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Building / Elevator Code Coordination

Examples of Sprinkler, Heat and Smoke Detector Locations for Elevators

Date: 2-17-2015, revision to previous memos dated 1-1-2013, 2-18-2005 and 12-1-1999.

Subject of revision:

Updated with latest codes. Added information regarding NFPA 72, 5.6.5 and 6.16.2 and ASME A17.1, 2.27.3.2. Added Cases 4f and 11b.

Purpose:

To assist in determining the fire sprinklering, heat detector and smoke detector locations within elevator hoistways, machine rooms, machinery spaces, control rooms and control spaces based on the current editions of applicable codes. Requirements vary depending on whether the elevator is a passenger or freight elevator, utilizes an electric traction or hydraulic drive system in machine rooms or in the hoistway, has a combustible or non-combustible hoistway and if the building or part of the building is sprinklered per NFPA 13 or NFPA 13R.

New Buildings:

This document is intended for application to new buildings with partial or full sprinkler systems.

Existing Buildings:

Sprinkler requirements for existing buildings may depend upon changes in use or occupancy, additions, exit distances, requirements of other code authorities or other factors. To determine sprinkler requirements in existing buildings, consult with the appropriate building code or fire code official.

Where installing sprinklers in new or existing elevator machine rooms, at the top of hoistways or in elevator pits where sprinkler activation would effect elevator operation, SPS 318.1708(3)(a) and (f) require installation of the current version of firefighters emergency operation and table SPS 318.1013-4, Item 8 requires installation of a shunt trip disconnect system. A permit to do so, applied for by a licensed elevator contractor, and an inspection are required.

For existing long term care facilities, the federal Centers for Medicare and Medicaid Services has issued a memo addressing sprinklering. Memo summary:

On August 13, 2008, the Centers for Medicare & Medicaid Services (CMS) published a final rule entitled "Medicare and Medicaid Programs; Fire Safety Requirements for Long Term Care Facilities, Automatic Sprinkler Systems."

This regulation requires all long term care facilities to be equipped with a supervised automatic sprinkler system by August 13, 2013, installed in accordance with the 1999 edition of the National Fire Protection Association's (NFPA) "Standard for the Installation of Sprinkler Systems" (NFPA 13).

Facilities with existing sprinkler systems should review their sprinkler systems to determine if they meet the requirements of the 1999 edition of NFPA 13.

Consult with the State of Wisconsin Department of Health Services (DHS) regarding sprinklering of long term care facilities, hospitals and other buildings under DHS jurisdiction, including possible alternatives to sprinklers such as Clean Agent systems.

Note: Removal or delayed connection of new sprinkler heads may only be with the approval of the appropriate building code or fire code authority, not the elevator code authority.

Codes Editions:

The cases in this document and code application and enforcement are based on:

Building Codes SPS 362 and 366 (Aug. 2014), adopted IBC – International Building Code (2009) and IEBC – International Existing Building Code (2009), NFPA 13 (2007), NFPA 13R (2007), NFPA 72 (2007), SPS 318 (Aug. 2014) and adopted ASME A17.1 (2013) except where noted.

Specific Codes:

NFPA 13, 8.15.5. Elevator Hoistways and Machine Rooms.

8.15.5.1. Sprinklers in elevator pits to be sidewall type not more than 2 feet above the pit floor.

8.15.5.3. Temperature ratings for sprinklers in elevator machine rooms or at the tops of hoistways shall be of ordinary or intermediate temperature rating. Glass bulbs will be orange, red, yellow or green of the commercial, not residential type.

NFPA 72, Chapter 5. Initiating Devices

Systems for elevator recall for firefighters emergency operation (6.16.3) and elevator shutdown (6.16.4) shall be designed installed in accordance with Chapter 5.

5.6.3.1. Elevator pits will not have a heat detector associated with a pit sprinkler because heat detectors are not permitted more than 12" below a ceiling.

5.6.5. Spacing for initiating devices is according to this section including for high, sloped and peaked ceilings (see 5.7.3.2.4.2), ceilings with beams and areas of high air movement.

