Report of the Committee on
Explosion Protection Systems

David C. Kirby, Chair
Union Carbide Corp., WV [U]

R. F. Schwab, Vice Chair
Allied-Signal Inc., NJ [U]

Luke S. Morrison, Secretary
Professional Loss Control Ltd, NB, Canada [I]

Joe R. Barton, Indianapolis, IN [SE]
John V. Birtwistle, Monsanto Co., MO [U]
William J. Bradford, Brookfield, CT [SE]
Reinhard E. Bruderer, Pred-Engr Inc., FL [U]
Kenneth L. Cashdollar, U.S. Nat'l Inst. of Occupational Safety & Health, PA [E]
Gary A. Chubb, A.O. Smith Engrd. Storage Products Co., KS [M]
David G. Clark, duPont de Nemours & Co., DE [U]
Henry L. Febo, Jr., Factory Mutual Research Corp., MA [I]
Mark A. Fry, Mark A. Fry & Assoc., Inc., NJ [SE]
Joseph P. Gillis, Westboro, MA [SE]
Edward J. Haas, Jr., J&H Marsh & McLennan, NY [I]
James G. Hansel, Air Products and Chemicals, Inc., PA [M]

Robert L. Henley, Ashland, Inc., KY [U]
Walter B. Howard, St. Louis, MO [SE]
Al Lewis, Kemper Insurance Cos., IL [I]
George Lobay, Canada Dept. of Natural Resources, ON, Canada [E]
R. A. Mancini, Amoco Engr and Construction Corp., TX [U]

Stephen A. McCoy, Nat'l Starch & Chemical Co., IN [U]

Rep. NFPA Industrial Fire Protection Section
Robert W. Nelson, Pocasset, MA [I]
John A. Noronha, Eastman Kodak Co., NY [U]
John Joseph Plunkett, U.S. Coast Guard, DC [E]
Mitchel L. Rooker, BS&B Safety Systems, OK [M]
Joseph A. Senecal, Kidde-Fenwal, Inc./Williams Holdings, MA [M]
Robert G. Zalosh, Worcester Polytechnic Inst., MA [SE]

Alternates
Laurence G. Britton, Union Carbide Corp., WV [U]
(Alt. to D. C. Kirby)
Kris Chatrathl, Fike Corp., MO [M]
(Alt. to R. L. DeGood)
Donald B. DeGood, Kemper Nat'l Insurance Cos., WA [I]
(Alt. to A. Lewis)

Thomas A. Gray, Akzo Nobel Coatings Inc., IL [U]
(Alt. to S. A. McCoy)
Dan A. Guaricci, Fenwal Safety Systems/Williams Holdings, MA [M]
(Alt. to J. A. Senecal)
Paul F. Hart, Industrial Risk Insurers, IL [I]
(Alt. to R. W. Nelson)
David D. Herrmann, The Dupont Co., DE [U]
(Alt. to D. G. Clark)
George A. Krabbe, Automatic Suppression Systems Inc., IL [IM]
(Alt. to M. D. Hard)
Arnold L. Mundt, BS&B Safety Systems, OK [M]
(Alt. to M. L. Rooker)
Samuel A. Rodgers, Allied Signal, VA [U]
(Alt. to R. F. Schwab)
Stephen M. Stuart, J&H Marsh & McLennan, MI [I]
(Alt. to E. J. Haas Jr.)
John Valiulis, Factory Mutual Research Corp., MA [I]
(Alt. to H. L. Febo Jr.)

Nonvoting
Harry Verakis, U.S. Dept. of Labor, WV

Staff Liaison: Martha H. Curtis

This list represents the membership at the time the Committee was balloted on the text of this edition. Since that time, changes in the membership may have occurred. A key to classifications is found at the front of this book.

Committee Scope: This Committee shall have primary responsibility for documents on explosion protection systems for all types of equipment and for buildings, except pressure venting devices designed to protect against overpressure of vessels such as those containing flammable liquids, liquefied gases, and compressed gases under fire exposure conditions, as now covered in existing NFPA standards.

This portion of the Technical Committee Report of the Committee on Explosion Protection Systems is presented for adoption.


