.4.2.4.2

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Chapter 17 – Initiating Devices:

- 17.7 Smoke-Sensing Fire Detectors:
  - Solid Joist and/or Beam Construction – Level Ceiling:
    - If beam depths are equal to or greater than 10% of the ceiling height (0.1H):
      - Where beam spacing is equal to or greater than 40% of the ceiling height (0.4H), spot-type detectors shall be located on the ceiling in each beam pocket.
      - Where beam spacing is less than 40% of the ceiling height (0.4H), the following shall be permitted:
        - Smooth ceiling spacing in the direction parallel to the beams and at 50% of smooth ceiling spacing in the direction perpendicular to the beams.
        - Location of the detectors may be on the ceiling or on the bottom of beams.

17.7.4.2.4.2

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Chapter 17 – Initiating Devices:

- 17.7 Smoke-Sensing Fire Detectors:
  - Solid Joist and/or Beam Construction – Level Ceiling:
    - For beam pockets formed by intersecting beams, including waffle or pan-type ceilings, the following shall apply:
      - If beam depths are less than 10% of the ceiling height (0.1H):
        - Smooth ceiling spacing is permitted.
        - Spot-type smoke detectors shall be permitted to be located on ceilings or on the bottom of beams.

17.7.4.2.4.2

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Chapter 17 – Initiating Devices:

- 17.7 Smoke-Sensing Fire Detectors:
  - Solid Joist and/or Beam Construction – Level Ceiling:
    - If beam depths are equal to or greater than 10% of the ceiling height (0.1H):
      - Where beam spacing is equal to or greater than 40% of the ceiling height (0.4H), spot-type detectors shall be located on the ceiling in each beam pocket.
      - Where beam spacing is less than 40% of the ceiling height (0.4H), the following shall be permitted:
        - Smooth ceiling spacing in the direction parallel to the beams and at 50% of smooth ceiling spacing in the direction perpendicular to the beams.
        - Location of the detectors may be on the ceiling or on the bottom of beams.

17.7.4.2.4.2

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Chapter 17 – Initiating Devices:

- 17.7 Smoke-Sensing Fire Detectors:
  - Solid Joist and/or Beam Construction – Level Ceiling:
    - Corridors of 15’ width or less having ceiling beams or solid joists perpendicular to the corridor length, the following shall apply:
      - Smooth ceiling spacing shall be permitted.
      - Spot-type detectors shall be permitted on ceilings, sidewalls, or the bottom of beams or joists.
    - Rooms of 900sf or less, the following shall apply:
      - Smooth ceiling spacing shall be permitted.
      - Location of spot-type smoke detectors shall be permitted on ceilings or the bottom of beams.

17.7.4.2.4.2

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Chapter 17 – Initiating Devices:

- 17.7 Smoke-Sensing Fire Detectors:
  - Solid Joist and/or Beam Construction – Sloping Ceiling:
    - Sloping ceilings with beams running parallel up slope, the following shall apply:
      - Spot-type detectors shall be located on the ceiling within beam pockets.
      - The ceiling height shall be taken as the average height over the slope.
      - Spacing shall be taken along a horizontal projection of the ceiling.
      - Smooth ceiling spacing shall be permitted within the beam pockets parallel to the beams.
      - Beam depths less than or equal to 10% of the ceiling height (0.1H), spot-type detectors shall be located with smooth ceiling spacing perpendicular to the beams.

17.7.4.2.4.3

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Chapter 17 – Initiating Devices:

- 17.7 Smoke-Sensing Fire Detectors:
  - Solid Joist and/or Beam Construction – Sloping Ceiling:
    - Sloping ceilings with beams running parallel up slope, the following shall apply:
      - Beam depths greater than 10% of the ceiling height (0.1H), the following shall apply for spacing perpendicular to the beams:
        - Where beam spacing is equal to or greater than 40% of the ceiling height (0.4H), spot-type detectors shall be located in each beam pocket.
        - Where beam spacing is less than 40% of the ceiling height (0.4H), spot-type detectors shall not be required in every beam pocket but shall be spaced not greater than 50% of smooth ceiling spacing.

17.7.4.2.4.3

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Chapter 17 – Initiating Devices:

- 17.7 Smoke-Sensing Fire Detectors:
  - Solid Joist and/or Beam Construction – Sloping Ceiling:
    - Sloping ceilings with beams running perpendicular across the slope, the following shall apply:
      - Spot-type detectors shall be located at the bottom of the beams.
      - The ceiling height shall be taken as the average height over the slope.
      - Spacing shall be taken along a horizontal projection of the ceiling.
      - Smooth ceiling spacing shall be permitted within the beam pockets.
      - Beam depths less than or equal to 10% of the ceiling height (0.1H), spot-type detectors shall be located with smooth ceiling spacing.