Note: The 2007 and earlier NFPA 72 did not directly address elevator lobbies having high ceilings typically found at a mezzanine or in an atrium, or elevator lobbies in structures with open grate floors/ceilings such as in power plants. These situations are unique in that the landings at two different floor levels can share a ceiling so smoke accumulating at that ceiling could be from a fire at one of several landings. Detection of fire at its source is essential for sending the elevator to the safest floor. The 2010 NFPA 72, 17.7.3.1.4 states: *If the intent is to initiate action when smoke/fire threatens a specific object or space, the detector shall be permitted to be installed in close proximity to that object or space.* The Annex adds: *When specific objects or spaces are threatened by smoke or fire, such as at elevator landings that have high ceilings in excess of 15 feet, detection should be placed on the wall above and within 60 inches from the top of the elevator doors.* This allows the detector to be located where it may be readily installed, tested and serviced while also providing the necessary smoke detection coverage for the landing. The manufacturer of the smoke detector for this use must provide a statement to the elevator plan reviewer or inspector verifying the smoke detector is acceptable for this type of installation.

5.7.3.2.1. Elevator pits will not have a smoke detector because smoke detectors are not permitted more than 12" below a ceiling.

NFPA 72, 6.16.2. General.

6.16.2.2. The relays necessary for connection of the fire alarm system to the elevator controller for firefighters emergency operation must be located within 3 feet of the elevator controller.

6.16.2.2. The relay necessary for monitoring the presence of the 120 volt power supply for activation of the shunt trip disconnect system as required by NFPA 72, 6.16.4.4 must be within 3 feet of (and may be within) the shunt trip disconnect.

NFPA 72, 6.16.3. Elevator Recall for Fire fighters' Emergency Operation.

6.16.3.5. Initiating devices in elevator lobbies are required to be within 21 feet horizontally of the centerline of elevator hoistway doors for elevator firefighters emergency operation.

6.16.3.7. Initiating devices for firefighters emergency operation are shown in this document as smoke detectors. If ambient conditions prohibit installation of automatic smoke detection, other automatic fire detection (heat detectors) shall be permitted.

NFPA 72, 6.16.4. Elevator Shutdown (shunt tripping).

6.16.4.1. Heat detectors for elevator shutdown prior to sprinkler operation must have a lower temperature and higher sensitivity compared to the sprinkler.

6.16.4.2. Heat detectors for elevator shutdown are required within 2 feet of each sprinkler head that could discharge water onto the elevator.

6.16.4.3. Water flow switches can be used in place of heat detectors but are not common.

ASME A17.1, 2.27.3.2 and 2.27.4.2 and SPS 318.1702(10)(b). Details of component locations and operation of the elevator(s) when initiating devices are activated.

Some elevators have all machinery and controls located within the hoistway with an inspection and test panel (ITP) in the hoistway door frame at one of the elevator landings. Elevators with an ITP do not have a separate machine room, machinery space, control room or control space. Per NFPA 72, 6.16.6.2, the relays required for connection of the fire alarm system to the elevator controller must be within 3 feet of the controller therefore within 3 feet of the ITP. Per ASME A17.1, 2.27.3.2.7(c) these relays are not permitted to be accessed through the elevator hoistway. Provisions must be made to access the relays from the landing with the ITP. The relays may be enclosed in wall-mounted or recessed boxes or panels, above the ceiling with access provided, or in rooms or other spaces within 3 feet of the ITP accessible to fire alarm servicing personnel.

IBC, 703.4. Combustible or non-combustible construction is defined this way: If wall and ceiling assemblies contain only materials considered non-combustible such as drywall over steel studs or steel joists, the assemblies are considered non-combustible. A hoistway entirely of such assemblies is considered non-combustible. If any part of an assembly is combustible, such as drywall over wood studs or wood joists, the assembly and therefore the hoistway are considered combustible.