This Report on Comments has been submitted to letter ballot of the Technical Committee on Explosion Protection Systems which consists of 30 voting members. The results of the ballots, after circulation of any negative votes, can be found in the report.

398
NFPA 68 — A98 ROC

68-1 - (Various): Accept
SUBMITTER: Technical Committee on Explosion Protection Systems
COMMENT ON PROPOSAL NO:
RECOMMENDATION:
1. Page 679 of Report on Proposals, 4.3.2 in the equation for hydraulic diameter, add the number 4 in front of the ratio A/P, so that it reads:  
   \[ A = 4(P/\delta) \]
2. Definition 1-4: Revise definition for Enclosure Strength as follows:
   Enclosure Strength (PES)(psi(bar)): For low strength enclosures, this is up to two-thirds the ultimate strength. For high strength enclosures, it is the enclosure design pressure to resist pred.
3. In 5.3.3.1, revise as follows:
   Commonly, design standards allow Pred to be selected up to two-thirds the ultimate strength for equipment, provided deformation of the equipment can be tolerate; or, two-thirds the yield strength for equipment where deformation cannot be tolerated.
4. In 5.3.3.2, modify the equations by adding:
   "For case (a) \( P_{es} = 1.5 \text{ Pred}/\delta \)"
   "For case (b) \( P_{es} = 1.5 \text{ Pred}/\delta \)"
5. In 6.2.4.1(d) delete "volume" in the title.
6. Add the following to a new 4.7.10.
   Also add existing 7.6 as 4.7.10.1.
4.7.10.2 For media-type dust collectors (i.e., using cloth bags, paper filter sheets or cartridges, etc.), locate deflagration vents preferably entirely on the dirty side of the collector volume.
   Calculate the minimum amount of the total deflagration venting area which should be provided on the dirty side by:
   \[ A_{dirt,min} \geq \left( \frac{V_{dirt}/V_{total}}{1/3} \right)^{1/3} A \]
   where:
   \( A_{dirt,min} \) is the minimum deflagration venting area which should be on the dirty side of the dust collector.
   \( V_{dirt} \) is the volume of the dirty side of the dust collector.
   \( V_{total} \) is the total volume of the dust collector.
   \( A \) is the total amount of deflagration venting needed for the dust collector.
7. On page 694 of the Report on Proposals, 7.7.2.2, after Equation 24, the conditions for Equations 22, 23, and 24 are listed. Revise the first condition as follows:
   "enclosure volume \( 0.5 \text{ m}^3 \) to \( 10,000 \text{ m}^3 \)"
8. In Figure 8.4.3 change the labels on the curves in the graph as follows:
   top curve: Dusts with \( K_1 < 200 \)
   bottom curve: Propane, dusts with \( K_1 > 200 \)
9. Table 2.2.3, pg 672, footnote no. 8:
   ASTM current edition and complete title.
10. Table 4.3, pg 679, top definition row:
   Change to read - \( (\text{psi})^{1/3} \) and \( (\text{bar})^{1/3} \)
11. Change Table 4-3 to Table 4-3.1.
13. Page 682, 8-7.3, revise last two sentences to read:
   "What vent spacing is required to limit the deflagration pressure to 25 psig (0.17 bar gauge), when the vents are designed to open at 0.05 bar gauge (0.73 psig)?"
14. Page 695, 8-2.2, Second sentence, revise as follows: change references 3, 65-76, 105, 106
SUBSTANTIATION: Items 1-5, 7-14 Editorial.
   Item 6: The new 4-7.10 was introduced because the Committee recognizes that a number of dust collectors fall within Chapter 4, so for consistency the new material added to 7-6.1 Comment 68-24 (Log #29) needs to be added to Chapter 4.
COMMITTEE ACTION: Accept.
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 27
NEGATIVE: 1
NOT RETURNED: 3 Clark, Morrison, Plunkett
EXPLANATION OF NEGATIVE:
HOWARD: Footnote 1 for Table 2-2.3 applies to nomographs, which no longer exist in NFPA 68. Constraints for the use of the dust venting equation 19 are stated in 7-2.2. Therefore delete Footnote 1 for Table 2-2.3.

