Report of Committee on Storage

Correlating Committee

E. J. Schiffhauer, Chairman
Eastman Kodak Co.

J. S. Barritt, Industrial Risk Insurers
William George Clark, MacMillan Bloedel Ltd
W. P. Thomas Jr., Kemper Group

Nonvoting
Wesley L. D. Chisholm, Liberty Mutual Insurance Co.
Rep. NFPA Comm on Motor Vehicles
R. A. Pedersen, Seattle, WA
Rep. NFPA Comm on Marine Terminals

Technical Committee on General Storage

W. P. Thomas Jr., Chairman
Kemper Group
David N. Lauridson, Secretary
The Atlantic Cos.

J. S. Barritt, Industrial Risk Insurers
Robert E. Bean, Palm Beach County Fire-Rescue
Martin M. Brown, White Plains, NY
Michael F. Burke, Factory Mutual Research Corp.
J. P. Carroll, Washington, DC
Robert C. Everson, Greensboro, NC
Thomas Goonan, Tom Goonan Associates
Raymond A. Grill, Rolf Jensen & Assoc. Inc.
Allen I. Hjertstedt, IRI Insurance
Richard S. Johnson, Toledo, OH
Rep. Owens-Illinois
John F. Murphy, Dow Chemical Co.
Rep. CHA
Jennifer L. Nelson, A T & T Co.
Peter A. Smith, INT Paper Co.
Joseph P. Spollen, Bayside, NY
Lewis H. Zimmermann, Adelphi Automatic Sprinkler Co.
Rep. NFSA

Alternates

Thomas J. Brown Jr., Factory Mutual Research Corp.
(Alternate to R. D. Jacobson)
Gregory L. Daum, South Orange, NJ
(Alternate to AIG Rep.)
Stephen R. Hoover, Kemper Group
(Alternate to W. P. Thomas)
Ladell R. Millan, Automatic Sprinkler Corp. of America
(Alternate to L. H. Zimmerman)
Ernest E. Miller, Industrial Risk Insurers
(Alternate to J. S. Barritt)
Gerald W. O'Rourke, Schirmer Engineering Corp.
(Alternate to Schirmer Engineering Corp. Rep.)

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.

The Report of the Committee on General Storage is presented for adoption.

This Report was prepared by the Technical Committee on General Storage and proposes for adoption the reconfirmation of NFPA 231E-1984, Recommended Practice for the Storage of Baled Cotton, 1984.

SUBSTANTIATION: The Technical Committee on General Storage recommends reconfirmation of the 1984 edition of NFPA 231E as the document is suitable for current use. References to other documents and standards will be updated and editorial changes to bring NFPA 231E into conformance with the NFPA Manual of Style will be accomplished in the reconfirmation edition.

COMMITTEE ACTION: Accept.

231E-1 - (Entire Standard): Accept

SUBMITTER: Technical Committee on General Storage

This Report has been submitted to letter ballot of the Correlating Committee on Storage which consists of 4 voting members; of whom 3 voted affirmatively, and 1 ballot was not returned (Mr. Schiffhauer).
Report of Committee on Water Extinguishing Systems

Correlating Committee
Paul D. Smith, Chairman
Gage-Babcock & Associates Inc.

John K. Bouchard, Secretary
National Fire Protection Association (Nonvoting)

Wayne E. Ault, Rolf Jensen & Associates Inc.
Thomas J. Brown Jr., Factory Mutual Research Corp.
casimir J. Drygas Jr., MBM Protection Consultants
Robert H. Herz, Moorestown, NJ
James W. Nolan, James W. Nolan Co.
Chester W. Schirmer, Schirmer Engineering Corp.
J. Samuel Slicer, W Chatham, MA

Technical Committee on Automatic Sprinklers
Chester W. Schirmer, Chairman
Schirmer Engineering Corp.

