

SCHULTE & ASSOCIATES

Building Code Consultants
880D Forest Avenue
Evanston, IL 60202
fpeschulte@aol.com
847/866-7479

LOOKING BACK: ROOF VENT CODE CHANGE PROPOSALS

By Richard Schulte

The issue of the use of smoke/heat (roof) vents in buildings protected by a sprinkler system has been a controversy in the field of fire protection for at least 40 years. In the early 1970's, concern was expressed that the opening of roof vents could have an adverse effect on the operation of a sprinkler system.

Recently, a subcommittee of the NFPA 13 committee developed provisions which addressed the installation of roof vents in sprinklered buildings. These provisions permit the installation of roof vents only if the vents are designed such that the vents will not operate if the sprinkler system effectively controls or extinguishes the fire.

The vent provisions now included in the 2010 edition of NFPA 13 specifically require that only manually-operated vents be provided, or, as an alternative to manually-operated vents, automatic vents activated by a fusible link with a temperature rating one temperature classification higher than the temperature classification of the sprinklers are permitted. The substantiation provided by the NFPA 13 subcommittee which developed these provisions reads as follows:

“The intent of the standard is that roof vents and draft curtains should not be used in conjunction with storage protection. Previous language was unenforceable.”

(Source: 13-325 Log #CP43 AUT-SSD, NFPA Report on Comments)

One of the committee members who voted against the proposed new vent provisions provided the following explanation for his negative vote:

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

MULTER, T.: *The following original proposal on ROP documents dated 10/20/2007 should be accepted as proposed but with a change to the annex statement.*

12.1.1 Roof Vents and Draft Curtains. *Roof vents and draft curtains shall not be used in conjunction with the sprinkler protection criteria for storage in this standard.*

A.12.1.1 *The design parameters in NFPA 13 were developed based upon the absence of roof vents or draft curtains. (See Annex C.6) Fire tests for sprinklers specifically listed for storage applications are tested without vents or draft curtains. References to control mode sprinklers in other building standards pertain*

to standard spray sprinklers that were not specifically tested by the laboratories for storage applications. With the advent of K-11.2 and larger sprinklers for storage applications and now Specific Application Control Mode sprinklers (being revised to CMSA), we need to realize that ESFRs are not the only storage sprinklers and that the use of smoke vents and draft curtains can be detrimental to all sprinklers that are specifically tested for storage applications. FM Global's recommended storage protection designs are based upon vents not being provided and that the use of automatic vents may increase the sprinkler water demand."

"Roof vents and draft curtains shall not be used in conjunction with the sprinkler protection criteria for storage in this standard. . .the use of smoke vents and draft curtains can be detrimental to all sprinklers that are specifically tested for storage applications."

More recently, the membership of the International Code Council (ICC) also took up this issue. The ICC Code Technology Committee developed code change proposal F144-90/10 which eliminated the requirement for roof vents in industrial and storage buildings provided with sprinkler protection and substituted a requirement for a manually-activated smoke removal system. This code change proposal was disapproved by the ICC membership after amendments to the original proposal were included.

Given the longstanding controversy over the installation of roof vents in sprinklered buildings, it is well worth taking a look at some of the code change proposals addressing the issue over the years.

Given the longstanding controversy over the installation of roof vents in sprinklered buildings, it is well worth taking a look at some of the code change proposals addressing the issue over the years. The following are proposals to amend the requirements for vents in the BOCA Basic Building Code (a.k.a. the BOCA Basic/National Building Code and the BOCA National Building Code):

“Code Change No.: B28-81 [1981]

Basic Building Code

Section: 507

Proponent: John G. Degenkolb

Change subsection to read as follows:

507.3 Roof Vents: . . .

In buildings of use group S-1 which are completely protected by an automatic fire suppression system, roof vents shall be capable of being openable manually or, if automatically, by heat detection with the use of fusible links having a 360° F rating.

SUPPORTING STATEMENT(S): Prior to the mid-year meeting, fire tests on vents will have been completed at IITRI [Illinois Institute of Technology Research Institute]. This proposal is to hold open that modification to the code which was Disapproved at the Annual Meeting after having been approved as modified by the Code Revisions Committee upon the recommendation of the proponent that it be held for Further Study. Vents should NOT be completely eliminated on the basis of sprinkler protection and should be at least capable of manual operation.”

