



DESIGN STANDARDS BULLETIN

The *Design Standards* were developed to work in conjunction with the requirements of the Construction and Professional Services Manual (CPSM) of the State of Virginia. This Bulletin is for the *Old Dominion University Design Standards* only and will not address any revisions associated with the CPSM.

This Bulletin is being issued as an interim change to the standards which cannot wait for the annual updates. It will be officially incorporated into the standards at the next published update.

REQUESTED BY: Jean Kennedy Sleeman

DATE REQUESTED: July 22, 2020

TITLE: University Architect

ODU DEPARTMENT: Facilities Management & Construction

Section of the Design Standards Being Considered:

Appendix Section Addition, to be referenced in Chapter 4 – Division 21: Fire Protection

The following information is shared as part of Old Dominion University's Design Standards in an effort to improve ODU project submissions to the Department of Engineering and Buildings, an ongoing overall effort. A/E's are encouraged to read and understand this guidance carefully. This is subject to change and is provided in addition to the requirements stated in the current edition of the CPSM.

Suggested Wording for the Proposed Addition / Deletion / Change:

Appendix AO Fire Alarm + Fire Sprinkler Guidance

Date Issued: July 22, 2020

Issued To: Dave Robichaud, Mike Brady, Willie Spencer, Christopher Pewterbaugh, John Hasher, Jay Graven, Mike Craig, Craig Marshal

cc: CannonDesign, DJG, Moseley Architects, RRMM, VMDO

Attachments: Appendix AO Fire Alarm + Fire Sprinkler Guidance

Editor's Note: The following information is shared as part of Old Dominion University's Design Standards in an effort to improve ODU project submissions to the Department of Engineering and Buildings, an ongoing overall effort. A/E's are encouraged to read and understand this guidance carefully. This is subject to change and is provided in addition to the requirements stated in the current edition of the CPSM.

Top Reasons [Fire Protection] Shop Drawings are not Approved
By Michael Christensen, RA
Received July 22, 2020

1. The drawings are generally incomplete.
 - a. Fire sprinkler systems do not have 100% water coverage.
 - b. Fire sprinkler systems do not have a means to forward flow the backflow preventer.
 - c. Fire sprinklers systems have not had the FDC location approved by the local fire department.
 - d. No PIV for the sprinkler system. Provide a remote PIV, wall PIV, or other indicating valve.
 - e. Site plans (civil) are not coordinated with fire protection drawings. Items include the FDC & PIV.
 - f. No provisions for spare heads for sprinkler systems.
 - g. No detail or provision for a temporary standpipe system.
 - h. General misunderstanding of fire sprinkler systems and their role with elevators.
 - i. No outdoor fire alarm bell.
 - j. PIV is not monitored by the fire alarm system
 - k. Fire alarms do not have 100% strobe coverage.
 - l. No provision for central station monitoring of the fire alarm.
 - m. General misunderstanding of fire alarms and their role with elevators.
 - n. The function and names for of all spaces has not been provided.
2. No product data.
3. No project number.
4. Copyright notice has not been removed for state work.
5. Drawing sheets missing.
6. Drawings are not readable.

UNDERSTANDING FIRE ALARM AND FIRE SPRINKLER REQUIREMENTS FOR ELEVATORS

*By Michael Christensen, RA
April 24, 2019, Revised October 18, 2019*

With elevator technology continuously changing, coordinating the pertinent codes that govern the installation of elevators is a challenging task. The principal codes currently governing elevator installations in Virginia are the *2015 Virginia Construction Code*, the *2013 ASME A17.1 Safety Code for Elevators and Escalators*, the *2013 NFPA 72 Fire Alarm and Signaling Code*, the *2013 NFPA 13 Automatic Sprinkler Systems* and the *2014 NFPA 70 National Electrical Code Article 620 Elevators*. The intent of this advisory is to provide architects, engineers, contractors, and owners an itemized code summary for each of the four primary components that are used to achieve elevator recall and main line power disconnect.

The purpose of elevator recall is to take an elevator out of normal service and to return it the designated floor level. At the designated floor level, occupants may egress the elevator and building. The elevator is then available for Fire Fighter Phase II Recall where they have control of the elevator. Elevator recall is generally initiated by specifically located smoke detectors with some exceptions. Smoke detectors are connected to the fire alarm system.

The purpose of main line power disconnect is to disconnect the power to the elevator prior to the application of water from the fire sprinkler heads thus avoiding the potential hazards of wet elevator brakes and electrical short circuits. Main line power disconnect is generally initiated by specifically located heat detectors with some exceptions. Heat detectors are connected to the fire alarm system.