Edward C. Bacon, Dept. of Public Safety
Rep. NFANA
Gerry Barbeau, Insurers Advisory Organization
Charles B. Barnett, Automatic Sprinkler Corp. of America
Rep. NFSA
Albert H. Comly, Jr., Curtis Cox Kennerly
Rep. AIA
Thomas G. Daly, Hilton Hotels Corp.
Rep. AHMA
John L. DeRoo, Union Carbide Corp.
Rep. NFPA IFPS
James R. Dowling, Natl Assn. of Home Builders
(Vote Limited to 130)
Robert E. Duke, Fire Control Inc.
W. David Hilton, Cobb County Fire Dept.
Rep. IAFC
Richard E. Hughey, ISO Commercial Risk Services
Rolf M. Jensen, Rolf Jensen & Associates Inc.
George E. Laverick, Underwriters Laboratories Inc.
Kenneth W. Linder, Industrial Risk Insurers
B. J. Lukes, Grinnell Fire Protection System Co. Ltd.
Rep. CASA
Dennis Lundstedt, Dept. of State, FBO/Fire Protection
Section (Vote Limited to 130)
Wayne M. Martin, Los Angeles City Fire Dept.
Donald I. McGIllivray, Underwriters Labs of Canada
John G. O'Neill, Gage-Babcock & Assoc Inc.
J. K. Richardson, Natl Research Council of Canada
E. J. Schiffhauer, Eastman Kodak Co.
Edward H. Smith, Dennis Fire Protection Inc.
Rep. AFSAC
J. Tom Smith, US Fire Administration
(Vote Limited to 130)
Rep. NFSA
John J. Walsh, United Assn. of Jourymen & Apprentices of
the Plumbing & Pipe Fitting Ind. of the US & Canada
William E. Wilcox, Factory Mutual Research Corp.
Harry R. Winchen, Liberty Mutual Insurance Co.
Rep. AAI
D. M. Ylaras, ICI Americas Inc.
Rep. NFPA IFPS
Lewis H. Zimmermann, Adelphia Automatic Sprinkler Co.
Rep. NFSA

Alternates
Roger L. Allard, Factory Mutual Research Corp.
(Alternate to W. E. Wilcox)
William H. Carey, Underwriters Laboratories Inc.
(Alternate to G. E. Laverick)
Don R. Dean, Dow Chemical Co.
(Alternate to J. L. DeRoo)
Tommy E. England, Industrial Risk Insurers
(Alternate to K. W. Linder)
David G. Evans, Ctr. for Fire Research
(Alternate to BBS Rep.)
Russell P. Fleming, Natl Fire Sprinkler Assn.
(Alternate to W. Tiesta)
Stephen R. Hoover, Kemper Group
(Alternate to H. Winchen)
carroll V. Lovett, Xerox Corp.
(Alternate to D. M. Ylaras)
J. R. Mawhinnie, Natl Research Council
(Alternate to J. K. Richardson)
Mervyn M. Maxwell, Maxwell & LeBreton Architects
(Alternate to J. G. O'Neill)
Francis J. Miklautich, Eastman Kodak Co.
(Alternate to E. J. Schiffhauer)
Michael T. Newman, ARMWISK, Inc.
(Alternate to ARM Rep.)
Joseph G. Novak, S. Pasadena Fire Dept.
(Alternate to NFANA Rep.)
Gerald W. O'Rourke, Schirmer Engineering Corp.
(Alternate to C. W. Schirmer)
James Retzlaff, The Viking Corp.
(Alternate to NFSA Rep.)
Harry Shaw, Intl Assoc. of Fire Chiefs
(Alternate to W. David Hilton)
Jack Thacker, Allan Automatic Sprinkler Co.
(Alternate to L. Zimmermann)
John Veelenturf, The Sheraton Corp.
(Alternate to T. G. Daly)
William A. Webb, Rolf Jensen & Assoc Inc.
(Alternate to R. H. Jensen)
R. J. Wright, Underwriters Labs of Canada
(Alternate to D. I. McGIllivray)

Barry M. Lee, Wormald Fire Systems

Technical Committee on Standpipes
James W. Nolan, Chairman
James W Nolan Co.