17.7.4.2.4.4

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Chapter 17 – Initiating Devices:

- 17.7 Smoke-Sensing Fire Detectors:
  - Solid Joist and/or Beam Construction – Sloping Ceiling:
    - Sloping ceilings with beams running perpendicular across the slope, the following shall apply:
      - Beam depths greater than 10% of the ceiling height (0.1H), spot-type detectors shall not be required to be located closer than (0.4H) and shall not exceed 50% of smooth ceiling spacing.

17.7.4.2.4.4

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Chapter 17 – Initiating Devices:

- 17.7 Smoke-Sensing Fire Detectors:
  - Solid Joist and/or Beam Construction – Sloping Ceiling:
    - Sloping ceilings with beams pockets formed by intersecting beams, the following shall apply:
      - Spot- type detectors shall be located at the bottom of the beams.
      - The ceiling height shall be taken as the average height over the slope.
      - Spacing shall be taken along a horizontal projection of the ceiling.
      - Beams depths less than or equal to 10% of the ceiling height (0.1H), spot-type detectors shall be spaced with not more than 3 beams between detectors and shall not exceed the smooth ceiling spacing.

17.7.4.2.4.5

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Chapter 17 – Initiating Devices:

- 17.7 Smoke-Sensing Fire Detectors:
  - Solid Joist and/or Beam Construction – Sloping Ceiling:
    - Sloping ceilings with beams pockets formed by intersecting beams, the following shall apply:
      - Beams depths greater than 10% of the ceiling height (0.1H), spot-type detectors shall be spaced with not more than 2 beams between detectors but shall not be required to be spaced closer than (0.4H) and shall not exceed 50% of the smooth ceiling spacing.
    - For sloped ceilings with solid joists, the detectors shall be located on the bottom of the joist.

17.7.4.2.4.5, 17.7.4.2.4.6

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Chapter 17 – Initiating Devices:

- 17.7 Smoke-Sensing Fire Detectors:
  - Peaked / Shed Ceilings:
    - Detectors shall first be spaced and located within 36” of the peak or high side of the ceiling.
    - The number and spacing of additional detectors, shall be based on the horizontal projection of the ceiling.

17.7.4.3, 17.7.4.4

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Chapter 17 – Initiating Devices:

- 17.7 Smoke-Sensing Fire Detectors:
  - Raised Floors and Suspended Ceilings:
    - Spaces below raised floors and above suspended ceilings shall be treated as separate rooms for detector spacing.
    - Detectors in these spaces shall not be used in lieu of providing detection within the room.

17.7.4.5

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Chapter 17 – Initiating Devices:

- 17.7 Smoke-Sensing Fire Detectors:
  - 17.7.6 Smoke Detectors for Control of Smoke Spread:
    - Smoke detectors installed and used to prevent smoke spread by initiating control of fans, dampers, doors, and other equipment shall be classified in the following manner:
      - Area detectors that are installed in related smoke compartments.
      - Detectors that are installed in the air duct systems.
      - Video image smoke detection that is installed in related smoke compartments.
    - Detectors that are installed in the air duct system shall not be used as a substitute for open area protection.

17.7.6.1, 17.7.6.2.1

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Chapter 17 – Initiating Devices:

- 17.7 Smoke-Sensing Fire Detectors:
  - 17.7.6 Smoke Detectors for Control of Smoke Spread:
    - To minimize the recirculation of smoke, a detector approved for air duct use shall be installed as required by NFPA 90A, *Standard for the Installation of Air Conditioning and Ventilating Systems*.

17.7.6.3.1

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Chapter 17 – Initiating Devices:

- 17.7 Smoke-Sensing Fire Detectors:
  - 17.7.6 Smoke Detectors for Control of Smoke Spread:
    - NFPA 90A (2021):
      - Smoke detectors listed for use in air distribution systems shall be located as follows:
        - Downstream of the air filters and ahead of any branch connections in air supply systems having a capacity greater than 2000cfm.
        - At each story prior to the connection to a common return and prior to any recirculation or fresh air inlet connection in return air systems having a capacity greater than 15,000cfm and serving more than one story.

NFPA 90A (2021) 6.4.2

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Chapter 17 – Initiating Devices:

- 17.7 Smoke-Sensing Fire Detectors:
  - 17.7.6 Smoke Detectors for Control of Smoke Spread:
    - NFPA 90A (2021):
      - Return air system smoke detectors shall not be required where the entire space served by the air distribution system is protected by a system of area smoke detectors.
      - Smoke detectors shall not be required for fan units whose sole function is to remove air from the inside of the building to the outside of the building.

