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Codes and Standards

Tel: 212-705-8500  
Fax: 212-705-8501

345 East 47th Street  
New York, NY 10017-2392  
U.S.A.

# Elevators, Fire, and Accessibility

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## **WILL BUILDING OCCUPANTS USE ELEVATORS FOR EVACUATION? FACTORS AFFECTING COMPLIANCE WITH THE EMERGENCY PLAN**

*by Norman E. Groner and Bernard M. Levin*

For two decades, the American public has been instructed to avoid using elevators during fire emergencies. Signs in elevator lobbies tell occupants to use stairs and not elevators. Fires that have killed people in elevators have been extensively publicized, leading most people to understand the danger of using elevators during fire emergencies.

Assuming that it is technically feasible to build elevators usable for evacuating building occupants, the question arises: "Can all the education to avoid elevators during fire emergencies be overcome?" There is no reason to install fire-safe elevators if people won't use them. This paper examines the factors that will affect people's decisions to use elevators during fire emergencies. Our evidence about the role of such factors is based in large part on interviews that the authors conducted as part of a research program at the National Institute of Standards and Technology supported by the General Services Administration and the Federal Aviation Administration. Our part of the research examined the human and organizational factors involved in using refuge areas and elevators during fire emergencies. (Levin and Groner, 1992; Levin and Groner, 1994) We believe that with sufficient attention to the factors discussed in this paper, the great majority of people would follow a plan that suggests the use of elevators to evacuate the building. Conversely, if attention is not paid to such factors, then the plan to use elevators could easily breakdown, with unforeseen and potentially tragic consequences.

### **BUILDING OCCUPANTS ARE LIKELY TO PURSUE STRATEGIES THAT THEY PERCEIVE AS MOST LIKELY TO OFFER SAFETY**

There is strong evidence that people behave rationally during emergencies—that they do the best they can given the information available to them. (see Prioux and Sime, 1991; Sime, 1985) There is scant evidence to support the common belief that

people panic, or otherwise behave irrationally during emergencies (see Sime, 1990). In general, people will decide to use elevators if they believe that using them is safer than other available strategies. (Other psychological factors, such as altruism and compliance with authority, mediate self-interest—a consideration that is beyond the scope of this paper.)

### **THE CAMPAIGN TO PREVENT OCCUPANT USE OF ELEVATORS INHIBITS EMERGENCY ELEVATOR USE.**

When people encounter a new situation, they tend to use a strategy that has worked for them in similar situations. (Reason, 1990) For this reason, we expect that the campaign to teach people to avoid elevators will interfere with future efforts to have them use elevators to evacuate buildings.

During our interviews with air traffic controllers, we confirmed the hypothesis that people would view elevator evacuation with considerable apprehension. Without exception, every interviewee indicated at least some hesitation to use elevators to evacuate the towers. It is important to note, however, that the strength of their hesitancy varied widely. After explaining that special design features would make these elevators much safer than present installations, all of the controllers were more willing to entertain the option of using elevators to evacuate the towers. A few air traffic controllers indicated that they would gladly use an elevator that had been designed for emergency evacuations. A few other controllers indicated that any feasible alternative strategy would still be preferable to using a "supposedly" fire-safe elevator, even descending through stairs filled with smoke, or waiting for a helicopter rescue. The opinions of the other controllers fell between these two extremes.

### **PERSONS UNABLE TO USE STAIRS WILL BE STRONGLY MOTIVATED TO**

## USE ELEVATORS

In today's multi-story buildings, persons who are unable to use stairs, or who use stairs only with discomfort or risk of injury, are clearly disadvantaged during a fire emergency. Automatic suppression systems and compartmentation provide a high degree of safety to all building occupants, regardless of whether they can use stairs or not. However, having to remain in the building, dependent on others for rescue, is unsatisfying, regardless of the level of safety. Persons who cannot leave the building unassisted will unavoidably conclude that they are less safe than other building occupants.

However, it should not be assumed that even persons unable to safely descend stairs will necessarily use elevators to evacuate. If mobility-impaired persons are sufficiently distrustful about the safety of elevators, they may still prefer to wait for rescue or use stairs, perhaps at greatly increased actual (but not perceived) risk. As an example, during our study of staging areas, we interviewed a building occupant with both legs amputated who explained that he would pull himself up stairs (his office was located below grade) and suffer the resulting injuries, rather than risk being "trapped" in the nearby staging area. In general, just like anyone else, someone whose disability prevents a safe stair descent will follow the strategy that he perceives as most likely to provide safety.

### BUILDING OCCUPANTS MUST BE PROVIDED WITH INFORMATION ABOUT FIRE-SAFE ELEVATORS BEFORE THEY WILL TRUST IN THEIR SAFETY

In a situation where there is little basis for judging whether using stairs is safer than using elevators, building occupants are more likely to choose the stairs, because people show a natural tendency to favor more general problem-solving strategies that have worked in the past. However, people will substitute an alternative strategy ("use elevators") when presented with clear "countersigns" indicating that the more general strategy ("don't use elevators") is less desirable. (cf. Reason, 1990) Therefore, building occupants targeted to use elevators need to be provided with *convincing* information that they will be safer using that strategy.

As we stated in our study of refuge areas, "the first

step in developing credibility is to have a system worthy of trust. However, having well designed, carefully constructed and properly maintained staging areas is not sufficient to engender confidence." (Levin and Groner, 1992) Building occupants must be provided with a description of the special design features that allow elevators to operate during a fire emergency. Building occupants need to understand that these features provide a very high degree of reliability and safety. During our interviews with building occupants, most people expressed a considerable increase in their willingness to use staging areas or elevators (depending on the study) after the special design features had been described to them.

### CREDIBILITY OF INFORMATION ABOUT THE ELEVATOR SYSTEM DEPENDS ON THE CREDIBILITY OF THE SOURCE OF THE INFORMATION

Social psychological studies have demonstrated that message-induced changes in attitudes can derive as much from the credibility of the source of a communication as from the content of the message. (Zimbardo and Ebbesen, 1970)

Poor relations with building management will inhibit emergency elevator use because the credibility of the source will be questioned. If building occupants have an unfavorable opinion about building management, they will be more skeptical about the integrity of the elevator evacuation system. In such instances, information would be more convincing when provided by outside engineers.

Building occupants understand that an elevator evacuation system needs to be properly maintained and operated. For this reason, it is especially important for building management to maintain an effective emergency team, with prompt replacement of floor wardens and others. Similarly, frequent elevator breakdowns can erode confidence that an emergency elevator system would provide reliable safety. In our study of aviation control towers, we found that those air traffic controllers who commented that the elevator in their tower was often out-of-service, for either unforeseen equipment problems or scheduled maintenance, were much more skeptical that an emergency evacuation elevator system would be properly maintained to provide adequate safety. (Aviation control towers have only one elevator, so any elevator down-time is conspicuous and very inconvenient to the