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THE NFPA TECHNICAL MEETING: NFPA 204 TESTIMONY

By Richard Schulte

The use of smoke/heat vents in buildings protected by a sprinkler system has been debated in the fire protection field for more than 30 years. The latest battle in this debate occurred at the Annual Meeting of the National Fire Protection Association (NFPA) on June 9, 2010. At issue was the NFPA's Smoke Management Committee's proposal to amend NFPA 204 by including "mandatory" performance-based provisions addressing the design of roof vent systems in sprinklered buildings. (Actually, mandatory performance-based provisions without a clearly defined "design goal". I know what you're thinking-how can performance-based provisions be considered to be mandatory without a clearly defined "design goal"? Sorry, but I have no answer to that question. Without a clearly defined "design goal", performance-based provisions can't be considered to be mandatory provisions.)

The following are excerpts from comments on the Smoke Management Committee's proposal by Daniel O'Connor (Schirmer Engineering Corporation), Carl Baldassarra (RJA Group), Richard Davis (FM Global) and William Koffel (Koffel Associates):

Daniel O'Connor:

"So where are we going here? My comment here is that the technical basis for designing vent systems and sprinkler buildings has essentially been investigated now for more than 25 years and has not yet been developed in this proposal for Chapter 11."

"Despite the lack of substantiation and specificity of how to design such systems, vented sprinkler buildings, I believe the proponents are misrepresenting this proposal as finally a solution to the long-time challenge of combining sprinklered buildings with automatic smoking heat vents."

"My comment here is that the technical basis for designing vent systems and sprinkler buildings has essentially been investigated now for more than 25 years and has not yet been developed in this proposal for Chapter 11."

"I'd like to draw your attention to one. . .section of this proposal 11.4.2. That section reads as follows: "Vents shall not operate until after sprinklers have been determined to establish control of a fire."

"Vents shall not operate until after sprinklers have been determined to establish control of a fire."

" . . .in my mind as I read this 204-8, there's really no reasonable engineering expectation or accepted calculation method that allows the point of sprinkler control to be predicted on a reliable and repeatable basis, especially given the wide variety of variables possible in storage configurations."

Richard Davis:

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"In fact, some of the members on the committee don't feel that smoke vents should even be required in sprinkler buildings."

"The majority of the committee members did feel that if heat and smoke vents were -- and draft curtains were required in sprinklered buildings, that they should not adversely affect the sprinkler operations."

"Currently the only requirements in IBC or IFC are for the draft curtain depth. There are no requirements for the location of the draft curtain with respect to an aisle space."

"Furthermore, in 1998 there was an NFPA investigation report entitled "Bulk Retail Storage Fire" in Tempe, Arizona and the information in that report suggested that the draft curtain which was not in conformance with these proposed requirements channeled heat away and caused sprinklers to operate well beyond the fire where they're not putting water on the fire or even effectively causing pre-wetting."

"In the note that Dan O'Connor commented on, specifically 11.4.2, vents shall not operate until the sprinklers have controlled the fire, admittedly it is a difficult situation to try to police."

“We talked about the importance of allowing the first ring of sprinklers to open and put water on the fire; the second ring of sprinklers to cause pre-wetting to prevent the advancement of the fire; and in the end of the discussion where we included an explanation of (indiscernible) vents and what that concept is, we even suggested an alternative that manual remote operation of vents be considered that would take away the concern that is presented in item 11.4.2.”

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William Koffel:

“I think the real issue before you today is is this better than what's in the 2007 edition of the standard. What is proposed in the new Chapter 11 coordinates and references text in NFPA 13 2010 edition.”

“I think the real issue before you today is is this better than what's in the 2007 edition of the standard.”

“So there are things that you will be losing that apparently the committee believes and certainly the industry believes are beneficial.”

“So I think the real question for you today relative to this motion is: What is the harm? Has the maker of the motion proven to you that there's anything technically wrong or that any harm will really come from including Chapter 11 in this edition of NFPA 204?”

