Columns

Unbalanced" Fire Protection Myth

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The Alliance for Fire Safety (AFS) Web site indicates that the AFS is *"a consortium of concerned firefighting groups and built-in fire protection interests*" and that the purpose of the organization is "*to advocate* [for] *stronger building codes and higher fire safety standards for our nation's high-rise commercial buildings, hotels, schools, hospitals and other structures.*"

This Web site includes two rather interesting articles - one titled "*Have We Learned Enough About Fire Safety From 9/11?*" written by Dr. W. Gene Corley and the other titled "*Reliability of Automatic Sprinkler Systems*," written by William E. Koffel. Both Corley's and Koffel's articles should be of interest to anyone involved with building fire safety. In addition, the Web site includes several other Web pages that should also be of interest. One of the Web pages that caught my attention is titled "*The Need for Balanced Fire Protection in Building*[s]." This page summarizes the Alliance for Fire Safety's position on the subject of "balanced" fire protection.

Excerpts from this Web page include the following:

> *"A steady erosion of building code provisions concerning fire-resistant construction in commercial and institutional facilities has placed firefighters and the general public at greater risk than ever before. This trend has caused fire protection in buildings to be out of balance. And things are getting worse."*
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> *"Over the past 30 years, the three national model building codes have called for increased use of sprinklers, while steadily reducing requirements for fire and smoke resistant components. ..."*
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> *"However, these structural components, materials and systems [referring to passive fire protection features] have a proven track record of containing and controlling the spread of fire and smoke and limiting the damage to a burning building and surrounding structures. In addition, they maintain structural stability, enabling building occupants to escape safely and permitting firefighters to do their jobs with minimum risk."*

"Despite the inherent benefits of fire- and smoke-resistant construction, the new model codes continue to be receptive to "sprinkler trade-offs" that create potentially dangerous imbalances in fire protection. This trend has been supported, in part, by building owners and developers who seek to reduce construction costs. Unfortunately, those who favor more sprinklers at the expense of fire-resistant construction insist that sprinklers are virtually foolproof and that built-in fire protection measures are, therefore, unnecessary."

"While it is clear that sprinklers are important in protecting property and lives, there is ample evidence to show that they do not always perform as intended. In fact, recent data obtained from the National Fire Protection Association [NFPA] *shows that sprinklers failed to operate in one out of every six fires. Since sprinkler systems can and do fail to operate, there is still cause for concern when fire- and smoke-resistant construction continues to be traded-off. So why place all of our fire protection eggs in one basket?"*

"Those needing further evidence that sprinklers may not always function as intended need only examine the product recall record of sprinklers between 1999 and 2001. During that period, the U.S. Consumer Product Safety Commission sought to recall some 67 defective sprinkler models because of their potential to fail during a fire. The defective sprinkler models represented more than 37 million sprinklers manufactured between 1961 and 2001."

"Even if a sprinkler system functions properly, a fire involving a larger than anticipated quantity of combustibles or fast-burning materials has the potential to overwhelm it. For example, earlier this year, fire destroyed a St. Louis warehouse packed full of highly flammable foam rubber. The sprinklers activated properly, but apparently were no match for the speed and size of the blaze."

"The new model code [the International Building Code] *has ushered in an era of fire safety that is far less stringent than that provided by any previous model code. This new trend - a result of trading off built-in fire-and smoke-resistant construction for sprinklers - is also reflected in the new National Fire Protection Association's NFPA 5000 Building Construction and Safety Code."*

"In truth, both the IBC [International Building Code] *and NFPA 5000 permit the use of significant sprinkler trade-offs that could lead to greater destruction of property and less safety for building occupants and firefighters over the life of the building."*

"Efforts to reduce requirements relating to fire- and smoke-resistant construction make little sense given the fact that fires originating in fire-resistant compartments seldom migrate, according to a recent study by the National Fire Protection Research Foundation. While only one in 10 fires extend to adjacent areas in fire-resistant buildings, more than 20 percent of fires that started in rooms built with unprotected wood frame spread to adjacent areas. At the same time, fires involving fire-resistant construction result in lower dollar loss - $4,000 on average, as opposed to $11,000 for fires involving unprotected, wood-frame construction - according to the NFPRF study."