NFPA 90A (2021) 6.4.2

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Chapter 17 – Initiating Devices:

- 17.7 Smoke-Sensing Fire Detectors:
  - 17.7.6 Smoke Detectors for Control of Smoke Spread:
    - Where the air duct system passes through other smoke compartments not served by the duct, additional smoke detectors shall not be required to be installed.
    - Michigan Mechanical Code (2021):
      - Michigan has adopted the International Mechanical Code (2021) with amendments statewide. The requirements for duct smoke detection within the Michigan Mechanical Code differ from those contained in NFPA 90A (2021) and are presented in the following sections.

17.7.6.4.2.1, 17.7.6.4.2.2, MMC 2021 (IMC 2021) 606

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Chapter 17 – Initiating Devices:

- 17.7 Smoke-Sensing Fire Detectors:
  - **MMC (2021), Section 606:**
    - Smoke detectors shall be installed as follows:
      - **Exception: Smoke detectors shall not be required where air distribution systems are incapable of spreading smoke beyond the enclosing walls, floors, and ceilings of the room or space where the smoke is generated.**
      - Smoke detectors shall be installed in return air systems with a design capacity greater than 2000cfm, in the return air duct or plenum, upstream of any filters, exhaust air connections, outdoor air connections, or decontamination equipment and appliances.
      - Exception: Smoke detectors are not required if the entire area served by the unit is protected by area smoke detectors connected to a fire alarm system.

MMC 2021 (IMC 2021) 606.2, 606.2.1

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Chapter 17 – Initiating Devices:

- 17.7 Smoke-Sensing Fire Detectors:
  - **MMC (2021), Section 606:**
    - Smoke detectors shall be installed as follows:
      - Where return air risers serve two or more stories and serve any portion of a return air system having a design capacity greater than 15,000cfm, smoke detectors shall be installed at each story. Such smoke detectors shall be located upstream of the connection between the return air riser and any air ducts or plenums.
      - Smoke detection shall be installed in accordance with NFPA 72.
      - Access shall be provided to smoke detectors for inspection and maintenance.
      - Upon activation, the smoke detection system shall shut down all operational capabilities of the air distribution system.

MMC 2021 (IMC 2021) 606.2.3, 606.3, 606.4

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Chapter 17 – Initiating Devices:

- 17.7 Smoke-Sensing Fire Detectors:
  - **MMC (2021), Section 606:**
    - Smoke detectors shall be installed as follows:
      - The duct smoke detectors shall be connected to a fire alarm system where a fire alarm system is required. The activation of a duct smoke detector shall activate a visible and audible supervisory signal at a constantly attended location. In facilities that are required to be monitored by a supervising station, duct smoke detectors shall report only as a supervisory signal, not as a fire alarm.
      - **Exception:** The supervisory signal at a constantly attended location is not required where the duct smoke detector activates the building's alarm-indicating appliances.

MMC 2021 (IMC 2021) 606.4.1

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Chapter 17 – Initiating Devices:

- 17.7 Smoke-Sensing Fire Detectors:
  - **MMC (2021), Section 606:**
    - Smoke detectors shall be installed as follows:
      - **Exception:** In occupancies not required to be equipped with a fire alarm system, actuation of a smoke detector shall activate a visible and audible signal in an approved location. Duct smoke detector trouble conditions shall activate a visible or audible signal in an approved location and shall be identified as air duct detector trouble.

MMC 2021 (IMC 2021) 606.4.1

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Chapter 17 – Initiating Devices:

- 17.7 Smoke-Sensing Fire Detectors:
  - 17.7.6 Smoke Detectors for Control of Smoke Spread:
    - Smoke detectors for air-duct systems shall be:
      - Listed for the purpose for which they are being used.
      - Installed in such a way as to obtain a representative sample of the airstream.
      - Installed by one of the following methods:
        - Rigid mounting within the duct.
        - Rigid mounting to the duct wall with the sensing element protruding into the duct.
        - Installation outside the duct with rigidly mounted sampling tubes protruding into the duct.
        - Installation through the duct with projected light beam.

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17.7.6.5.1, 17.6.5.2, 17.6.5.3

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Chapter 17 – Initiating Devices:

- 17.7 Smoke-Sensing Fire Detectors:
  - 17.7.6 Smoke Detectors for Control of Smoke Spread:
    - Detectors shall be mounted in accordance with the manufacturer's published instructions and be accessible for cleaning by providing access doors or panels in accordance with NFPA 90A.
    - The location of all detectors in air duct systems shall be permanently and clearly identified and recorded.
    - Detectors mounted outside of a duct that employs sampling tubes for transporting smoke from inside the duct to the detector shall be designed and installed to allow verification of airflow from the duct to the detector.