68-3 - (2.8.5.1): Accept
SUBMITTER: R. F. Schwab, AlliedSignal Inc.
COMMENT ON PROPOSAL NO: 68-3
RECOMMENDATION:
Regarding the translation of the Figure 2-3.5.1 from Page 248 of Bartknecht’s Book "Explosions-Schutze" I am submitting a sketch of the graph with everything properly labeled and translated.

REFERENCES:
2. Bartknecht, Dust Explosions, p. 53.

SUBSTANTIATION: For your information the same basic graph is also used in Barknecht's earlier book "Explosions" (1980) Page 53. The newer graph is a clearer version of the older one but the basic info is the same in both cases.

In the earlier one Barknecht specifically refers to the trade name of the dyestuff tested as being "Hansa Yellow" but this really is of no significance.
Note: Supporting material is available for review at NFPA headquarters.
COMMITTEE ACTION: Accept.

399
VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 27
NOT RETURNED: 3 Clark, Morrison, Plunkett

COMMITTEE STATEMENT: The "prime" is used in the equations but the word "prime" is not used, therefore file word is not needed on the figures. In addition, equations 12-15 accordingly.

The symbol should not be a prime and give a prime 1 to the $P_{red}$ with ducts. Change plain $P_{red}$ and give a prime 1 to the $P_{red}$ with ducts. Change equations 12-15 accordingly.

COMMITTEE ACTION: Reject.

COMMITTEE STATEMENT: The comment provided no explanation of Equation 17 to the Committee.

EXPLANATION OF NEGATIVE:

FEBO: There is no hard data to support proposed adjusted equation.

68-8 - (6-2.3, Equation 17): Reject
SUBMITTER: Walter B. Howard, St. Louis, MO
COMMENT ON PROPOSAL NO: 68-3
RECOMMENDATION: None. see below; recommend clarification.

STABILIZATION: Equation 20, based on very extensive research with various lengths and sizes of vessels, and based on extensive research on various flammable dusts over a range of $K_{t}$ values, finds it necessary to include the factors $P_{red}$ to the first power, and log $L/D$. Again, based on extensive research, Equation 20 does not include a factor of $K_{t}$. In contrast, Equation 17 does include a factor, $K_{a}$, involves a factor, $\left(\frac{L}{D} - 2\right)$ and does not include a factor, $P_{red}$.

What are the reasons for these significant differences?

Please note, in this connection, that Equation 17 is based on Dr. Bartknecht's 1993 text, Figure 1.250 (p. 256) and the test material on pp. 255 and 263. These relate only to research with the single gas, propane, and only to research with the enclosure diameter 1600 mm. How can we be sure that Equation 17 applies to gases of other $K_{t}$ values, and to enclosures of other diameters? Please note that this is not a statement of opposition to Equation 17, but, instead, it is an objective statement of the need for further explanation of Equation 17 to the Committee.

COMMITTEE ACTION: Reject.

COMMITTEE STATEMENT: The comment provided no recommendation so it has been rejected in accordance with the Regulations Governing Committee Projects.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 30
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 27
NOT RETURNED: 3 Clark, Morrison, Plunkett

---

68-9 - (6.2.4.1 and 7.2.6): Accept
SUBMITTER: Walter B. Howard, St. Louis, MO
COMMENT ON PROPOSAL NO: 68-3
RECOMMENDATION: In all the graphs and graph titles change pressure designation from bar to bar ga.

STABILIZATION: This is necessary for consistency of practice throughout the text and also in order to avoid a possible confusion of interpreting the simple designation of "bar" as meaning bar abs.

COMMITTEE ACTION: Accept.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 30
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 27
NOT RETURNED: 3 Clark, Morrison, Plunkett

---

68-10 - (6.2.4.1, Factor A): Accept
SUBMITTER: Walter B. Howard, St. Louis, MO
COMMENT ON PROPOSAL NO: 68-3
RECOMMENDATION: In first sentence, change "heading" to "title" in order to use better wording.

STABILIZATION: Improve diction. The word, "heading", often implies something located at the beginning or top of a statement, whereas the word, "title", does not particularly indicate location. In the case of a figure or graph the designation beneath it is usually called a title.

