



Fire Protection

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Active vs. Passive Fire Protection

A letter written by Richard Licht, codes and standards manager for 3M Fire Protection Products, addressing the issue of “trade-offs” in passive fire protection requirements when sprinkler protection is installed appeared on page 60 of the September 2001 issue of *Plumbing Engineer*. That letter contained a number of interesting comments, so it is well worth a review. Rather than reprint the entire letter, let me just comment upon a few of the excerpts from the letter.

Mr. Licht writes:

“It is clear that sprinklers have been ineffective in stopping the migration of toxic smoke in reported fires. This conclusion is based on study of fire incidents in sprinklered high rise buildings where smoke migrated beyond the floor of origin to expose occupants to toxic and deadly fumes.”

Mr. Licht’s generalization regarding smoke migration in sprinklered buildings is technically correct, but it is also misleading. The statistics cited do show that smoke generated from a fire in sprinklered buildings does occasionally spread to floors other than the fire floor. What the statistics referenced do not show, however, is the extent of the migration of smoke or the reason for the smoke migration. Smoke may spread to other floors via improperly firestopped penetrations of the floor construction (a code violation) or through unenclosed floor openings that are permitted by building codes. (All three regional model building codes and the *International Building Code* permit unenclosed floor openings to connect two building stories in most occupancies.) Logic would dictate that cases where smoke migrated to other floors via unenclosed floor openings or improperly firestopped penetrations be excluded from the statistics on smoke migration in sprinklered buildings. However, the statistics cited by Mr. Licht are simply the raw statistics, which, of course, may lead to faulty conclusions.

Let’s also examine Mr. Licht’s concern about “toxic and deadly fumes” produced by fires. Of obvious interest if we are talking about toxic and deadly fumes are the fire fatality statistics collected by the National Fire Protection Association (NFPA). The fire fatality statistics published by the NFPA indicate in the eight-year period between 1988 and 1995, only one fire fatality occurred in the all of the high rise office buildings in the United States. These same statistics indicate that in the five-year period between 1991 and 1995, not a single person died as a result of a fire in any high rise hotel building in the United States.

In the interest of providing a fair and balanced picture of the magnitude of the fire problem in U.S. high rise build-

ings, it should be noted that the NFPA statistics indicate that a total of 589 people died in U.S. high rise apartment buildings in the 11-year period between 1985 and 1995. That averages out to approximately 54 fire fatalities in high rise apartment buildings a year. However, it should be noted that these statistics include both sprinklered and unsprinklered buildings. Of course, only the number of fatalities that occurred in sprinklered high rise apartment buildings are of interest in this discussion.

The NFPA statistics cited above clearly show that the reference to “toxic and deadly fumes” is intended to play on our emotions, rather than to look objectively at the facts.

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There is no denying that smoke from a fire can be “toxic and deadly”, but the probability of dying in a fire in a high rise building is so small that there should be little concern by the public. To put things in perspective, it should be noted that it is estimated that approximately 75 people die each year in the United States as a result of being struck by lightning. In other words, it can be stated that typically more people die in the United States as a result of being struck by lightning than as a result of fires in high rise buildings. No emotion, just the facts.

Mr. Licht also writes:

“Smoke is widely recognized as the primary killer in structural fires. It asphyxiates, limits visibility, reduces the possibility of escape, endangers fire fighters and hampers their efforts.”

No need to comment further on this statement. The statistics on lightning vs. fire fatalities in U.S. high rise buildings say it all. Obviously, Mr. Licht is speaking theoretically, not about our “real world” experience.

Continued on page 13

Fire Protection

Continued from page 10

In addition, Mr. Licht further writes:

“The Canadian report states (p. 134) ‘Even when a sprinkler system meets the performance intentions of NFPA 13 with respect to achieving fire control, enough smoke can be produced by a shielded fire to fill the fire floor, stair shafts and other floors with smoke. It is reasonably likely that fires in office settings will be poorly ventilated, with the result that carbon monoxide concentration in the smoke may be dangerously high. If no measures are taken to prevent smoke spread, smoke from a shielded, sprinklered fire will create a threat to life safety in the building.’”

Obviously, the Canadian report referenced in Mr. Licht’s

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letter didn’t review the NFPA’s statistics on fire fatalities in high rise office buildings. The fire record of both sprinklered and unsprinklered high rise office buildings in the United States is almost unblemished. While the Canadian report represents theory, it apparently doesn’t take into account that the occupants of the fire floor in office buildings will evacuate the fire floor and that fire suppression forces will respond to the fire. Once the occupants of the fire floor have evacuated the floor, the concentrations of CO and CO₂ on the fire floor are of little interest (even to firefighters, because firefighters wear self-contained breathing apparatus). And, of course, a fire in an office building that is controlled by the operation of a sprinkler system should be easily extinguished by the firefighters, more than likely with a single small hose line.

Mr. Licht concludes his letter with the following:

“To abandon balanced fire protection in favor of sprinkler trade-offs is to invite disaster. That is not merely an emotional argument to sell unnecessary products, as Mr. Schulte claims, but a statistical fact backed by a tragic record of death from toxic smoke.”

Based upon the NFPA statistics cited above, the record is clear — sprinklered high rise buildings are extremely safe buildings. (So are unsprinklered high rise buildings, for that matter.) And if sprinklered high rise buildings are extremely safe, then sprinklered low rise buildings must also be safe. (Similarly, if unsprinklered high rise buildings are safe, then unsprinklered low rise buildings must also be safe.) To claim otherwise is to simply ignore the facts. The claim that sprinkler trade-offs are not justified using the statistics cited by Mr. Licht can only be characterized as an attempt to confuse the facts with statistics that only tell part of the story. □