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SPRINKLER SYSTEM RELIABILITY

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The topic of "balanced fire protection" has been a subject which has often been discussed in this column. The reason for this is simple-what constitutes "balanced fire protection" has been the subject of heated and acrimonious debate ever since the regional model code groups decided to develop a single model building code, the International Building Code.

A trade association which consists of manufacturers and installers of passive fire protection products known as the Alliance for Fire and Smoke Containment and Control (AFSCC) is most often at the forefront of this debate. The AFSCC argues that active fire protection (sprinkler protection) is unreliable and, hence, reductions ("trade-offs") in passive fire protection features when active fire protection is provided in a building cannot be justified and that these "trade-offs" should be removed from the building code.

The AFSCC website (as of July 4, 2007) includes a link to an article titled "Is the AFSCC anti–sprinkler?". The following are excerpts from this article:

> "*The Alliance for Fire and Smoke Containment and Control, Inc. established a mission statement in 1999 that promotes a balanced fire protection design. Such designs incorporate the well-known fire protection triad of suppression, compartmentation, and detection.*"

> "*In response to the growing trend to eliminate built-in fire and smoke protection features in new construction, the AFSCC was developed to help promote the value of compartmentation as* ***one*** *of the three essential elements in balanced design.*"

> "*The members of the AFSCC are advocates of the widespread use of sprinklers. . . . Sprinklers often receive the credit for saving lives and loss mitigation that are actually produced by the whole integrated system of balanced fire protection in which sprinklers are an essential part, but not the only part.* "

> "*Although not opposed to the use of sprinklers, the AFSCC opposes the hundreds of often unjustified sprinkler trade-offs found in the recent editions of model building codes that trigger the significant reduction or complete elimination of fire and smoke resistant construction, and many other built-in complimentary features.*"

"*Although the record indicates that sprinkler systems often perform as intended, those who benefit from the design, testing, manufacturing, inspection, and installation of sprinklers have promoted a near-perfect operational reliability statistic.*"

"*A review of more recent fire experience in the United States indicates that the reliability of automatic sprinkler systems, while still good, may not be as high as reported. A 96-99% operational reliability of sprinkler systems and economic incentives are often cited as reasons for eliminating passive fire protection features.*"

"*The result is a new bias that has been created with the opposite effect - a record that can be interpreted to imply that sprinkler systems have a record nearing perfection, in spite of recent recalls, documented problems with piping corrosion, leaks, valve shut-offs and other mechanical problems. In truth, the national fire record has a conspicuous 30 year gap in the history of how, why, and how often sprinklers systems may not perform satisfactorily.*"

"*While recent NFPA fire data indicates that property loss and life loss are reduced in buildings protected throughout with an automatic sprinkler system, the same data indicates that sprinklers fail to operate 1 in every 6 fires that are large enough to activate a sprinkler. A failure rate of 1 in every 6 fires is contrary to what has historically been reported. Additionally, AFSCC conducted its own focus group interviews with fire service personnel to survey their real world experience with sprinklers. Those interviewed confirmed a lower performance than 96-98% reliability.*"

"*Without question, the same factors that affect sprinkler performance affect the performance of every other element of the fire protection package. . . . That undisputed fact, however, underscores the need for redundancy of systems, to complement the other in case of unsatisfactory performance by one. Trading off such redundancy should be based on a well-justified exception. No one system is as effective as a well-designed, well-maintained combination of multiple systems.*"

"*AFSCC does not endorse settling for a bare, minimum standard of fire safety driven solely by economic agendas. Neither does the AFSCC support passive protection as a substitute for sprinklers, although the organization has been portrayed in that negative light by those inclined to rely solely on sprinkler systems for total fire protection.*"

"*The AFSCC is not anti-sprinkler. It is the position of AFSCC, however, to be realistic about the limitations and performance capabilities of* ***all*** *fire and smoke protection features. We are committed to cooperate with those who promote fire safe buildings, and to support the major contribution that sprinklers make when combined with many other time-tested fire and smoke features, for the safety and comfort of building owners and occupants, and for the protection of their property.*"

In a memorandum to the Michael Pfieffer, the staff liason to International Code Council's Code Technology Committee (CTC), dated April 19, 2007, Vicki Lovell of InterCode, Inc. (who often represents the AFSCC) wrote the following:

"*In 2005, the Alliance for Fire and Smoke Containment and Control, Inc. (AFSCC) commissioned Koffel and Associates, Inc. to analyze NFPA's sprinkler performance data and to produce a report without prejudice about sprinkler reliability in the US. In his report, Mr. Koffel makes a significant distinction that many other proponents of sprinklers do not make: the difference between performance reliability and operational reliability. The report reflects the available information from NFPA for the time period reviewed and helps to clarify the subtle but distinct differences reflected in the data between component, system, and building performance. That report, now referred to as the Koffel Report and posted on the CTC website, was reviewed and validated by Dr. John Hall of NFPA before it was released by the AFSCC.*

Richard Schulte persistently discredits the Koffel Report and its sponsor, the AFSCC, most recently in a series of emails to ICC regarding the Prince William [George's] County and Scottsdale reports on sprinkler performance in those local jurisdictions. Mr. Schulte offers the Prince William [George's] *County and Scottsdale reports as "proof" that the AFSCC and Mr. Koffel are "in error" and that "sprinklers in the residential setting are close to 100 percent reliable". If the City of Scottsdale and Prince George*['s] *County reported to NFIRS/NFPA during the time period studied in the Koffel Report, then their favorable experience with sprinklers would have been captured in the data with the many other fire incidents where sprinklers operated satisfactorily. However, their experiences do not supersede or negate all other reports from other jurisdictions, as Mr. Schulte purports.*

We strongly object to Richard Schulte's persistent characterization of the AFSCC as intentionally distributing false information. Mr. Schulte also continues to disparage Mr. Koffel's professional credibility and his admirable reputation, for which he has worked very hard. Although the AFSCC has no objection to ICC posting the articles from Scottsdale or Prince William [George's] *County on the website, we find Richard Schulte's inflammatory statements about the AFSCC and the Koffel Report unsavory, unsupported, and irresponsible and request that his remarks not be distributed. If Mr. Schulte's comments have already been distributed, then we request that this letter be forwarded to those recipients. If any of Mr. Schulte's opinions about the AFSCC or the Koffel Report are posted on the CTC website in the context of some other article, then we request that this letter be posted in response.*

On the subject of credibility and reputation, it would be enlightening for Mr. Schulte to publicly disclose why, and at whose behest, he persistently attacks the AFSCC, his fellow P.E. Bill Koffel, and the proven-effective fire protection designs where sprinklers are a vitally important component in most cases, but not the only vitally important component in all cases."

The article titled "Is the AFSCC anti–sprinkler?" paired with Lovell's memorandum to the ICC offers a rather interesting medley of opinions by the AFSCC. In the "anti-sprinkler" article, the AFSCC claims not to be "anti-sprinkler", however, the article includes the statistic that sprinkler systems fail (on average) in 1 in 6 fires large enough to activate sprinklers. This statistic was included in the first "Koffel Report" on sprinkler reliability (and also in articles written by Dr. Gene Corley of the CTL Group). After the publication of the NFPA study on sprinkler reliability, "U.S. Experience With Sprinklers and Other Fire Extinguishing Equipment," dated August 2005 (actually released on September 9, 2005) cast doubt on conclusions of the first "Koffel Report", the "Koffel Report" was revised and the second "Koffel Report" (which now appears on the AFSCC website) was released. The second "Koffel Report" indicates an average sprinkler system failure rate of 1 in 10. If the "Koffel Report" cited in Lovell's memorandum indicates an average failure rate of 1 in 10, why would articles linked to on the AFSCC website continue to cite a 1 in 6 failure rate and why is there no objection by Koffel to the 1 in 6 failure rate still being cited by the AFSCC? It seems obvious, at least to me, that the first "Koffel Report" was based upon poor data, hence the need for a second "Koffel Report" based upon better data.

While both the NFPA report on sprinkler reliability and the second "Koffel Report" are in relatively close agreement concerning the average failure rate of sprinkler systems, does this mean that the average failure rates cited by both the NFPA and Koffel Reports are definitive. It would seem that the sprinkler system failure rates reported in the Scottsdale Report and the Prince George's County studies on residential sprinklers (a combined 1 failure in 214 sprinkler system activations; less than a 1 percent failure rate) should be of interest to both Koffel and the AFSCC. Is the residential sprinkler system failure rate in Scottsdale and Prince George's County "proof" that Koffel's and the NFPA's average failure rate statistic is in error? No, of course not, but it is evidence that average failure rate statistic reported by Koffel and cited by the AFSCC may skew the discussion of the reliability of sprinkler systems.