(**Source:** 1981 Proposed Changes to the BOCA Basic Codes)

“Code Change No.: B52-84 [1984]

Section: 504.3

Proponent: Marshall A. Klein, FPE

Representing: Marshall A. Klein & Associates

Change subsections to read:

~~504.3~~ Roof vents: (Delete subsection 504.3 and Table 504.3 in entirety)

~~504.4~~ **504.3** Travel distance:

SUPPORTING STATEMENT: Based on the latest revision to NFIPA 204M by NFIPA in Nov., 1982, that standard provides design criteria for nonsprinklered, single-story buildings only (Ref: NFIPA 204, Sec. 1-2.1). In fact, Chapter 6 of NFIPA 204 questions the desirability of venting in sprinklered buildings!”

(**Source:** 1984 Proposed Changes BOCA Basic/National Codes)

“Code Change No.: B24-85 [1985]

Section: 504.3

Proponent: Martin Walsh/Charles Decker

Representing: CABO-BCMC [Council of American Building Officials-Board for the Coordination of the Model Codes]

Delete without substitution:

~~**504.3 Roof vents:** The roof system of one-story buildings of unlimited area when of Type 2, 3 or 4 construction shall be provided with smoke and heat vents in accordance with Table 504.3.~~

~~**504.4 Travel distance:** The maximum length of exit access travel distance in unlimited area buildings shall be 400 feet (122 m).~~

Table 504.3 Roof Vent Requirements. (Delete Table 504.3 entirely)

SUPPORTING STATEMENT: The CABO Board for the Coordination of the Model Codes [BCMC] has reviewed the contents of the codes and is recommending that the use of roof vents be recognized in Factory and Storage buildings for an increase in exit access travel distance due to the improved visibility in the fire vicinity and increased opportunity for fire service accessibility to the location of a fire by removal of heat and smoke.

The deletion of this text would permit the use of the access travel distance limitations of Section 807 to apply to all buildings including buildings of Type 1A [construction] which also are of unlimited area. The BCMC determined that roof vents are of little value in occupancies of light to moderate fire loads and are designed and intended for use in Factory and Industrial buildings.”

(**Source:** 1985 Proposed Changes to the BOCA Basic/National Codes)

“Code Change No.: B25-85 [1985]

Section: 504.3

Proponent: David Hammerman P.E.

Representing: State of Maryland

Change to read as shown:

504.3 Roof vents: Except in sprinklered buildings, the roof system of one story buildings of unlimited area when of Type 2, 3 or 4 construction shall be provided with smoke and heat vents in accordance with Table 504.3.

Exception: Buildings of Use Group I-2.

SUPPORTING STATEMENT: Smoke and heat venting is appropriate for a building which is constructed without a fire suppression system.

It is likely that the manual operation of roof vents in locations remote from a fire may draw the heat from the fire to the vent opening, thereby causing the operation of additional sprinklers outside of the actual fire area.”

(**Source:** 1985 Proposed Changes to the BOCA Basic/National Codes)

“Code Change No.: B70-85 [1985]

Section: 807.4.1

Proponent: Martin Walsh/Charles Decker

Representing: CABO-BCMC [Council of American Building Officials-Board for the Coordination of the Model Codes]

Add new section as shown:

807.4.1 Roof vent increase: In buildings of Use Groups F or S, one story in height, equipped with automatic heat and smoke roof vents complying with Section 1429 and equipped throughout with an approved automatic fire suppression system, the exit access travel distance limitation in Table 807 shall be increased to 400 feet.

SUPPORTING STATEMENT: This is a coordination change to the changes proposed to Sections 504 and 1429. This section would permit the travel distance increase in all Factory and Storage buildings regardless of Type of Construction.

The increased travel distance for the occupants is reasonable because of the improved visibility available as the roof vents remove the products of combustion.”

(**Source:** 1985 Proposed Changes to the BOCA Basic/National Codes)

Discussion

As we look back at the proposed code changes to the BOCA Code, it is rather interesting to see that the NFPA 13 committee essentially adopted John G. (Gus) Degenkolb's proposal made in 1981 and, after 29 years, included his proposal in the 2010 edition of NFPA 13.

One can say that the NFPA 13 committee gave plenty of consideration to Degenkolb's proposal before incorporating the concept into NFPA 13, however, the substantiation statement made for the new NFPA 13 provisions actually indicate that the NFPA 13 committee disagrees with Degenkolb. Once again, to repeat the substantiation statement for the new provisions addressing roof vents contained in the 2010 edition of NFPA 13:

"The intent of the standard is that roof vents and draft curtains should not be used in conjunction with storage protection. . ."

Continuing through the code change proposals above, we see that Marshall Klein notes that the 1982 edition of NFPA 204M does not contain provisions which address the installation of roof vents in buildings provided with sprinkler protection. Interestingly enough, 28 years later, the same can still be said about the latest edition of NFPA 204. In fact, the proposal to finally include provisions for the design of roof vent systems in sprinklered buildings in NFPA 204 was rejected by the NFPA membership in June 2010.