"The value of fire-resistant construction was clearly demonstrated in a fire that gutted four floors of the 62-story First Interstate Tower office complex in downtown Los Angeles in 1987 [1988]*. The blaze blew out windows and destroyed office furnishings on each of the four floors, but resulted in no loss of life. [The FEMA fire investigation report indicates that one fatality occurred in the fire.] This was attributed, in part, to the performance of fireproofing that had been applied to the building's steel framing 16 years earlier. While the fireproofing was burned and blackened, it provided an effective protective shield, preventing key structural assemblies from warping and collapsing from the intense heat. Four months later, the building was re-opened and was totally functional."*

Note: The fire in the First Interstate Bank Building in 1988 is an example of fire spreading vertically in a fire resistive building. Three years later, in 1991, another fire spread vertically to engulf eight floors of the One Meridian Plaza Building in Philadelphia. The One Meridian Plaza Building was also a fire resistive building. The vertical spread of the fire in the One Meridian Plaza fire was stopped by the activation of 10 sprinklers on the 30th floor of the building. If not for the sprinklers on the 30th floor (and above), the vertical spread of the fire would have continued (because the Philadelphia Fire Department had ceased suppression operations within the building).

"When viewed collectively, sprinkler trade-offs have the potential to place building occupants and firefighters in great danger should sprinkler systems fail to function properly during a fire."

"Given what is now known about the performance of sprinkler systems and fire-resistant components and materials, it seems prudent to require that new buildings incorporate both forms of fire protection in a manner consistent with previous, more conservative building codes."

"Just as seat belts and airbags work together to provide even greater safety in automobiles, built-in fire- and smoke-resistant construction, working together with sprinklers, can achieve even greater fire safety in buildings. With lives at stake, nothing less should be acceptable."

The excerpts above are a pretty impressive array of facts and statistics on fire safety in America. Well actually, the excerpts above are pretty much devoid of any facts and statistics, so let's take a look at a few:

- According to statistics published by the NFPA, in the 21 years between 1980 and 2000, the number of responses by fire departments increased by roughly 89 percent; however, the number of fire department responses to actual fires decreased by roughly 42 percent.

- In 1977, the NFPA estimates that there were 7,395 civilian fire fatalities in the United States. In the year 2005, NFPA estimates that there were only 3,675 civilian fatalities - a decrease of 50.3 percent.

- In 1977, the NFPA estimates that there were 157 firefighter fatalities. In recent years, the number of firefighter fatalities that occur in the United States has been reduced to roughly 100 - a decrease of about 35 percent.

- According to the NFPA, the primary cause of firefighter fatalities is heart attacks, not fire, smoke or building collapses in structure fires.

- In 2005, the NFPA estimates that there were 87 firefighter fatalities. Of those fatalities, 11 (or fewer) were caused by fire, smoke or building collapse in structure fires.

- In recent years, NFPA statistics have indicated that fire fatalities in one- and two-family dwellings have accounted for more than 60 percent of the total number of fire fatalities occurring in the United States, and residential occupancies have accounted for more than 80 percent of the total fire fatalities.

- An NFPA study of fires in high-rise buildings, published in September 2001, indicates that in the 14-year period between 1985 and 1998, only seven fire fatalities occurred in all of the high-rise office buildings in the United States. In that same 14-year period, more than 560,000 Americans died in traffic accidents.

- The NFPA estimates that approximately 50 fire fatalities occurred in commercial (non-residential) buildings in 2005.

- In the 30 years since the installation of sprinkler protection has become commonplace in high-rise buildings, not a single major high-rise building fire has occurred in a high-rise building protected throughout by a sprinkler system.

  Note: The fires that occurred in the World Trade Center (WTC) complex were caused by missile attacks on the WTC towers. The provisions contained in building codes do not address missile attacks. Hence, the fires that occurred at the WTC complex on September 11th are not included in the statistic cited above.

- According to an NFPA study on the reliability of sprinkler systems (dated August 2005), the average operational failure rate for sprinkler systems is seven percent. Based upon this, the average operational failure rate is 1 in 14, not 1 in 6.

- According to the NFPA study on the reliability of sprinkler systems, sprinkler protection provided in hotels/motels reduced the fire fatality rate by 91 percent (when compared with the fire fatality rate of unsprinklered hotels/motels) in the 10-year period between 1989 and 1998.

- According to the NFPA, in the 5-year period between 1994 and 1998, no fire fatalities occurred in any hotel/motel in the United States protected throughout by a sprinkler system.

- Since the three regional model building codes included provisions that permitted atriums in buildings that are protected throughout by a sprinkler system in the late 1970s, not a single major fire has occurred in a building that contains an atrium and that is protected throughout by a sprinkler system.

These statistics paint quite a different picture of fire safety in the United States than do the excerpts above from the AFS Web site.