17.7.6.5.4, 17.6.5.5, 17.6.5.6

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Chapter 17 – Initiating Devices:

- 17.7 Smoke-Sensing Fire Detectors:
  - 17.7.6.6 Smoke Detectors for Door Release Service:
    - Door release service can be provided by an open area protection system covering the room, corridor, or enclosed space on each side of the smoke door that are located and spaced in accordance with the requirements of 17.7.4, which covers location and spacing of smoke detectors.
    - Door release service can be provided by smoke detectors used exclusively for smoke door release service installed per the requirements of 17.7.6.6.

17.7.6.6.1, 17.7.6.6.2

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Chapter 17 – Initiating Devices:

- 17.7 Smoke-Sensing Fire Detectors:
  - 17.7.6.6 Smoke Detectors for Door Release Service:
    - Where door release service is accomplished directly from the smoke detector(s), the detectors shall be listed for releasing service.
    - If doors are to be closed in response to smoke flowing in either direction, when the distance from the top of door to ceiling is ≤ 24", the detector requirements are:
      - One ceiling mount detector on either side, **or**
      - Two wall mount detectors, one on each side, **or**
      - One detector listed for door frame mounting, **or** detector integral to door closer assembly.

17.7.6.6.4.1(A)

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Chapter 17 – Initiating Devices:

- 17.7 Smoke-Sensing Fire Detectors:
  - 17.7.6.6 Smoke Detectors for Door Release Service:
    - If doors are to be closed in response to smoke flowing in either direction, when the distance from the top of door to ceiling is > 24“ on one side only, the detector requirements are:
      - One ceiling mount detector on higher side, **or**
      - Two wall mount detectors, one on each side, **or**
      - One detector listed for door frame mounting, **or** detector integral to door closer assembly.

17.7.6.6.4.1(B)

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Chapter 17 – Initiating Devices:

- 17.7 Smoke-Sensing Fire Detectors:
  - 17.7.6.6 Smoke Detectors for Door Release Service:
    - If doors are to be closed in response to smoke flowing in either direction, when the distance from the top of door to ceiling is > 24“ on both sides, the detector requirements are:
      - Two ceiling mount detectors one on each side, **or**
      - Two wall mount detectors, one on each side, **or**
      - One detector listed for door frame mounting, **or** detector integral to door closer assembly.
    - *If the depth of wall section above the door is 60” or greater, additional detectors might be required as determined by an engineering evaluation.*

17.7.6.6.4.1(C), A17.7.6.6.4.1(C)

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Chapter 17 – Initiating Devices:

- 17.7 Smoke-Sensing Fire Detectors:
  - 17.7.6.6 Smoke Detectors for Door Release Service:
    - If a detector is specifically listed for door frame mounting, or if a listed combination or integral detector-door closer assembly is used, only one detector shall be required if installed per the manufacturers published instructions.

17.7.6.6.4.1(D)

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Chapter 17 – Initiating Devices:

- 17.7 Smoke-Sensing Fire Detectors:
  - 17.7.6.6 Smoke Detectors for Door Release Service:
    - If door release is intended to prevent smoke transmission from one space to another in one direction only, detectors shall be located in the space in which smoke is to be confined, regardless of the depth of wall section above the door and shall be in accordance 17.7.6.6.5. Alternatively, a smoke detector conforming to 17.6.6.4.1(D) shall be permitted to be used.
    - If ceiling mounted smoke detectors are installed on a smooth ceiling for a single or double doorway, they shall be located as follows:
      - On the centerline of the doorway.
      - No more than 5', nor less than 12" away from the doorway, and at least (door to ceiling height) from the door, measured along the ceiling and perpendicular to the doorway.

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17.7.6.6.4.2, 17.7.6.6.5

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Chapter 17 – Initiating Devices:

- 17.7 Smoke-Sensing Fire Detectors:
  - 17.7.6.6 Smoke Detectors for Door Release Service:
    - If there are multiple doorways, and the separation between doorways exceeds 24", each doorway shall be treated separately.
    - Each group of three or more doorway openings shall be treated separately.
    - Each group of doorway openings that exceeds 20' in width shall be treated separately.