It took one more code change cycle to actually remove the requirements for the installation of roof vents in unlimited area buildings in the BOCA Code, but the BOCA membership finally deleted the provisions for the installation of roof vents when this proposal came from the Board for the Coordination of the Model Codes (BCMC).

Does the installation of roof vents in buildings protected by a sprinkler system make sense?

It would seem logical that the other two regional model building codes would have followed BCMC/BOCA's lead and also deleted the requirements for roof vents in sprinklered buildings from the Standard Building Code and the Uniform Building Code if BCMC agreed that there was no rationale for these provisions. However, this did not happen and the roof vent provisions remained in the Standard and Uniform Codes until the last editions of these codes were published in the late 1990's.

Does the installation of roof vents in buildings protected by a sprinkler system make sense? The research done at Underwriters Laboratories (UL) on the interaction of sprinklers and roof vents in 1997/1998 demonstrated that individually-activated roof vents were unlikely to open where the temperature rating of the roof vent fusible link had the same temperature rating as the sprinklers. In tests where the roof vents did open, the number of vents which opened was limited to one. Given the above, it can be concluded that the vents will have little, if any, impact on the smoke and heat which collects in the building where the temperature rating of the vent links and sprinklers have the same temperature rating (assuming that the sprinkler system operates successfully).

Obviously, based upon the testing conducted in 1997/1998, the likelihood that any vents will open automatically is essentially nil if the temperature rating of the vent links is one temperature classification higher than the temperature classification of the sprinklers, as now required by NFPA 13. If no vents will open automatically, then there seems to be little benefit to providing vents

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Based upon the above, it appears that the only real benefit to providing vents in a sprinklered building is if the sprinkler system fails to operate or control the fire. In the event of a sprinkler system failure, should fire fighters conduct interior manual fire fighting operations in large industrial or storage buildings?

In the event of a sprinkler system failure, should fire fighters conduct interior manual fire fighting operations in large industrial or storage buildings?

Since most large single-story industrial and storage buildings are typically constructed with non-rated roof construction which includes light-weight structural members, it is my opinion that the risk to fire fighters is simply too high to conduct interior fire fighting operations and that operations should be limited to exterior fire fighting in the event of sprinkler system failure. There is no need to be concerned about access to the building to apply hose streams because the roof will soon collapse, if the roof hasn't already collapsed prior to the arrival of the fire department. Providing roof vents as a back-up for sprinkler protection only invites risky operations in the event of sprinkler system failure-

-think Sofa Superstore in Charleston, South Carolina.

While the debate over the use of roof vents in sprinklered buildings still continues, there is some good news on the horizon. Many in the fire service are starting to realize that roof vents in sprinklered buildings do not “work” in the same manner as vents in unsprinklered buildings. (In fact, unsprinklered and sprinklered industrial and storage buildings are entirely two different types of “animals”.) In April 2010, the ICC Joint Fire Service Review Committee voted to support the CTC’s code change proposal, F144-09/10, as originally proposed by the CTC.

With support from the fire service (and a little bit of luck), the use of roof vents in one story industrial and storage buildings protected by a sprinkler system will soon be history. The only question which will remain is: why did it take 25 years to remove the requirements for roof vents in sprinklered buildings from the code? I guess you could say that the BOCA Code was a quarter of a century ahead of its time.

Just a passing thought, but how many billions of dollars have been wasted putting roof vents in sprinklered buildings for the last 30 years or so? Imagine if those billions of wasted dollars had been invested in providing sprinkler protection in single-family dwellings instead or investing those dollars in highway safety. How many people would be alive today if we hadn’t mis-spent all that capital on a technology that never “worked” like the manufacturers and consultants, *i.e.*, Dr. Craig Beyler, Rick Thornberry and William Koffel, told us and instead invested those dollars in safety products that actually perform?

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It’s interesting to note that Beyler, Thornberry and Koffel are all graduates of the fire protection engineering program at the University of Maryland. It’s also interesting to note that those opposed to the use of vents in sprinklered buildings, *i.e.*, Chester Schirmer, Rolf Jensen, Carl Baldassarra, Daniel O’Connor and Richard Schulte are graduates of the fire protection engineering program at the Illinois Institute of Technology (IIT). Must just be a coincidence.

Editor's Note: Missouri is the “show-me” state. The author was born in Missouri in 1954 and grew up just across the river from St. Louis. Missouri is also famous for its stubborn mules. You have to be stubborn to spend close to 30 years of your life working to get the requirement for roof vents in sprinklered buildings removed from the building code.

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Richard C. Schulte