COMMITTEE ACTION: Accept.
 Мне нужно изменить последнюю фразу на:

"For values of L/D greater than 5, use Chapter 8."

SUBSTANTIATION: As the sentence is presently written, it could be interpreted mathematically following the sentence just before. It could thus be interpreted as meaning that, for values of L/D higher than 2, use Chapter 8. The meaning should be made unequivocally clear, and hence the proposed text revision.

COMMITTEE ACTION: Accept

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 30

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 27
NOT RETURNED: 3 Clark, Morrison, Plunkett

COMMITTEE STATEMENT: The proposed graph excludes key aspects such as L/D = 5 and Kg = 550; enlarge the Report on Proposals graph, but delete some of the horizontal lines to make the graph more readable. The value of a more readable graph is recognized by the Committee and will be incorporated in the final document.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 30

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 27
NOT RETURNED: 3 Clark, Morrison, Plunkett

COMMENT ON PROPOSAL NO: 68-3

SUBMITTER: Walter B. Howard, St. Louis, MO

COMMITTEE ACTION: Accept in Principle.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 30

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 27
NOT RETURNED: 3 Clark, Morrison, Plunkett

NFPA 68 — A98 ROC
SUBMITTER: Walter B. Howard, St. Louis, MO

COMMITTEE ACTION: Accept.

RECOMMENDATION:

Page 688 in A98 ROP, right column, second and third equation from top - In both these equations the subscripts, red, 1, red, 2, are too small for easy reading. Therefore they should be printed in larger characters.

SUBSTANTIATION: This can in fact be done is shown on page 687, right column, equation under (e), by the larger characters used for red, 2, and red, 1. These comments regarding size of characters pertain throughout the entire text for all material that is new in this edition. Ease of reading by the user is of prime importance.

Note also that on page 688, right column, third equation from top, the comma for "red, 2" is erroneously printed "red, 2." Especially with the small characters this could appear to be a period and could be taken to mean to somehow multiply "red" by "2." This can lead to confusion on the part of the user. The printing needs to be corrected.

COMMITTEE ACTION: Accept.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 30

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 27
NOT RETURNED: 3 Clark, Morrison, Plunkett

68-18 - (65.3): Accept
SUBMITTER: Walter B. Howard, St. Louis, MO
COMMENT ON PROPOSAL NO: 68-3
RECOMMENDATION:

Page 688 of A98 ROP, right column, second and third equation from top - In both these equations the subscripts, red, 1, red, 2, are too small for easy reading. Therefore they should be printed in larger characters.

SUBSTANTIATION: This can in fact be done is shown on page 687, right column, equation under (e), by the larger characters used for red, 2, and red, 1. These comments regarding size of characters pertain throughout the entire text for all material that is new in this edition. Ease of reading by the user is of prime important.

Note also that on page 688, right column, third equation from top, the comma for "red, 2" is erroneously printed "red, 2." Especially with the small characters this could appear to be a period and could be taken to mean to somehow multiply "red" by "2." This can lead to confusion on the part of the user. The printing needs to be corrected.

COMMITTEE ACTION: Accept.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 30

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 27
NOT RETURNED: 3 Clark, Morrison, Plunkett

68-22 - (Figure 7.2.6): Accept
SUBMITTER: Walter B. Howard, St. Louis, MO
COMMENT ON PROPOSAL NO: 68-3
RECOMMENDATION:

| Figures 7.2.6(a) through 7.2.6(h) |

Factor A, second sentence, change the second sentence to read: "Plot a line from the $R_{ct}$ value at the bottom up to the $P_{red}$ line and then across to the left" (consistent with the wording in the two parts just below).

SUBSTANTIATION: 1st item: only those graphs relisted above pertain to Factor A.
2nd item: needed for unambiguous clarity.

COMMITTEE ACTION: Accept.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 30

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 27
NOT RETURNED: 3 Clark, Morrison, Plunkett

68-23 - (7.2.6, Figure 7.2.6(m)): Accept
SUBMITTER: Walter B. Howard, St. Louis, MO
COMMENT ON PROPOSAL NO: 68-3
RECOMMENDATION:

| In title of figure, delete the word "volume". |

SUBSTANTIATION: This graph for Factor B is not a graph for the effect of volume in elongated vessels. The necessary and sufficient title is "Elongated vessel correction, Factor B - for dusts".