17.7.6.6.4.3 (A), (B), (C)

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Chapter 17 – Initiating Devices:

- 17.7 Smoke-Sensing Fire Detectors:
  - 17.7.7.1 Spot-Type Detectors:
    - Combination and multi-sensor smoke detectors with an integral fixed-temperature heat detector shall comply with Table 17.6.2.1 for maximum ceiling temperature.
    - Holes in the back of the detector shall be covered, and the detector mounted so that airflow from inside or around the housing does not prevent smoke entry during a fire or test condition.

17.7.7.1.1, 17.7.7.1.2

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Chapter 17 – Initiating Devices:

- 17.7 Smoke-Sensing Fire Detectors:
  - 17.7.7.3 High Air Movement Areas:
    - Smoke detectors shall not be located directly in the airstream of supply registers.
    - Smoke detector spacing in high air movement areas shall be reduced where the airflow in a space exceeds 8 minutes per air change (total space volume) (which is equal to 7.5 air changes per hour).
    - Spacing shall be adjusted per Table 17.7.7.3.3.2 or Figure 17.7.7.3.3.2.
    - The adjustments from the table and figure are applied before making any other required adjustments. Table 17.7.7.3.3.2 and Figure 17.7.7.3.3.2 do not apply to under-floor or above-ceiling spaces.
    - Air-sampling and projected beam smoke detectors shall be installed per the manufacturer's published instructions.

17.7.7.3.2, 17.7.7.3.3.1, 17.7.7.3.3.2, 17.7.7.3.3.3

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Chapter 17 – Initiating Devices:

- 17.7 Smoke-Sensing Fire Detectors:
  - 17.7.8 Video Image Smoke Detection:
    - Video image smoke detection systems and all the components thereof, including hardware and software, shall be listed for the purpose of smoke detection.
    - Systems shall be designed in accordance with the performance-based design requirements of section 17.3. The location and spacing of video image smoke detectors shall comply with the requirements of section 17.11.5.
    - Video signals that are generated by cameras that are components of video image smoke detection systems shall be permitted to be transmitted to other systems for other uses only through output connections provided specifically for that purpose by the video system manufacturer.
    - All component controls and software shall be protected against unauthorized changes. 17.7.8.1, 17.7.8.2.1, 17.7.8.2.2, 17.7.8.3, 17.7.8.4

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Chapter 17 – Initiating Devices:

- 17.8 Radiant Energy-Sensing Fire Detectors:
  - Radiant energy includes the electromagnetic radiation emitted as a by-product of the combustion reaction. This includes radiation in the ultraviolet, visible, and infrared portions of the spectrum emitted by flames or glowing embers.
  - The radiant energy detection design documentation shall state the required performance objective of the system.
  - These detectors shall be categorized as flame detectors and spark/ember detectors.
  - The selection of radiant energy-sensing detectors shall be based on the following:
    - Matching of the spectral response of the detector to the spectral emissions of the fire or fires to be detected.
    - Minimizing the possible of spurious nuisance alarms from non-fire sources inherent to the hazard area.

A17.8.1, 17.8.1.1, 17.8.1.3, 17.8.2.2

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Chapter 17 – Initiating Devices:

- 17.8 Radiant Energy-Sensing Fire Detectors:
  - Radiant energy-sensing fire detectors shall be employed consistent with the listing or approval and the inverse square law, which defines the fire size versus distance curve for the detector.
  - Detector quantity shall be based on the detectors being positioned so that no point requiring detection is obstructed or outside the field of view of at least one detector.

17.8.3.1.1, 17.8.3.1.2

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Chapter 17 – Initiating Devices:

- 17.8 Radiant Energy-Sensing Fire Detectors:
  - The location and spacing of flame detectors shall be based on an engineering evaluation that includes:
    - Size of fire to be detected.
    - Fuel involved.
    - Sensitivity of the detector.
    - Field of view of the detector.
    - Distance between the fire and detector.
    - Radiant energy absorption of the atmosphere.
    - Presence of extraneous sources of radiant emissions.
    - Purpose of the detection system.
    - Response time required. 17.8.3.2.1

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Chapter 17 – Initiating Devices:

- 17.8 Radiant Energy-Sensing Fire Detectors:
  - Types of applications for flame detectors:
    - High-ceiling, open-spaced buildings such as warehouses and aircraft hangers.
    - Outdoor or semi-outdoor areas where winds or drafts can prevent fire from reaching a smoke or heat detector.
    - Areas where rapidly developing flaming fires can occur, such as aircraft hangers, petrochemical production areas, storage and transfer areas, natural gas installations, paint shops, or solvent areas.
    - Areas needing high fire risk machinery or installations, often coupled with an automatic gas extinguishing system.
    - Environments that are unsuitable for other types of detectors.