“The maker of the motion says the industry believes that there's a solution. Nothing further from the truth. I'm representing the industry. We think this is a baby step forward. We think there are strides to be made yet, but we would encourage you to allow us to build upon this in the next edition of NFPA 204 and not take us back to where we were several years ago and have to start from scratch.”

“I think my previous testimony was mischaracterized. I didn't say move this forward because there's no harm.”

“So I think the real question for you today relative to this motion is: What is the harm? Has the maker of the motion proven to you that there's anything technically wrong or that any harm will really come from including Chapter 11 in this edition of NFPA 204?”

Carl Baldassarra:

“I'm very surprised to hear what I just heard, that this might not do any harm so you ought to support it, you ought to oppose the motion. That's not the standard that NFPA holds itself to in this regard. We heard Jim Shannon on Monday say the world relies on NFPA's reputation for sound technical decisions as reflected in its standards.”

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“The representatives of the -- from the vent industry said at the ICC meeting that they wanted to have another cycle to get this right. It's not right, and this proposal doesn't make it any better.”

Daniel O'Connor:

*“In fact, before I came to this meeting, it was interesting to me to pull out their [referring to FM Global] 2010 installation guidelines for automatic sprinklers dealing with heat and smoke vents. **Those guidelines, in fact, say do not install automatic smoke and heat vents in facilities equipped with sprinkler protection.** Manual heat and smoke vents, however, [are] acceptable.”*

“Those guidelines, in fact, say do not install automatic smoke and heat vents in facilities equipped with sprinkler protection. Manual heat and smoke vents, however, [are] acceptable.”

“So what else does that criteria say? FM criteria says if you have vents in your building, install quick response sprinklers directly under the vent opening on a maximum 4-foot linear and 16 square foot area spacing. What does that do? That absolutely prevents the automatic heat vent from opening.”

“They also say install FM approved vents equipped with a standard response 360 degree nominal thermal activating device. What does that do? That absolutely prevents the automatic vent from opening.”

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“They also say you can install the vents that are FM approved for occupancies protected by quick response storage sprinklers. What does that do? That absolutely prevents the automatic vent from opening.”

“I am very concerned that we have major insurance companies in this country that do not accept the use of vents and they have their own guidelines against it. . .”

“. . . I think this is bad science to be moving in this direction, and it's counter to the goals of NFPA. . .”

“. . . I think this is bad science to be moving in this direction, and it's counter to the goals of NFPA, and I urge you to reject Comment 204-8.”

William Koffel:

“I think my previous testimony was mischaracterized. I didn't say move this forward because there's no harm.”

“The ICC code technology committee, yes, they moved forward a proposal that only recognized 204 in non-sprinklered buildings. The committee modified that to allow the use of 204 in sprinklered buildings.”

“A lot of the past testimony you just heard was the argument about whether we should have vents or not. That's not this argument. 204 does not require vents. It tells us here are the things to consider if you have to put vents in.”

“A lot of the past testimony you just heard was the argument about whether we should have vents or not. That's not this argument. 204 does not require vents.”

Carl Baldassarra:

“Does this language here help me as a designer as just asked rhetorically? No, it does not.”

“Think about this. Can you look at any building that has a sprinkler system in it and predict when the fire in that building is going to be under control? You can’t do that.”

“Does this language here help me as a designer as just asked rhetorically? No, it does not.”

After the debate, a motion to send the Smoke Management Committee’s proposal back to committee was approved.

