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SPRINKLERS AND ELEVATORS

The Safety Code for Elevators and Escalators, ASME A17.1 has requirements pertaining to the safe operation of elevators when sprinklers are provided in elevator machine rooms and hoistways. [ASME A17.1d-2000 and earlier editions Rule 102.2(c)] [ASME A17.1-2000 and later editions Section 2.8.2.3]. The Code requires that a means be provided to automatically remove the mainline (electric) power supply from the affected elevator upon or prior to the application of water from sprinklers. The intent of this requirement is to prevent water from being applied to an electrically energized elevator system. Water can “short out” critical safety circuits and may allow the elevator to operate in an unsafe manner such as with open doors. Water may also impinge on the elevator brakes ability to stop the car or hold the car at a floor. If the electric power is removed from the elevator before the application of water, the car will be stopped (at rest) with power off, and the potential for an elevator accident resulting from the application of water will be greatly reduced.

The ASME A17.1 Code prohibits the elevator control from being the means to disconnect the power. The requirement states; “This means shall be independent of the elevator control ...”. The reason for this requirement is that the elevator control may be on fire or if there is sufficient heat, the elevator controller may no longer function reliably and therefore cannot be relied upon to give a signal to disconnect the main line power supply and allow sprinklers to actuate.

The A17.1 Code does not endorse a particular design. The Code is written in performance language, allowing the designers to implement the Code requirements in different ways. One example of how the disconnection of the main line power supply could be implemented in compliance with the requirements in ASME A17.1 (i.e. the means is independent of the elevator control) is to use a heat detector to shut down elevator power prior to sprinkler operation as specified in Section 3-9.4 of the National Fire Alarm Code (NFPA 72-1999). The heat detector would have a lower temperature rating and a higher sensitivity compared to the sprinkler, such that when the heat produced by the fire triggers the heat detector it signals the shunt-trip breaker or disconnect switch to remove the mainline power to the affected elevator(s). As the temperature increases above the actuation level of the heat detector, the temperature will eventually trigger the sprinkler head, releasing the flow of water. Water is then applied to an electrically de-energized (powered down) elevator system, which is stopped (at rest).

SPRINKLERS AND ELEVATORS

PAGE 2 of 2

An issue that many people raise, is the potential for an elevator car to be stopped between landings. This is a remote possibility, however:

- It is unlikely as the smoke detector in the machine room probably initiated Phase I recall prior to the temperature activating the heat detector;
- Stopping a moving elevator is not considered unsafe and in fact is exactly what the ASME A17.1 Code mandates whenever an electrical protective device determines that continued operation may be hazardous;
- In the 20 + years this requirement has been in the ASME A17.1 Code, there has not been a reported incident of stopping an elevator car between landings.

If after reading the above, a concern still persists about the extreme unlikely probability of stopping the car between landings, the following design appears to conform to the ASME A17.1 requirements and may decrease further this potential. Remember, if the elevator control system is on fire, or the ambient temperature in the machine room is above the operating temperature of the equipment, no system can assure the car will only stop at a landing.

- The machine room heat detector in addition to the smoke detector could initiate Phase I Emergency Recall Operation.
- When the machine room heat detector is actuated, the fire alarm system could, after a predetermined time, actuate the shunt-trip breaker or disconnect switch to remove the mainline power to the effected elevator(s) and then initiate sprinkler activation. The predetermined time should be equal to the time required to complete Phase I recall.

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NEII Central Code Committee