Recall and main line power disconnect functions will be evaluated under the following conditions, which apply to the majority of elevators installations:

- The buildings have an automatic sprinkler system.
- The elevator shafts are noncombustible or limited combustible construction.
- The elevators are hydraulic, conventional traction or machine-room-less.
- The elevator cabs are constructed of noncombustible materials.
- The requirements for accessible, fire service and occupant evacuation elevators are not included in this summary.

SMOKE DETECTORS ARE USED TO INITIATE ELEVATOR RECALL

- Smoke detectors are always required in elevator lobbies and shall be located within 21 feet of the centerline of elevator doors. *NFPA 72-21.3.5*.
- Where elevator landings have a ceiling greater than 15 feet high, the smoke detector may be placed on the wall above and within 60 inches of the top of the elevator door(s). *NFPA 72-A17.4.10*.
- Smoke detectors always are required in elevator machine/control rooms. *ASME A17.1-2.27.3.2*.
- Where sprinkler heads are located in the hoistway including the pit, smoke detectors shall be provided. Refer to *NFPA 72-21.3.14.1 (3)*.

- Smoke detectors are not required in hoistways that do not have sprinkler head(s). *NFPA 72-21.3.6 and ASME A17.1-2.27.3.2.1(c)*. Existing elevators that have ventilation are allowed to have a smoke detector at the top of the hoistway.
- A sprinkler head at the elevator pit requires a fire detector near the hazard. *NFPA 72-17.4.10 and 21.3.14.1 (3)*. According to *ASME A17.1 Safety Code for Elevators and Escalators*, the elevator pit is part of the hoistway.
- Where the environmental conditions may cause false alarms such as elevators that open into kitchens or parking garages, then automatic fire detection such as heat detectors are permitted. *NFPA 72-21.3.9*.
- Smoke detectors may not be used for elevator shunt trip, as they would activate more quickly than a heat detector and thus create the possibility of disconnecting the main line power and potentially trapping occupants before the elevator could be recalled to the designated floor. *ASME A17.1 - 2.8.3.3.3*.
- A change to the 2013 *NFPA 72* states that a smoke detector shall not be installed in the elevator pit unless it is listed for the environment. *NFPA 72-21.3.8*.
- Where buildings are not equipped with fire alarm systems, a “dedicated function fire alarm system” shall be provided in order to provide elevator recall. *NFPA 72-21.3.1 and 21.3.2*. This type of system might also include the monitoring of the fire sprinkler system.

HEAT DETECTORS ARE USED TO INITIATE SHUNTING THE MAIN POWER TO THE ELEVATOR WITH SOME EXCEPTIONS

- Where sprinkler heads are present, heat detectors that are located in the hoistway and the machine room/control room shall be used for elevator shut down. These heat detectors shall have both a lower temperature rating and a higher sensitivity (response time index-RTI) than the sprinkler head (*NFPA 72-21.4.1*) and shall be located within 24 inches of the sprinkler head. *NFPA 72-21.4.2*. There shall be enough of a time delay to recall the elevator from the top of the hoistway to the designated floor before the elevator power is disconnected. When elevator recall is accomplished prior to main line power being disconnected the occupants will be able to successfully egress the elevator and avoid being trapped inside. *ASME A17.1-2.8.3.3.2*.
- Elevator hoistways and machine rooms containing control equipment that have sprinkler protection shall have an approved means of shunting the power per the requirements of *NFPA 72-21.4*. The main line power shall be disconnected prior to the application of water and shall not be self-resetting.
- Shunting the main line power shall not disconnect branch lines for car lighting, receptacles, ventilation, heating or air conditioning. *NFPA 70-620.22 Branch Circuits for Car Lighting, Receptacles, Ventilation, Heating and Air-Conditioning and 620.51 Disconnecting Means*.
- Where sprinkler heads are provided in the elevator pit of hydraulic elevators heat detectors that shunt the power are not required per *ASME A17.1*. The application of water below the cab should not adversely affect the elevator braking or electrical system.
- The activation of sprinkler heads outside of the hoistway or machine room shall not disconnect the main power line to the elevator. *VCC 3006.5 Shunt trip and ASME A17.1- 2.8.3.3.2 (C)*.