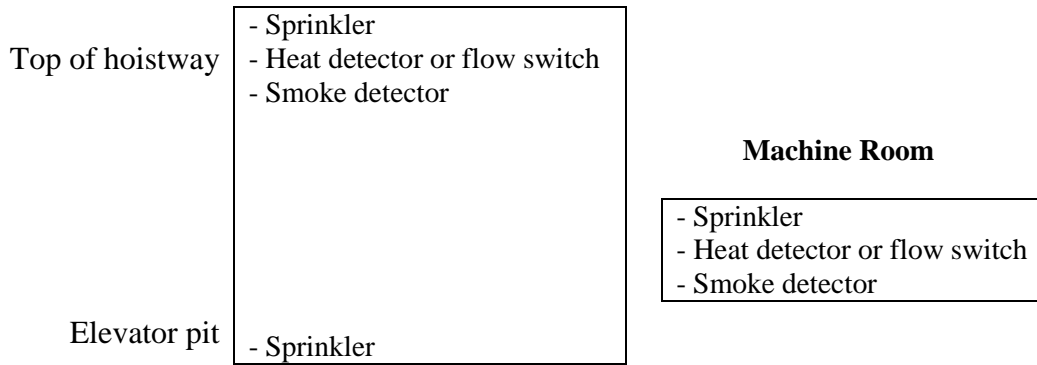
IBC, Section 1502. A penthouse is an enclosed, unoccupied structure above the roof of a building, other than a tank, tower, spire, dome, cupola or bulkhead.

IBC, 3004.4, Exception. Where a hoistway vent that is not of the permanently open type is provided at the top of an elevator or dumbwaiter hoistway, the top of the hoistway must be provided with a smoke detector to open the vent. A smoke detector at the top of the hoistway for elevator firefighters emergency operation as described in this article may also open the damper. If a smoke detector is not required at the top of the hoistway according to the applicable case in this document, a smoke detector must be located there to open such a hoistway vent damper. Also see SPS 362.3004. This is typically required where the elevator or dumbwaiter serves 4 stories and at least one story contains an R-1, R-2, I-1 or I-2 (occupancy with overnight sleeping – apartment, dormitory, hotel, hospital, nursing home, etc.).

Case 1: Building completely sprinklered per NFPA 13.

- passenger or freight elevator
- combustibile hoistway
- electric traction or hydraulic elevator
- machine room on any level, not in a penthouse
- smoke detector also at each landing

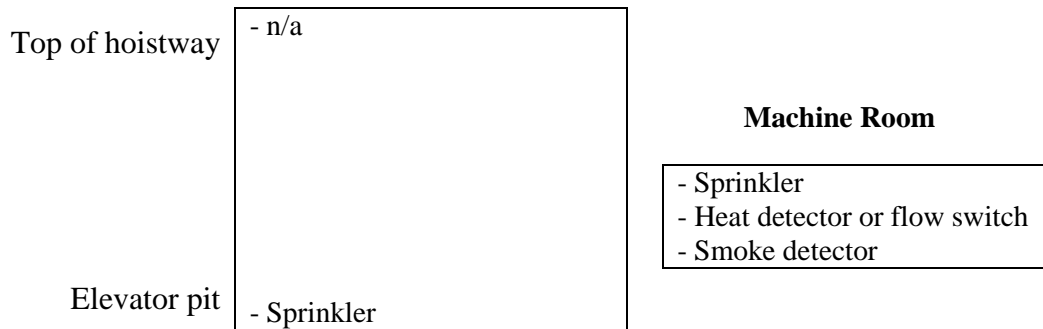
Hoistway



Case 2: Building completely sprinklered per NFPA 13.

- passenger elevator
- non-combustibile hoistway
- hydraulic elevator
- machine room on any level, not in a penthouse
- smoke detector also at each landing

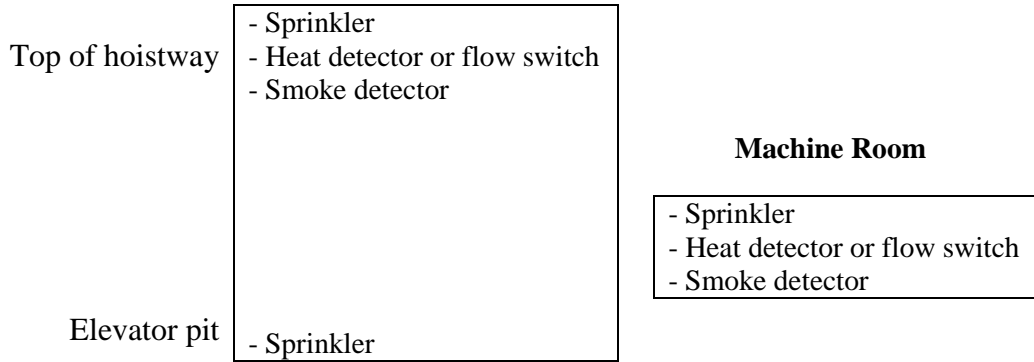
Hoistway



Case 2a: Building completely sprinklered per NFPA 13.