The abscissa designation needs to be changed from "Height/diameter" to 'Length/diameter" in order to be consistent with usage in the rest of the test.

COMMITTEE ACTION: Accept.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 30

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 27
NOT RETURNED: 3 Clark, Morrison, Plunkett

68-24 - (7.2.6, New): Accept in Part
SUBMITTER: Henry L. Febo, Jr., Factory Mutual Research Corp.
COMMENT ON PROPOSAL NO: 68-3
RECOMMENDATION:

Add new paragraph 7.6.1:

For media-type dust collectors (i.e., using cloth bags, paper filter sheets or cartridges, etc.), locate explosion vents preferably entirely on the dirty side of the collector volume. It is acceptable to have a few on the clean side. Calculate the minimum amount of the total explosion venting area which must be provided on the dirty side by:

$$A_{v, dirty, min} = \frac{(V_{dirty}/V_{total})^{2/3} \times A_{v, total}}{Av, dirty, min}$$

where:

- $A_{v, dirty, min}$ is the minimum explosion venting area which should be on the dirty side of the dust collector.
- $V_{dirty}$ is the volume of the dirty side of the dust collector.
- $V_{total}$ is the total volume of the dust collector.
- $A_{v, total}$ is the total amount of explosion venting needed for the dust collector.

SUBSTANTIATION: Tube sheets, bays, support frames etc. will interfere with free venting of explosion gases and thus all or a significant portion of the venting must come from the dirty side of the collector.

COMMITTEE ACTION: Accept in Part.
Add new paragraph 7-6.1:
For media-type dust collectors (i.e., using cloth bags, paper filter sheets or cartridges, etc.), locate deflagration vents preferably entirely on the dirty side of the collector volume. Calculate the minimum amount of the total deflagration venting area which should be provided on the dirty side by:

\[
A_{\text{dirty, min}} = \left( \frac{V_{\text{dirty}}}{V_{\text{total}}} \right)^{2/3} \times A_v
\]

where:

- \( A_{\text{dirty, min}} \) is the minimum deflagration venting area which should be on the dirty side of the dust collector
- \( V_{\text{dirty}} \) is the volume of the dirty side of the dust collector
- \( V_{\text{total}} \) is the total volume of the dust collector
- \( A_v \) is the total amount of deflagration venting needed for the dust collector.

COMMITTEE STATEMENT: Delete the second sentence because the word "a few" was not quantifiable and is defined by the equation below. "Must" was changed to "should" to be consistent with the guide. The \( A_v \) total was changed to \( A_v \) because \( A_v \) total is not used and would introduce a new term that is not recognized within the document.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 50
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 27
NOT RETURNED: 3 Clark, Morrison, Plunkett

68-25 - (7-7.2.2): Accept
SUBMITTER: Walter B. Howard, St. Louis, MO
COMMENT ON PROPOSAL NO: 68-3
RECOMMENDATION:
(1) Change first factor in Equation 23 to read \( P_{\text{max,a}} \), i.e., lower the position of the \( a \).
(2) Change static activation pressure limiting statement to read \( \leq \) instead of the present \( \geq \), per VDI3673.
(3) Change reduced pressure definition to read \( \leq \) instead of \( > \), per VDI3673.
(4) Replace the presently deleted statement from VDI3673: maximum pressure, \( P_{\text{max}} \leq 9 \text{ bar} \text{ ga}

SUBSTANTIATION: The above corrections are necessary for text accuracy.
COMMITTEE ACTION: Accept.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 50
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 27
NOT RETURNED: 3 Clark, Morrison, Plunkett

68-26 - (7-8.2): Accept
SUBMITTER: Walter B. Howard, St. Louis, MO
COMMENT ON PROPOSAL NO: 68-3
RECOMMENDATION:
In third sentence, clarify the \( K \) term to clearly show \( K_{\text{st}} \).
SUBSTANTIATION: Clarify the printing.
COMMITTEE ACTION: Accept.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 50
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 27
NOT RETURNED: 3 Clark, Morrison, Plunkett