A17.8.3.2.1

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Chapter 17 – Initiating Devices:

- 17.8 Radiant Energy-Sensing Fire Detectors:
  - Extraneous sources of radiant emissions that can interfere with the stability of flame detectors:
    - Sunlight.
    - Lightning.
    - X-rays.
    - Gamma rays.
    - Cosmic rays.
    - Ultraviolet radiation from welding.
    - Electromagnetic interference (EMI, RFI).
    - Hot objects.
    - Artificial lighting. A17.8.3.2.1

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Chapter 17 – Initiating Devices:

- 17.8 Radiant Energy-Sensing Fire Detectors:
  - The system design shall specify the size of the flaming fire of a given fuel to be detected.
  - As flame detectors are line-of-sight devices, their ability to respond to the area of fire in the protection zone shall not be compromised by the presence of intervening structural members or other opaque objects or materials.
  - Provisions shall be made to maintain detector window clarity in applications where airborne particulates and aerosols coat the detector window and effect sensitivity.
  - This requirement can be satisfied by:
    - Lens clarity monitoring and cleaning where a contaminated lens signal is generated.
    - Lens air purge.

17.8.3.2.2, 17.8.3.2.5, 17.8.3.2.6, A17.8.3.2.6

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Chapter 17 – Initiating Devices:

- 17.8 Radiant Energy-Sensing Fire Detectors:
  - The location and spacing of spark/ember detectors shall be based on an engineering evaluation that includes:
    - Size of the spark/ember to be detected.
    - Fuel involved.
    - Sensitivity of the detector.
    - Field of view of the detector.
    - Distance between the fire and detector.
    - Radiant energy absorption of the atmosphere.
    - Presence of extraneous sources of radiant emissions.
    - Purpose of the detection system.
    - Response time required. 17.8.3.3.1

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Chapter 17 – Initiating Devices:

- 17.8 Radiant Energy-Sensing Fire Detectors:
  - Extraneous sources of radiant emissions that can interfere with the stability of spark/ember detectors:
    - Ambient light.
    - Electromagnetic interference (EMI, RFI).
    - Electrostatic discharge in the fuel stream.

A17.8.3.3.1

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Chapter 17 – Initiating Devices:

- 17.8 Radiant Energy-Sensing Fire Detectors:
  - The system design shall specify the size of the spark/ember of the given fuel to be detected.
  - Spark detectors shall be positioned so that all points within the cross section of the conveyance duct, conveyor, or chute where the detectors are located are within the field of view of at least one detector.
  - Provisions shall be made to maintain detector window clarity in applications where airborne particulates and aerosols coat the detector window between maintenance intervals and effect sensitivity.
  - This requirement can be satisfied by:
    - Lens clarity monitoring and cleaning where a contaminated lens signal is generated.
    - Lens air purge. 17.8.3.3.2, 17.8.3.3.3, 17.8.3.3.6, A17.8.3.3.6

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Chapter 17 – Initiating Devices:

- 17.8 Radiant Energy-Sensing Fire Detectors:
  - Radiant energy-sensing detectors shall be shielded or otherwise arranged to prevent action from unwanted radiant energy.
  - Where used outdoors, radiant energy-sensing detectors shall be shielded or otherwise arranged in a fashion to prevent diminishing sensitivity by conditions such as rain or snow and yet allow a clear field of view of the hazard area.
  - A radiant energy-sensing detector shall not be installed where the ambient conditions are known to exceed the extremes for which the detector has been listed.

17.8.4.2, 17.8.4.3, 17.8.4.4

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Chapter 17 – Initiating Devices:

- 17.8 Radiant Energy-Sensing Fire Detectors:
  - 17.8.5 Video Image Flame Detection:
    - Video image flame detection systems and all the components thereof, including hardware and software, shall be listed for the purpose of flame detection.
    - Video signals that are generated by cameras that are components of video image flame detection systems shall be permitted to be transmitted to other systems for other uses only through output connections provided specifically for that purpose by the video system manufacturer.
    - All component controls and software shall be protected against unauthorized changes.

17.8.5.1, 17.8.5.3, 17.8.5.4

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Chapter 17 – Initiating Devices:

- 17.9 Combination, Multi-Criteria, and Multi-Sensor Detectors:

  A **combination detector** either responds to more than one fire phenomena or employs more than one operating principal to sense one of these phenomena. Typical examples include combination smoke / heat detectors or a combination rate-of-rise and fixed-temperature heat detector.

  A **multi-criteria detector** contains multiple sensors that separately respond to physical stimulus such as heat, smoke, or fire gases, or employs more than one sensor to sense the same stimulus. The sensor is capable of generating only one alarm signal from the sensors employed in the design either independently or in combination. Typical sensors utilized in the combination signal can include heat, smoke, flame, or carbon monoxide.