- freight elevator
- non-combustible hoistway
- hydraulic elevator
- machine room on any level, not in a penthouse
- smoke detector also at each landing

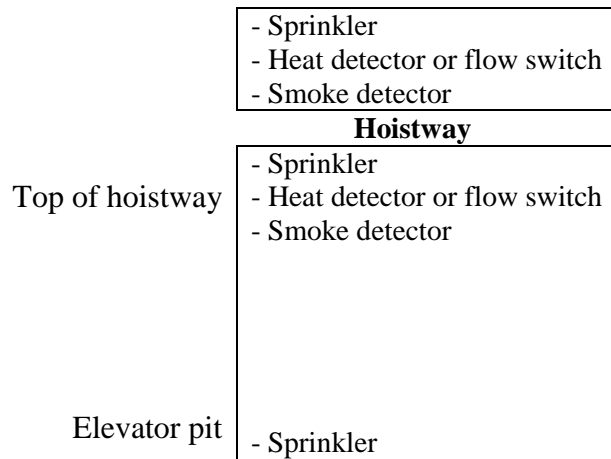
Hoistway



Case 3: Building completely sprinklered per NFPA 13.

- passenger or freight elevator
- combustibile hoistway
- electric traction elevator
- penthouse machine room
- smoke detector also at each landing

Machine Room



Case 4: Building completely sprinklered per NFPA 13.

- passenger elevator
- non-combustible hoistway
- electric traction elevator
- penthouse machine room
- smoke detector also at each landing

Machine Room

- | |
|---|
| - Sprinkler - Heat detector or flow switch - Smoke detector |
|---|

Hoistway

- | | |
|-----------------|-------|
| Top of hoistway | - n/a |
| Elevator pit | - n/a |

Case 4a: Building completely sprinklered per NFPA 13.

- freight elevator
- non-combustible hoistway
- electric traction elevator
- penthouse machine room
- smoke detector also at each landing

Machine Room

- | |
|---|
| - Sprinkler - Heat detector or flow switch - Smoke detector |
|---|

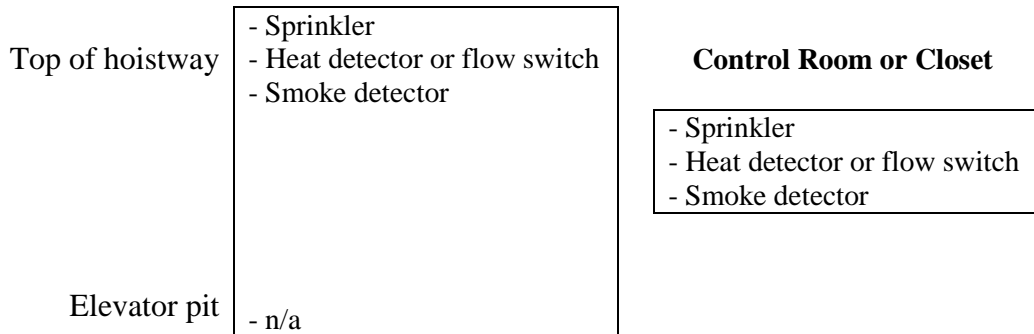
Hoistway

- | | |
|-----------------|---|
| Top of hoistway | - Sprinkler - Heat detector or flow switch - Smoke detector |
| Elevator pit | - n/a |

Case 4b: Building completely sprinklered per NFPA 13.