As has been pointed out in previous columns, there are two solutions to the "problem" of sprinkler system reliability. The first, and most obvious solution, is to make sprinkler systems more reliable simply by doing more frequent inspections of the control valves and by actually enforcing NFPA 25. (According to the 2005 NFPA study on sprinkler reliability, two-thirds of the sprinkler system failures can be attributed to closed water supply valves.) But, of course, the AFSCC doesn't support the obvious solution, but the alternative solution of providing both sprinkler protection and passive fire protection, even though it's been proven time and again that passive fire protection (other than structural fire protection), is ineffective in the real world. Effectively maintaining the myriad of passive fire protection features in the real world is just about an impossible task, while maintaining the effectiveness of sprinkler protection is far simpler. Given the fact that the AFSCC doesn't appear to support the most obvious and simple solution to the "problem" of sprinkler system reliability, it's not too difficult for me to conclude that what the AFSCC is really all about is using the building code to sell passive fire protection products.

With respect to Lovell's question about why the author of this column "persistently attacks the AFSCC and" Mr. Koffel, it has to do with professional ethics and integrity. The AFSCC has been involved in "shading" the truth about the reliability of sprinkler systems (as evidenced by their continued use of the 1 in 6 failure rate) in order to accomplish the real goal of the trade organization-to maintain and increase the market share of passive fire protection products. It appears that the AFSCC has little or no regard for the American public who has to bear the burden of paying for compliance with these unnecessary requirements. With two-thirds of the fire fatalities in the United States occurring in 1- and 2-family dwellings and over 80 percent of the fatalities occurring in residential occupancies, the fire safety features which have proven to virtually eliminate fire fatalities in residential occupancies in the real world is a combination of smoke detection and sprinkler protection. If the combination of sprinklers and smoke detectors virtually eliminates fire fatalities in residential occupancies, then there is little left for passive fire protection to accomplish in the way of occupant fire safety.

The ability of sprinkler protection to accomplish reducing the number of fire fatalities to virtually zero in residential occupancies is very well illustrated in this excerpt from the Scottsdale Report:

Case Study 6

Date: July 31, 1995
Location: 13000 N. 103rd Place [Scottsdale, Arizona]
Time: 1000 hours
Occupancy: Single Family Residence
Cause: Arson
Activation: 1 head [sprinkler]
Total Loss: $1,500
Total Potential: $138,000
Flow Time: 10 minutes

Narrative:

"*An arsonist used flammable liquid to ignite this house fire. A 21 year old occupant was sleeping in a bedroom at the time of the incident. A second party poured gasoline over the sleeping occupant and in the bedroom before igniting the materials. The sleeping occupant received only minor burns from his contact with the flammable liquid. Total damage was contained to the room of origin as a result of a single sprinkler head activation. Extensive damage to the structure would have occurred along with a probable fire fatality if not for the installation of the* [sprinkler] *system.*

This is an excellent example of the effectiveness of the residential systems ability to address flammable liquid fires and to protect the people in the room of origin."

Of course, if residential sprinklers can maintain tenability in the room of origin in an arson fire involving flammable liquids poured directly on a sleeping occupant, more than likely the operation of sprinklers will be able to maintain tenability throughout any building. That's just plain old-fashioned common horse sense, but, of course, if that's true, then the need for all those passive fire protection features the AFSCC has been pushing in sprinklered buildings is "out the window" so to speak. Oops-can't have that can we, Ms. Lovell? I know my comments above are about as welcome as "a skunk at a [AFSCC] garden party", but the answer to the fire "problem" in United States is as black and white as a skunk and the answer has little to do with eliminating "trade-offs" in passive fire protection in buildings protected by sprinklers.

It's my opinion that it's time for the fire service to wake up and realize what the "balanced fire protection" ploy used by the AFSCC is really all about-selling unnecessary passive fire protection products in sprinklered buildings. To paraphrase Abraham Lincoln, "you can fool some to the people some of the time, but you can't fool all of the people all of the time." It's time for Ms. Lovell and the AFSCC to stop trying to fool us with their "cooked" statistic on sprinkler system failures and to actually contribute to the building fire safety by assisting in the effort to reduce the number of sprinkler system failures which occur. Mr. Koffel's (and Dr. Corley's) assistance in this effort would also be very much appreciated.

Editor's Note: The "Scottsdale Report" and a report on the experience with sprinkler protection in residential occupancies in Prince George's County, Maryland can be found on the internet at the following addresses:

http://www.homefiresprinkler.org/images/sprinklers.PDF

http://www.homefiresprinkler.org/images/PrinceGeorgeStudy.pdf

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