- Typically, the exceptions for using heat detectors in lieu of smoke detectors for elevator recall are where environmental conditions make smoke detectors unreliable. Locations such as elevator lobbies at parking garages are better suited for heat detectors. *NFPA 72-21.3.9.*

WATER FLOW SWITCHS ARE USED TO INITIATE SHUNTING THE MAIN POWER TO THE ELEVATOR WITH AN EXCEPTION

- A flow switch without a time delay or one with the delay that is permanently disabled may be used in lieu of a heat detector to shunt the main power. *NFPA 72-21.4.3.*
- There is no requirement to provide both a flow switch and a heat detector for disconnecting the main power.
- A change to the 2013 *NFPA 72* allows a waterflow switch to initiate elevator recall. The sprinkler head and the flow switch must be separately valved and dedicated only to the elevator pit head. *NFPA 72-21.3.3.*
- As the codes have changed *DEB Notice 03/19/09-Elevator Recall* is no longer required.

SPRINKLER HEADS ARE NOT REQUIRED AT HOISTWAYS AND MACHINE/CONTROL ROOMS WITH EXCEPTIONS

- Sprinkler heads are not required at the top of the hoistway of traction elevators where the cab meets the noncombustible requirements of *ASME A17.1 Safety Code for Elevators and Escalators. NFPA 13-8.15.5.6.*
- Sprinkler heads are not required at the elevator pit of elevators where the cab meets the noncombustible requirements of *ASME A17.1 Safety Code for Elevators and Escalators* and does not contain combustible hydraulic fluids. *NFPA 13-8.15.5.2.*
- Sprinkler heads are required at the elevator pit for hydraulic elevators as the hydraulic fluid is a combustible liquid. Sidewall heads shall be placed not more than 24 inches above the floor of the pit. *NFPA 13-8.15.5.1.*
- Where machine-room-less elevators use polyurethane-coated steel belts or similar combustible belts, sprinklers shall be installed at the top and bottom of the hoistway. *NFPA 13-8.15.5.7.1.* Where these belts have a FT-1 rating per the *UL 62* vertical burn test, sprinkler heads are not required. *NFPA 13-8.15.5.7.2.*
- Where machine/control rooms meet all of the 5 conditions of *NFPA 13-8.15.5.3*, automatic sprinklers are not required. The conditions are (1) the space is dedicated to the elevator equipment only, (2) the space is protected by smoke or other detectors, (3) the space has a fire rated separation which is the same rating as the hoistway, (4) the space has no stored materials unrelated to the elevator, and (5) the elevator machinery is not the hydraulic type.
- The actuation of sprinkler heads outside of the hoistway or equipment room shall not disconnect the main line power. *ASME A17.1-2.8.3.3.2 and VCC 3005.5 Shunt trip.*
- Sprinkler risers shall not be installed in the elevator hoistway. Branch lines shall not serve more than one level. *ASME A17.1-2.8.3.3.1.*
- Sprinkler heads in hoistways and machine rooms shall have an intermediate temperature rating and shall be a standard response type (lower sensitivity). This allows the *NFPA 72* requirement for heat

- detectors to have a lower temperature rating and a higher sensitivity to create an adequate time delay for elevator recall prior to disconnecting the main line power. *NFPA 13-8.15.5.4 and NFPA 72-21.4.1.*
- “VCC 3005.7 Shunt trip 3. Where the structure that the elevator will be located in is required to be fully sprinklered by this code, the hoistway that the elevator machine equipment is located in shall be equipped with a fire suppression system as a machine room in accordance with NFPA 13. Some detectors for the automatic initiation of Phase I Emergency Recall Operation, and heat detectors or other approved devices (flow switches) that automatically disconnect the main line power supply to the elevators, shall be installed within the hoistway”.
 - Side wall sprinkler heads shall be used at the elevator pit while upright, pendant or side wall heads may be used at the elevator hoistway. *NFPA 13-8.15.5.1 and 8.15.5.5.*

SUMMARY

Smoke detectors are always required at elevator lobbies and machine/control rooms for the purpose of elevator recall. Smoke detectors are not required at the top of elevator hoistways unless sprinkler heads are present or there is a hoistway ventilation system. Where environmental conditions are not suitable for smoke detectors, heat detectors may be substituted for smoke detectors. Heat detectors are used for disconnecting the main line power. If desired, a flow switch may be used for shunt in lieu of a heat detector. Sprinkler heads are not required in elevator hoistways unless there are combustible components present. These combustible components could be hydraulic fluids or belts covered with combustible coatings that do not have a FT-1 rating. Knowing the basic facts about the specific elevator being installed and the code fundamentals will make understanding fire alarm and sprinkler requirements almost easy.