- passenger elevator
- non-combustible hoistway
- machine-room-less electric traction elevator, machine at top of hoistway
- controller in control room or control closet, on any floor level
- smoke detector also at each landing

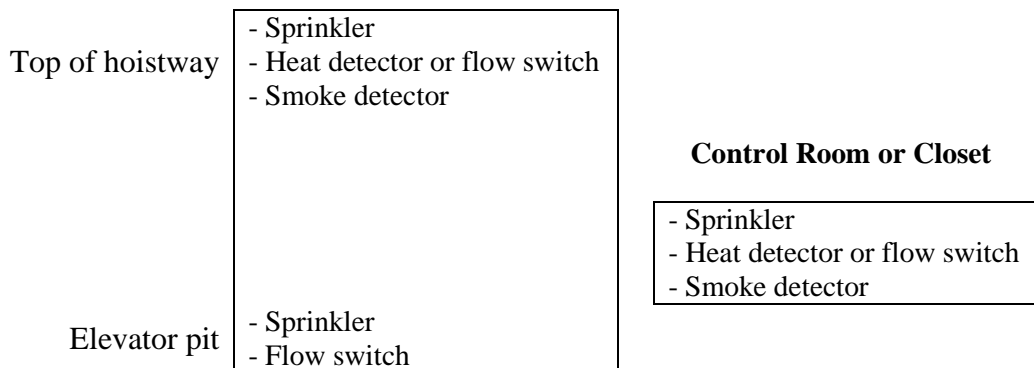
Hoistway/Machinery Space



Case 4c: Building completely sprinklered per NFPA 13.

- passenger elevator
- combustible or non-combustible hoistway
- machine-room-less electric traction elevator, machine at bottom of hoistway
- controller in control room or control closet, on any floor level
- smoke detector also at each landing

Hoistway/Machinery Space



Case 4d: Building completely sprinklered per NFPA 13.

- passenger elevator
- combustible or non-combustible hoistway
- electric traction elevator
- machine and some control eq. at top of hoistway and an inspection and test panel (ITP) in an elevator hoistway door frame
- smoke detector also at each landing

Hoistway/Machinery Space

| | |
|-----------------|---|
| Top of hoistway | - Sprinkler - Heat detector or flow switch - Smoke detector |
| Elevator pit | - Sprinkler |

Case 4e: Building completely sprinklered per NFPA 13.

- passenger elevator
- combustible or non-combustible hoistway
- machine-room-less hydraulic elevator
- hydraulic tank extending to pit floor with machine/control equipment in hoistway accessed at or above floor level of lowest landing
- smoke detector also at each landing

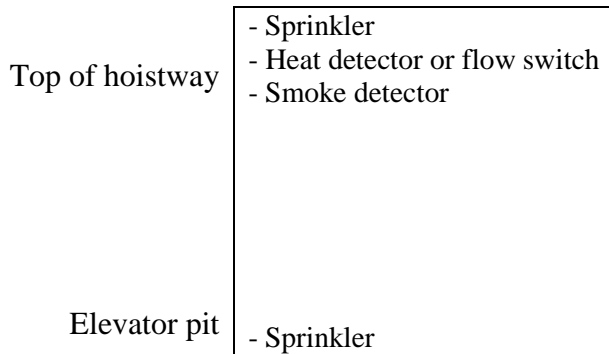
Hoistway/Machinery Space

| | |
|-----------------|---|
| Top of hoistway | - Sprinkler - Heat detector or flow switch - Smoke detector |
| Elevator pit | - Sprinkler |
| | Machine closet - Smoke detector |

Case 4f: Building completely sprinklered per NFPA 13.

- passenger elevator
- combustible or non-combustible hoistway
- machine-room-less hydraulic elevator
- hydraulic tank in pit with machine/control equipment in hoistway and inspection and test panel (ITP) in an elevator hoistway door frame
- smoke detector also at each landing

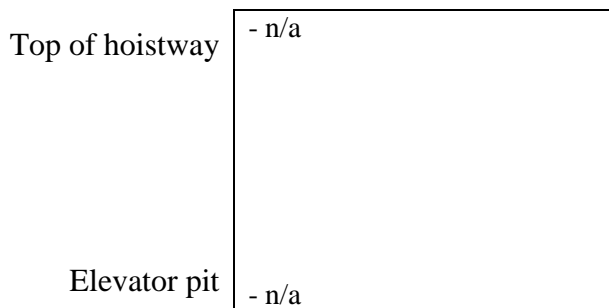
Hoistway/Machinery Space



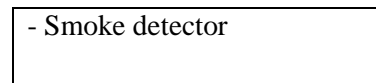
Case 5: Building sprinklered per NFPA 13R.