68-27 - (Table 9-3.4.2): Accept
SUBMITTER: Henry L. Febo, Jr., Factory Mutual Research Corp.
COMMENT ON PROPOSAL NO: 68-3
RECOMMENDATION:
Footnote of table is incorrect. Replace \( A_v = 64.8 \text{ ft}^2 (6.0 \text{ m}^2) \)
with:

\[
A_v = 6.0 \text{ ft}^2 (0.56 \text{ m}^2)
\]

SUBSTANTIATION: The correct data was obtained from the reference article.
COMMITTEE ACTION: Accept.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 50
VOTE ON COMMITTEE ACTION:
At the same time, the technology of the device is still being developed and tested on an ongoing basis to broaden its applicability, efficiency and performance. When used in accordance with the manufacturer’s recommendations, the device offers a proven and effective system for dust explosion mitigation.

Note: Supporting material is available for review at NFPA headquarters.

**COMMITTEE ACTION:** Accept in Principle in Part.

Revised as follows:

Add new text as follows:

3-10 Venting with Flame Arresting and Particulate Retention

3-10.1 There are situations where external venting is not feasible, such as where location of equipment outdoors or adjacent to exterior walls is impractical or ducting would be so long as to be ineffective. When faced with this situation, a device operating on the principles of flame arresting and particulate retention can provide increased workplace safety. Even with complete retention of particulates, the immediate area surrounding the vent could experience overpressure and radiant energy. These pose personnel concerns in occupied facilities.

3-10.2 Particulate retention devices should be listed and only considered for use within the tested range of $K_{st}$, dust loading, dust type, enclosure volume, and $F_{ret}$. The retention of particulates results in a loss of venting efficiency. Vent area calculated in Chapters 5 and 7 should be adjusted using experimentally determined efficiency values (See Section 7-3).

3-10.3 Venting indoors will have an effect on the building housing the protected equipment due to increased pressurization of the surrounding volume. (See also Section 7-2)

3-10.4 Venting indoor increases potential for secondary explosions. Particulate deposits in the immediate area could be dislodged by the pressure wave and generate a combustible dust cloud. The areas adjacent to the discharge point should be clear of combustible dusts. (See also Section 3-6.4)

7-7.3 Venting Internal to a Building with Flame Arresting and Particulate Retention. Even with complete retention of flame and particulates, the immediate area surrounding the vent could experience overpressure and radiant energy. Venting indoors will have an effect on the building housing the protected equipment due to increased pressurization of the surrounding volume [112]. Expected overpressure should be compared to the building design and building venting considered to limit overpressures. The resulting pressure increase in an unvented building can be estimated from:

$$\Delta P = 1.74 \frac{P_0}{V_1/V_0}$$

$V_0$ = free volume of building

$V_1$ = volume of protected equipment

$P_0$ = ambient pressure, 14.7 psia or 1.015 bar abs

$\Delta P$ = pressure rise in the building (in same units as $P_0$)

Add text to read as follows:

9-7 Flame-Arresting and Particulate Retention Vent Systems.

9-7.1 Flame-Arresting and Particulate Retention Vent Systems. Deflagration venting systems have been developed that have a rupture membrane for venting and a flame-arresting element. As a deflagration is vented through the system, any burned and unburned dust is retained within the device. Combustion gases are cooled and no flame emerges from the system. In addition, near field blast effects (overpressure) are greatly reduced outside the system. See Section 3-10. See Figure 9-7.1.

9-7.2 Flame-Arresting and Particulate Retention Vent Systems should be listed for the application and should be used within the specifications of the listing.

9-7.3 The deflagration venting area provided for the protected enclosure should be increased to compensate for the reduction in venting efficiency due to the presence of the device.

9-7.4 Limitations:

(a) When flame-arresting and particulate retention vent systems are used inside a building, care should be taken to ensure a safe installation. Considerations include, but are not limited to:

(1) proximity of personnel; volume of room; possibility of combustible mixtures exterior to the equipment; and possible toxic emissions.