Discussion

Once again, we have yet another example of disingenuous statements made in code development hearing testimony by representatives of the smoke/heat vent manufacturers. At the ICC code hearings held in Baltimore in late October 2009, William Koffel had this to say about the Smoke Management Committee’s proposal addressing the issue of the installation of smoke/heat vents in buildings protected by a sprinkler system:

“. . . Secondly, they talk about a recommendation of the NFPA 204 committee. I sit on the NFPA smoke management committee responsible for 204. I’m not representing that committee here. I sit on NFPA 13 discharge criteria committee which is responsible for Chapter 12. I’m not representing that committee. But I think this committee [referring to the ICC Fire Code Changes Committee] needs to know that NFPA 13 now allows vents and draft curtains in buildings protected throughout with a sprinkler system. In fact, they’ve even gone so far to allow it in a building with ESFR sprinklers, smoke vents that is, if the vents have a certain criteria. That’s in Chapter 12 of the 2010 edition of NFPA 13. So the 13 committee recognizes that this is a viable technology in sprinklered buildings. 204 has a proposal, or a comment, that is being balloted now that has a new chapter for designing smoke vents in buildings protected with a sprinkler system, so the technology is being addressed by the appropriate NFPA committees.”

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At the same hearing in Baltimore, Juli Ruth, representing the AAMA Smoke Vent Task Group, had this to say about the NFPA 204 proposal:

“. . . Having participated or sat in on some of the CTC meetings and stuff for the last couple of years, the question that kept coming up was, ‘Is the current requirements of the IFC for smoke and heat vent design appropriate?’ And, when we look at it, and we see that these are things that have been in the code for a long time, many of them probably put in there, perhaps put in there before the sprinkler requirements were put in, maybe not, with regards to how these would interact with sprinkler systems. So, we

started looking at ‘where is this being addressed?’ Well, it’s being addressed in 204 as you already heard. NFPA 13 permits it and we feel that it is important to continue to allow the use of these when they’re appropriately designed as guided by NFPA – and I think that’s it.”

“So, we started looking at ‘where is this being addressed?’ Well, it’s being addressed in 204 as you already heard. NFPA 13 permits it and we feel that it is important to continue to allow the use of these when they’re appropriately designed as guided by NFPA – and I think that’s it.”

Also of interest in this discussion is the technical substantiation for the provisions addressing the installation of roof vents in buildings protected by a sprinkler system included in the 2010 edition of NFPA 13:

“The intent of the [NFPA 13] standard is that roof vents and draft curtains should not be used in conjunction with storage protection.” 13-325 Log #CP43 AUT-SSD

Given that both the 2010 edition of NFPA 13 and the FM Global sprinkler installation standard, Property Loss Prevention Data Sheet 2-0 (dated March 2010), recommend that roof vents and draft curtains not be provided in buildings protected by a sprinkler system, it would appear that there is no need to include provisions which address the use of roof vents in sprinklered buildings in NFPA 204. Based upon these two engineering standards, it can reasonably be concluded that the installation of roof vents and draft curtains is not consistent with standard engineering practice.

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Aside from the question of what constitutes standard engineering practice with regard to the use of roof vents in sprinklered buildings, William Koffel's characterization of the proposed provisions for the use of roof vents in sprinklered buildings in NFPA 204

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is most interesting. In the ICC code hearings, both Koffel and Ruth characterize the issue as "*being addressed in 204*", however, Koffel states that proposed provisions are just "*a baby step forward*" in the NFPA hearings. At NFPA, Koffel went so far as to state that "*we think there are strides to be made yet. . .*". In other words, the vent manufacturers' characterization of the NFPA 204 proposal depends upon the audience to whom they are speaking. It would seem reasonable to ask the vent manufacturers to wait until they have a complete proposal on how to design vents and draft curtains in a sprinklered building before stating that NFPA 204 will include the solution. After all, the vent manufacturers have only been working on this issue for 30+ years or so.

Also of interest in Koffel's testimony at NFPA is the fact that Koffel chose not to respond to Daniel O'Connor's question regarding how it is determined when "*sprinklers have been determined to establish control of a fire*". We know that the current crop of fire models which have been developed are not capable of reliably predicting sprinkler activation times, the number of sprinklers which will activate in a fire and the effect of sprinkler spray discharge on a fire. Given this, it would seem that William Koffel should have provided an explanation as to how an engineer will be able to predict when "*control of a fire*" is established. It seems reasonable to assume that Koffel can't answer the question which O'Connor raised or he would have done so at the microphone.