- passenger elevator
- R-2 occupancy with dwelling units in basement level
- non-combustible hoistway
- electric or hydraulic elevator.
- machine room on any level
- smoke detector also at each landing

Hoistway

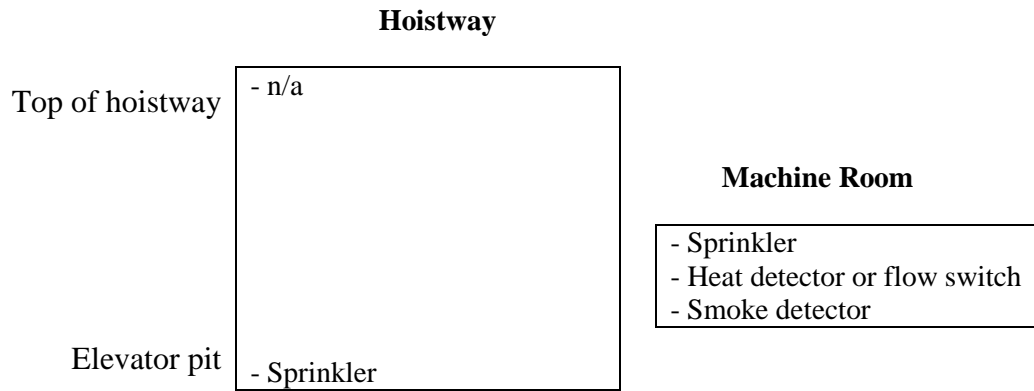


Machine Room



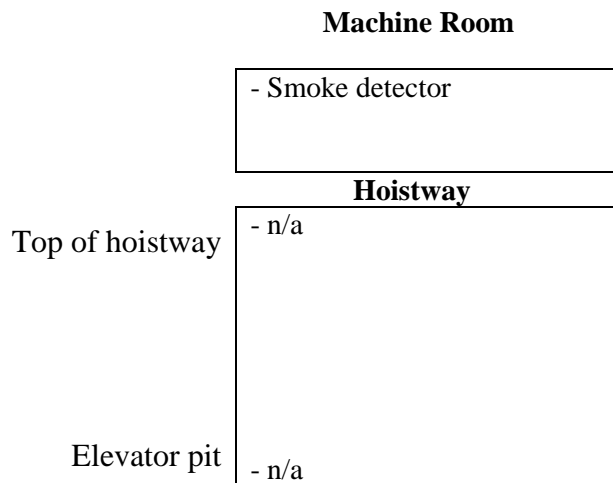
Case 6: Building sprinklered per NFPA 13R.

- passenger elevator
- non-combustible hoistway
- hydraulic elevator.
- machine room on lowest level
- R-2 occupancy on lowest level
- Parking sprinklered per NFPA 13 on lowest level
- smoke detector also at each landing



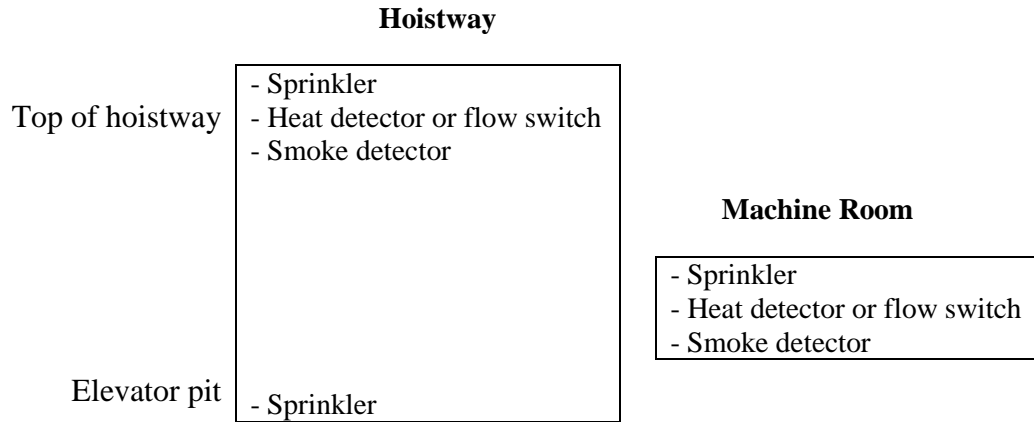
Case 7: Building sprinklered per NFPA 13R.