(b) Flame-Arresting and Particulate Retention Vent Systems should be sized to ensure that $P_{ret}$ remains within the enclosure design limits. It is essential that the user work closely with the manufacturer to ensure that all of the parameters are addressed for a safe, reliable installation.
NFPA 68 — A98 ROC

68- 29 - (9-7): Reject
SUBMITTER: Henry L. Febo, Jr., Factory Mutual Research Corp.
COMMENT ON PROPOSAL NO: 68-3
RECOMMENDATION: Delete the entire paragraph.
SUBSTANTIATION: Inclusion of this paragraph removes any possibility of economic justification for installation of these devices.
COMMITTEE ACTION: Reject.
COMMITTEE STATEMENT: See Committee Action and Committee Statement on 68-28 (Log#1).
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 30
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 26
ABSTENTION: 1
NOT RETURNED: 3 Clark, Morrison, Plunkett
EXPLANATION OF ABSTENTION: ZALOSH: Since I wasn't able to attend the last Committee meeting, and minutes for the meeting haven't been issued yet, I don't have the benefit of the discussion on this paragraph.

68- 30 - (Figure B-4): Accept in Part
SUBMITTER: Henry L. Febo, Jr., Factory Mutual Research Corp.
COMMENT ON PROPOSAL NO: 68-3
RECOMMENDATION: Delete the current figure and replace with one which is representative of current devices.
SUBSTANTIATION: Current 20 liter sphere test devices use a different dispersion method and the document should be updated to represent current technology.
COMMITTEE ACTION: Accept in Part.
COMMITTEE STATEMENT: No replacement figure has been included since the figure is included in the ASTM standard.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 30
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 27
NOT RETURNED: 3 Clark, Morrison, Plunkett
EXPLANATION OF ABSTENTION: CASHDOLLAR: Both the ring nozzle and the rebound nozzle are considered acceptable and are shown in figures in Appendix X1 of ASTM E1226-94.

68- 31 - (B-5-3): Accept
SUBMITTER: Henry L. Febo, Jr., Factory Mutual Research Corp.
COMMENT ON PROPOSAL NO: 68-3
RECOMMENDATION: Revise last paragraph as follows:
"The use of a whipping hose (see B-5-2.1) or rebound nozzle should avoid the necessity of using..."
SUBSTANTIATION: A rebound nozzle is commonly used for dust dispersion and should be included in this comment for completeness.
COMMITTEE ACTION: Accept.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 30
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 27
NOT RETURNED: 3 Clark, Morrison, Plunkett

68- 32 - (B-6): Accept in Principle
SUBMITTER: Henry L. Febo, Jr., Factory Mutual Research Corp.
COMMENT ON PROPOSAL NO: 68-3
RECOMMENDATION: Second paragraph, 5th sentence - After fifth sentence, "The authors recommend use of a 2.5 Kj,...igniter in a 1 m³ vessel" add the following parenthetical expression:
"(In contrast ASTM E1515 mandates the use of a 5 Kj ignition source for MEC testing)
SUBSTANTIATION: ASTM E1515 is a consensus standard for MEC (lower flammable limit) testing and this information needs to be included to prevent possible erroneous testing.
COMMITTEE ACTION: Accept in Principle.
COMMITTEE STATEMENT: Editorial. Specifies is more appropriate. The explanation for MEC clarifies its meaning.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 30
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 26
NEGATIVE: 1
NOT RETURNED: 3 Clark, Morrison, Plunkett
EXPLANATION OF NEGATIVE: CASHDOLLAR: ASTM E1515-96 neither "mandates" nor "specifies" a particular ignition source energy. It only gives recommendations. It allows various igniters to be used and requires the test chamber and ignition energy to be listed in the test report. Section 5.5 of E1515 says: "The recommended ignition source for measuring the MEC of dusts in 20-L chambers is a 2500 or 5000 J pyrotechnic ignitor." It also adds the warnings of B-6 regarding possible overdriving in 20-L chambers with strong igniters and the recommendation to test in larger (1-m³) chamber if there is a great difference in 20-L results with different igniters. There is no real difference between B-6 and ASTM E1515 recommendations.
NOTE: Supporting material is available for review at NFPA headquarters.
COMMENT ON AFFIRMATIVE: MANCINO: The reason for the comment is that the article/section cited in the ballot is not correct. The correct section is B-6.