  A **multi-sensor detector** contains multiple sensors that separately respond to physical stimulus such as heat, smoke, or fire gases or employ more than one sensor to sense the same stimulus. The device is capable of generating multiple alarm signals from any one of the sensors employed in the design independently or in combination. Typical sensors are the same as multi-criteria. 3.3.77.5, 3.3.77.13, 3.3.77.14

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Chapter 17 – Initiating Devices:

- 17.9 Combination, Multi-Criteria, and Multi-Sensor Detectors:
  - A combination detector shall be listed for each sensor, and the device listings shall determine the location and spacing criteria.
  - A multi-criteria detector shall be listed for the primary function of the device. Due to the device-specific, software-driven solution of multi-criteria detectors to reduce unwanted alarms and improve detector response, location and spacing criteria included with the detector installation instructions shall be followed.
    - *If the device is listed under UL 268 as a smoke detector, it is to be located, spaced, and installed in accordance with section 17.7.*
  - A multi-sensor detector shall be listed for each sensor. Due to the device-specific, software-driven solution of multi-sensor detectors to reduce unwanted alarms and improve detector response, location and spacing criteria included with the detector installation instructions shall be followed.

17.9.2.1, 17.9.2.2, 17.9.3.1, 17.9.3.2, 17.9.4.1, 17.9.4.2

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Chapter 17 – Initiating Devices:

- 17.12 Carbon Monoxide (CO) Detectors:
  - Where carbon monoxide detection of a building is required, carbon monoxide detectors shall be installed in accordance with all of the following, unless a performance-based design in accordance with section 17.3 is used:
    - On the ceiling in the same room as permanently installed fuel-burning appliances.
    - Centrally located on every habitable level and in every HVAC zone of the building.
    - Outside of each separate dwelling unit, guest room, and guest suite sleeping area within 21’ of any door to a sleeping room, with the distance measured along the path of travel.
    - Other locations where required by applicable laws, codes, or standards.

17.12.1

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Chapter 17 – Initiating Devices:

- 17.12 Carbon Monoxide Detectors:
  - Carbon monoxide detectors shall meet the following requirements:
    - Listed in accordance with applicable standards, such as UL 2075, *Gas and Vapor Detectors and Sensors*.
    - Set to respond to the sensitivity limits specified in UL2034, *Single and Multiple Station Carbon Monoxide Alarms*.
  - UL 2034 alarm thresholds are as follows:
    - 30-60 ppm maintained for no fewer than 30 days.
    - 70-149 ppm maintained for 60-240 minutes.
    - 150-399 ppm maintained for 10-50 minutes.
    - 400 ppm or greater maintained for 4 to 15 minutes.
    - Below 30 ppm, the detector is not permitted to give an alarm signal.

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Chapter 17 – Initiating Devices:

- 17.12 Carbon Monoxide Detectors:
  - All CO detectors shall be located and mounted so that accidental operation will not be caused by jarring and vibration.
  - Selection and placement shall take into account the performance characteristics of the detector and the areas into which the detectors are to be installed to prevent nuisance and unintentional alarms or improper operation after installation.
  - Unless tested and listed for recessed mounting, CO detectors shall not be recessed into the mounting surface.
  - Where detectors are used for signal initiation during construction, they shall be replaced prior to final commissioning.
  - Where detection is not required during construction, detectors are not to be installed until all other trades have completed cleanup.

17.12.4, 17.12.6, 17.12.7, 17.12.8.1, 17.12.8.2

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Chapter 17 – Initiating Devices:

- 17.13 Sprinkler Waterflow Alarm-Initiating Devices:
  - Actuation of the initiating device shall occur within 90 seconds of waterflow at the alarm-initiating device when flow occurs that is equivalent to that from a single sprinkler of the smallest orifice size installed in the system.
  - Movement of water due to waste, surges or variable pressure shall not initiate an alarm signal.

17.13.2, 17.13.3

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Chapter 17 – Initiating Devices:

- 17.14 Detection of Operation of other Automatic Extinguishing Systems:
  - The operation of fire extinguishing or suppression systems shall initiate an alarm signal by alarm-initiating devices in accordance with their individual listings. These devices may detect the following:
    - Flow of water in foam systems.
    - Pump activation.
    - Differential pressure.
    - Pressure (e.g., clean agent systems, carbon dioxide systems, and wet/dry chemical systems).
    - Mechanical operation of a release mechanism.