- passenger elevator
- combustible or non-combustible hoistway
- electric traction elevator
- penthouse machine room
- lowest level with fire department access openings
- R-2 occupancy in lowest level
- smoke detector also at each landing



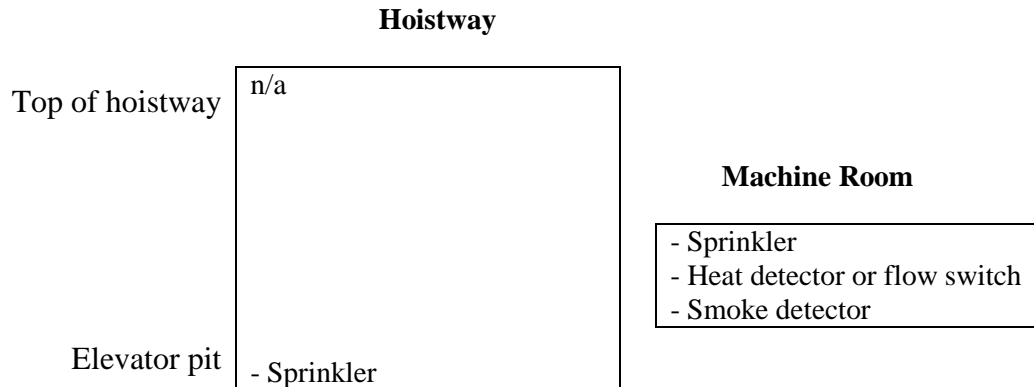
Case 8: Building partially sprinklered per NFPA 13R.

- passenger elevator
- combustible hoistway
- electric traction or hydraulic elevator.
- machine room on lowest level
- lowest level sprinklered per NFPA 13 because of windowless floor level or parking
- smoke detector also at each landing



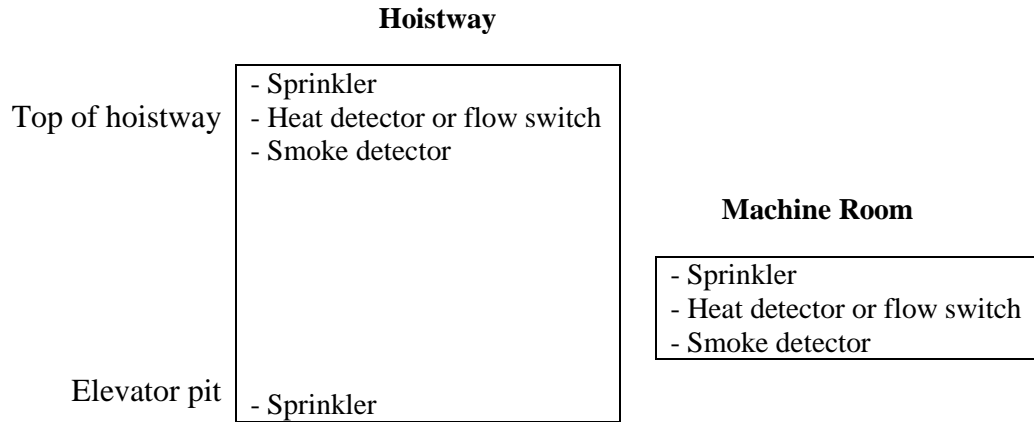
Case 9: Building partially sprinklered per NFPA 13R.