The statement made by the AFS that "over the past 30 years, the three national model building codes have called for increased use of sprinklers, while steadily reducing requirements for fire and smoke resistant components. ..." is accurate. And what have been the results of this trend? A steady decline in the number of fire fatalities in the United States of 50 percent in the 29 years between 1977 and 2005. In all fairness, the 50 percent decline in the number of fire fatalities cannot be attributed solely to the increased use of sprinkler protection in lieu of passive fire protection. The reduction in the number of fires occurring in the United States, as well as the use of smoke detectors in residential occupancies, have played a big part in the reduction in the number of fire fatalities. One thing can be stated with certainty, however - the number of civilian fire fatalities has not been rising over the past 30 years as implied by the Alliance for Fire Safety. Similarly, the number of firefighter fatalities has not been rising over the last 30 years either. America has never been more fire safe than it is today.

The failure rate of sprinkler systems cited by the Alliance for Fire Safety is an interesting statistic. If sprinkler systems fail as often as indicated by the AFS, where are all of the failures? Yes, sprinkler systems are not 100 percent reliable - there is no denying that fact. What is subject to debate, however, is the actual failure rate. If the failure rate is as stated by the Alliance for Fire Safety, why hasn't there been a major fire in a high-rise building protected throughout by a sprinkler system in the last 30 years? Why hasn't there been a major fire in sprinklered buildings that contain an atrium in the last quarter century?

It's no secret that sprinkler systems protecting storage occupancies, such as the building in St. Louis mentioned in the excerpts above, fail more frequently than in other occupancies, simply because the hazard of the contents within a storage building can easily be increased by a change in the configuration of the contents, as well as by a change in the contents. This type of failure mechanism is improbable in buildings that are primarily light hazard occupancies (as defined by NFPA 13), such as office buildings, hotels and apartment buildings. Hence, the choice of a storage building as an example of a sprinkler system failure is not really representative of failures which would typically occur in buildings with a greater potential for life loss than storage buildings.

The AFS' statement on "balanced" fire protection asks the rhetorical question "since sprinkler systems can and do fail to operate, ... why place all of our fire protection eggs in one basket?" This seems to be a reasonable question to ask, although the premise on which the question is based is patently false. As implied by the AFS's question, there is no model building code used in the United States in the last 30 years that permits the deletion of all fire protection and fire safety features in buildings that are protected throughout by a sprinkler system. In truth, the model codes only permit a relaxation of code requirements for sprinklered buildings. In other words, the model codes used in the United States do not "place all of our fire protection eggs in one basket" as asserted by the AFS.

To bolster its case for "balanced" fire protection, the AFS cites the fire that occurred in the First Interstate Bank Building in Los Angeles on the evening of May 4 and the morning of May 5, 1988 (not 1987 as indicated on the AFS web page). Again, a very curious example: The First Interstate Bank Building was constructed without sprinkler protection, hence, the building design did not incorporate the reductions in passive fire protection allowed for sprinklered buildings. At the time of the fire, the building was being retrofitted with sprinkler protection and the installation was 90 percent complete. Unfortunately, portions of the sprinkler system that were completed had not yet been placed in service (because the installation of the water flow indicators in the system had not been completed). The fire originated on the twelfth floor of the building; eventually, a total of four floors suffered "burn-out," and a fifth floor was partially damaged. Obviously, the spread of fire from the twelfth floor to four adjacent floors above would have to be considered to be a failure of the passive fire protection, not a success. If the portion of the sprinkler system installation that had been completed had been in service at the time of the fire, it is highly likely that the First Interstate Bank Building would have been open for business on the morning of May 5, 1988, rather than four months later.

The AFS' statement on "balanced" fire protection concludes with a comparison of building fire protection to auto safety. An interesting comparison, considering the statistics on highway fatalities. To reiterate, the NFPA study on high-rise building fires, published in September 2001, indicates that a total of seven Americans died as a result of fires in all of the high-rise office buildings throughout the United States in the 14-year period between 1985 and 1998, while in this same time period more than 560,000 Americans died on our nation's highways. (In other words, the ratio of U.S. traffic fatalities to fire fatalities in U.S. high-rise office buildings over this 14-year period was 80,000 to 1.) Comparing the need for additional passive fire protection in sprinklered buildings beyond that presently required by the International Building Code and NFPA 5000 to the need for both seat belts and air bags in automobiles would be laughable if the highway fatality statistics weren't so horrific.

Given the statistics cited above, it seems quite obvious why the Alliance for Fire Safety rarely makes references to the fire statistics. Are the fire safety provisions contained in the International Building Code and NFPA 5000 "unbalanced" as alleged by the AFS, or is the AFS simply trying to fool us into thinking that the fire safety and fire protection provisions contained in our two new model building codes are "unbalanced?" Now that you've seen the Alliance for Fire Safety's assertions and the statistics together, you can judge for yourself.

The addresses of the Web pages discussed above are:

www.afscc.org/afs_files/afsindex.htm and

www.afscc.org/afs_files/theneedforbalance.htm

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