17.14, A17.14

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Chapter 17 – Initiating Devices:

- 17.15 Manually Actuated Alarm-Initiating Devices:
  - Manually actuated alarm-initiating devices for initiating signals other than for fire alarm shall be permitted if the devices are differentiated from manual fire alarm boxes by a color other than red and labeling.
  - Manually actuated alarm-initiating devices shall be securely mounted.
  - Manually actuated alarm-initiating devices shall be mounted on a background of contrasting color.
  - The operable part of a manually actuated alarm-initiating devices shall be not less than 42” and not more than 48” from the finished floor.
  - Manually actuated alarm-initiating devices may be either single or double action.
  - Listed protective covers shall be permitted to be installed over single- or double-action manually actuated alarm-initiating devices.

17.15.2, 17.15.4, 17.15.5, 17.15.6, 17.15.7, 17.15.8

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Chapter 17 – Initiating Devices:

- 17.15 Manually Actuated Alarm-Initiating Devices:
  - Manual fire alarm boxes shall be installed so that they are conspicuous, unobstructed, and accessible.
  - Manual fire alarm boxes shall be located within 5’ of each exit doorway on each floor.
  - Additional manual fire alarm boxes shall be provided so that the travel distance to the nearest manual fire alarm box will not exceed 200’, measured horizontally on the same floor.
  - Manual fire alarm boxes shall be mounted on both sides of grouped openings over 40’ in width, and within 5’ of each side of grouped openings.

17.15.9.2, 17.15.9.4, 17.15.9.5, 17.15.9.6

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Chapter 17 – Initiating Devices:

- 17.17 Supervisory Signal-Initiating Devices:
  - Control Valve Supervisory-Initiating Device:
    - Two separate and distinct signals shall be initiated; movement of the valve from its normal position (off-normal) and restoration of the valve to its normal position.
    - Off-normal signal to be initiated during the first two revolutions of the handwheel or during 1/5th of the travel distance of the valve control apparatus from its normal position.
    - The off-normal signal shall not be restored at any valve position except normal.
  - *The requirement for two signals does not require two switches. A switch that transfers when the valve begins to close and remains transferred while the valve is closed then returns to normal when the valve is completely opened satisfies this requirement.*

17.17.1.1, 17.17.1.2, 17.17.1.3

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Chapter 17 – Initiating Devices:

- 17.17 Supervisory Signal-Initiating Devices:
  - Control Valve Supervisory-Initiating Device:
    - An initiating device for supervising the position of a control valve shall not interfere with the operation of the valve, obstruct the view of its indicator, or prevent access for valve maintenance.

17.17.1.4

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Chapter 17 – Initiating Devices:

- 17.17 Supervisory Signal-Initiating Devices:
  - Pressure Supervisory Signal-Initiating Device:
    - Two separate and distinct signals shall be initiated; one indicating that the required pressure has increased or decreased (off-normal) and the other to indicate restoration of the pressure to its normal value.
    - Pressure switches shall indicate both high- and low-pressure conditions.
    - A pressure tank supervisory signal-initiating device shall initiate an off-normal signal when the required pressure increases or decreases by 10 psi.
    - A dry pipe and pre-action sprinkler system pressure supervisory signal-initiating device shall initiate an off-normal signal when the required pressure increases or decreases by 10 psi, unless otherwise permitted by the manufacturer's published installation instructions.

17.17.2.1, 17.17.2.2.1, 17.17.2.2.2

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Chapter 17 – Initiating Devices:

- 17.17 Supervisory Signal-Initiating Devices:
  - Water Level Supervisory Signal-Initiating Device:
    - Two separate and distinct signals shall be initiated; one indicating that the required water level has been lowered or raised (off-normal) and the other indicating restoration.
    - A pressure tank signal-initiating device shall indicate both high and low water level conditions.
    - The off-normal signal shall be initiated when the water level falls or rises 3”.
    - A supervisory signal-initiating device for other than pressure tanks shall initiate a low water signal when the water level falls 12”.

17.17.3.1, 17.17.3.2, 17.17.3.2.1, 17.17.3.3

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Chapter 17 – Initiating Devices:

- 17.17 Supervisory Signal-Initiating Devices:
  - Water Temperature Supervisory Signal-Initiating Device:
    - A water temperature supervisory device for a water container exposed to freezing conditions shall initiate two separate and distinctive signals; one to indicate a decrease in water temperature to 40°F and the other to indicate its restoration to above 40°F.
  - Room Temperature Supervisory Signal-Initiating Device:
    - A room temperature supervisory device shall indicate a decrease in room temperature to 40°F and its restoration to above 40°F.

17.17.4, 17.17.5

END OF PERIOD 2 – MODULE 2

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