- passenger elevator
- non-combustible hoistway
- hydraulic elevator.
- machine room on lowest level
- lowest level sprinklered per NFPA 13 because of windowless floor level or parking
- smoke detector also at each landing



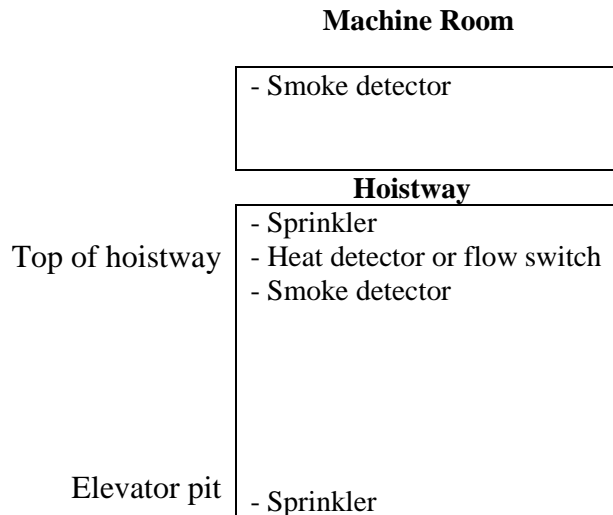
Case 9a: Building partially sprinklered per NFPA 13R.

- freight elevator
- non-combustible hoistway
- hydraulic elevator.
- machine room on lowest level
- lowest level sprinklered per NFPA 13 because of windowless floor level or parking
- smoke detector also at each landing



Case 10: Building partially sprinklered per NFPA 13R.

- passenger or freight elevator
- combustibile hoistway
- electric traction elevator
- penthouse machine room
- lowest level sprinklered per NFPA 13 because of windowless floor level or parking
- smoke detector also at each landing



Case 11: Building partially sprinklered per NFPA 13R.

- passenger elevator
- non-combustible hoistway
- electric traction elevator
- penthouse machine room
- lowest level sprinklered per NFPA 13 because of windowless floor level or parking
- smoke detector also at each landing

Machine Room

| |
|------------------|
| - Smoke detector |
|------------------|

Hoistway

| | |
|-----------------|-------|
| Top of hoistway | - n/a |
| Elevator pit | - n/a |

Case 11a: Building partially sprinklered per NFPA 13R.

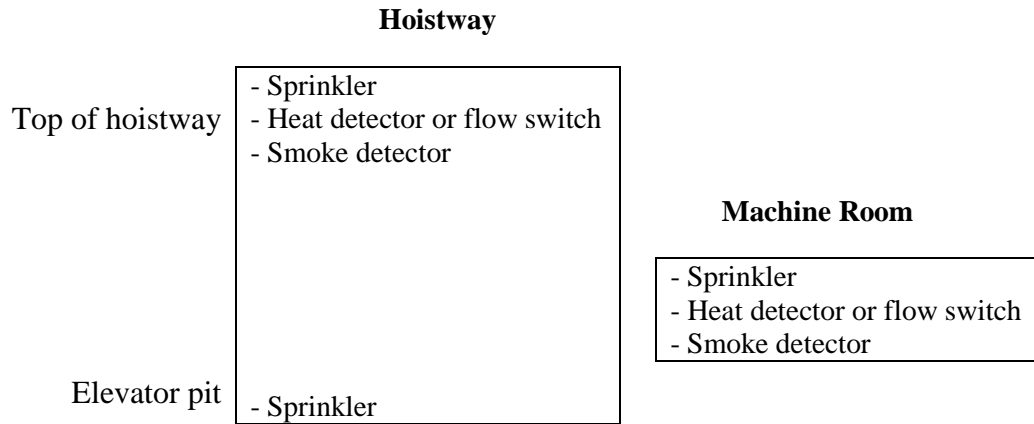
- passenger elevator
- non-combustible hoistway
- electric traction elevator
- machine and some control eq. at top of hoistway and an inspection and test panel (ITP) in an elevator hoistway door frame
- lowest level sprinklered per NFPA 13 because of windowless floor level or parking
- smoke detector also at each landing

Hoistway/Machinery Space

| | |
|-----------------|-------|
| Top of hoistway | - n/a |
| Elevator pit | - n/a |

Case 12: Building partially sprinklered per NFPA 13.

- passenger elevator
- combustible hoistway
- electric traction or hydraulic elevator.
- machine room on lowest level
- lowest level sprinklered per NFPA 13 because of windowless floor level
- smoke detector also at each landing



Case 13: Building partially sprinklered per NFPA 13.

- passenger elevator
- combustible hoistway
- electric traction elevator
- penthouse machine room
- lowest level sprinklered per NFPA 13 because of windowless floor level
- smoke detector also at each landing

