



## SPRINKLERS AND ELEVATORS

The Safety Code for Elevators and Escalators, ASME A17.1/CSA B44 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 thru ASME A17.1S-2005, Section 2.8.2.3] [ASME A17.1/CSA B44-2007 and later editions, Section 2.8.3.3.2]. In jurisdictions not enforcing the National Building Code Canada (NBCC), 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 brake’s 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/CSA B44 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 ASME A17.1/CSA B44 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/CSA B44 (e.g. a means independent of the elevator control) is to use a heat detector to shut down elevator power prior to sprinkler operation as specified in the National Fire Alarm Code, NFPA 72. The heat detector would have a lower temperature rating and a higher sensitivity compared to the sprinkler. The heat produced by the fire triggers the heat detector which actuates the shunt-trip breaker or disconnect switch to remove the mainline power to the affected elevator(s). When the temperature increases to the actuation level of the sprinkler head, water is applied to the electrically de-energized (powered down) elevator system.

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

- 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/CSA B44 Code mandates whenever an electrical protective device determines that continued operation may be hazardous;
- In the 25 + years this requirement has been in the ASME A17.1/CSA B44 Code, there has not been a reported incident of power removal due to shunt-trip breaker actuation stopping an elevator car between landings.

If after reading the above, a concern still persists about the extremely unlikely probability of stopping the car between landings, the following design appears to conform to the ASME A17.1/CSA B44 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 provide a predetermined time delay before actuating the shunt-trip breaker or disconnect switch and permit sprinkler activation. The predetermined time should be not less than the time required to complete Phase I recall.

With the addition of Occupant Evacuation Operation in the 2013 edition of A17.1/B44, a recommendation is made in Appendix V, Building Features for Occupant Evacuation Operation, to prohibit sprinklers in elevator machine rooms and hoistways. Combined with other mitigations to protect those spaces, this will provide the maximum time possible for building occupants or firefighters to use the elevators without the risk of the elevator(s) stopping prematurely or between floors.

#### **APPROVALS:**

The *NEII*® Central Code Committee is responsible for maintaining this policy. This policy shall be in effect for three (3) years from the date of approval by the *NEII*® Central Code Committee.

**Approved:** August 1, 2013

**Revised:** November 10, 2016