One other issue which needs to be addressed by the vent manufacturers is their apparent change in philosophy regarding the opening of vents. In May 2008, just a little over 2 years ago, Dr. Craig Beyler in his presentation to the ICC Code Technology Committee (CTC) on behalf of the Smoke Vent Task Group indicated that it was imperative that vents be opened quickly in a fire. Given this, the vent industry introduced the concept of the "ganged" opening of roof vents and proposed that vents be opened 60 seconds after water flow is detected in the sprinkler system.

In May 2008, just a little over 2 years ago, Dr. Craig Beyler in his presentation to the ICC Code Technology Committee (CTC) on behalf of the Smoke Vent Task Group indicated that it was imperative that vents be opened quickly in a fire.

Since May 2008, both the NFPA 13 committee and FM Global have included provisions in their respective sprinkler installation standards which will prevent vents from automatically opening in a fire controlled by sprinkler operation. These provisions are the complete opposite of Dr. Beyler's missive that vents must be opened quickly in order to be effective. If roof vents must be opened quickly in a fire to be effective, don't the new NFPA 13 and FM Global Loss Prevention Data Sheet 2-0 provisions addressing the use of roof vents defeat the objective of rapidly opening roof vents? The answer to that question is obvious.

In fact, Dr. Beyler is correct; in order for roof vents to operate effectively, the vents must be opened before the sprinkler system effectively controls the fire. After effective control of the fire by the sprinkler system, the temperatures at the ceiling are not sufficiently high enough for open roof vents to perform properly. To put it quite simply, "cold" smoke doesn't rise. Once the sprinkler system effectively controls a fire, the only smoke left in the building is "cold" smoke. Opening vents in the roof to vent smoke after effective control of the fire is achieved isn't going to vent any smoke.

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Finally, the issue of fire fighter safety needs to be mentioned. One of the reasons given for providing roof vents in sprinklered buildings by some is that the vents are a "backup" for the sprinkler system, just in case of sprinkler system failure. In the event of sprinkler system failure, typically due to a closed water supply valve, the building becomes an un-sprinklered building. Recall that the Sofa Superstore building in Charleston, South Carolina was only 42,00 SF in floor area and was not provided with sprinkler protection.

If the sprinkler system fails in a large building provided with roof vents, the building becomes just another Sofa Superstore. Vents are really only of use if offensive fire fighting tactics are utilized. Committing fire fighters deep inside a building where the sprinkler system has failed is simply not worth the risk.

Conclusion

The proposal to include design recommendations for the use of roof vents in buildings protected by a sprinkler system in NFPA 204 is deeply flawed. At this point in time, we simply don't have the tools necessary to perform the analysis required by this proposal. Why include a requirement for a performance analysis for the use of vents in sprinklered buildings in NFPA 204 if we don't have the tools to do the analysis?

The vent manufacturers have had 30+ years to come up with a design methodology for utilizing roof vents/draft curtains in sprinklered buildings and so far the vent manufacturers have failed. The vent manufacturers sudden interest in this subject has been peaked by code change proposal F144-09/10 (proposed by the ICC Code Technology Committee) which would delete the requirement for the installation of roof vents in sprinklered buildings and substitute a requirement for a manually-activated mechanical smoke removal system.

The use of roof vents and draft curtains in buildings protected by a sprinkler system has always been “junk fire protection”. It finally time to take the “junk” out (of the building code).

Editor’s Note: The complete transcript of testimony on NFPA 204 can be found at the following address:

http://www.nfpa.org/assets/files/PDF/CodesStandards/A10Transcript_June-9-2010.pdf

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