Fred S. Winters, Secretary
Wausau Insurance Companies
(Rep. AAI)

William C. Beard, Fire Equipment Co. Inc.
Rep. NAFED
Kenneth J. Carl, Baldwin, NY
Walter A. Damon, Schirmer Engineering Corp.
Kenneth P. Forget, Road Sprinkler Fitters Union 669
Rep. UAPF
James M. Freeman, Industrial Risk Insurers
Paul W. Glessner, Wisconsin Electric Power Co.
Gary S. Jensen, American Emergency Services Corp.
Herb Jewell, City of Norco Fire Dept.
George E. Laverick, Underwriters Laboratories Inc.
B. J. Lukes, Grinnell Fire Protection System Co. Ltd.
Rep. CASA
Richard Martinneau, Mid Hudson Automatic Sprinkler Corp.
Rep. NFSA
James E. Murray, The Mill Mutuals
Heinz E. Otto, Waterous Co.
Rep. MSS
John E. Plantinga, Meyer Strong & Jones
Edward J. Prendergast, Chicago Fire Dept.
E. A. Reilly, Potter-Roe Inc.
Rep. FEMA
David O. Rogers, Alexander & Alexander Inc.
controlled by Four operating sprinklers. This test was
ceiling panels located below the piping were dislodged
a spacing of 130 sq ft per sprinkler and with a flowing
very pertinent because they were done on exposed
connected to a water supply. Two of these tests are not
tests were conducted by UL in which the piping was
installations.

Hr. R. J. Wright's Proposals 13-46 to 48 (Log #141 to
precautions which should be taken when dealing with such
point out some very serious potential problems and
Proposal 13-43 (Log #60) and with their rejection of
William F. McCarthy, Roll Jonson & Assoc. Inc.

Kenneth W. Linder, Industrial Risk Insurers

Alternates
Frank E. Chapman, Wheeling, IL

Lee J. DeRoo, Underwriters Laboratories Inc.

Russell P. Fleming, Natl Fire Sprinkler Assn.

Alternates to W. Martin

Kenneth W. Linder, Industrial Risk Insurers

Alternates to J. H. Freeman

Daniel E. Majerczyk, Kemper Group

Alternates to F. Winters

William F. McCarthy, Roll Jensen & Assoc. Inc.

Alternates to P. Yurkonis


Alternates to E. A. Reilly

William T. Trinker, The Hill Mutuals

Alternates to J. Murray

James B. Visger, Road Sprinkler Fitters Local 669

(Alternate to K. Forget)

This list represents the membership at the time the Committee was balloted on the text of this
edition. The list is the membership at the time changes in the
can have occurred.

The Report of the Committee on Water Extinguishing Systems is presented for adoption in 4 parts.

PART I

Part I of this Report, was prepared by the Technical Committee on Automatic Sprinklers and proposes
the Installation of Automatic Sprinklers. NFPA 13-1987
is published in Volume 1 of the 1987 National Fire Codes
and in separate pamphlet form.

Part I of this Report has been submitted to letter
ballot of the Technical Committee on Automatic Sprinklers which consists of 29 voting members; in five
segments.

Segment No. 1 consists of Proposal Nos. 13-2,
voting members, 24 voted affirmatively, 2 negatively
(Messrs. Barbeau and Wright) and 3 ballots were not
returned (Messrs. Comly, DeRoo and Smith).

Mr. Barbeau voted negatively stating:
"I disagree with the Committee's rejection of my
Proposal 13-43 (Log #60) and with their rejection of
Mr. R. J. Wright's Proposals 13-46 to 48 (Log #141 to
143) and 13-76 to 80 (Log #144 to 148). All these
telate to plastic pipe sprinkler installations and they
point out some very serious potential problems and
precautions which should be taken when dealing with such
installations.

When I submitted my Proposal 13-43 (Log #60) I had
access only to the ULC (Underwriters' Laboratories of
Canada) fire test results for CPVC piping. I have since
obtained a copy of the original UL listing specification
for CPVC pipe protected by ceilings classified by UL as
to surface burning characteristics. Only three fire
tests were conducted by UL in which the piping was
connected to a water supply. Two of these tests are not
very pertinent because they were done on exposed
piping. The remaining single fire test was conducted at
a spacing of 130 sq ft per sprinkler and with a flowing
pressure of 175 p.s.i. Seven of the light weight
ceiling panels located below the piping were dislodged
and fell out of the grid frame but the fire was
controlled by four operating sprinklers. This test was
not a reasonable duplication of a light hazard occupancy
because light hazard sprinkler coverage of 225 sq ft per
sprinkler should have been used as has been done by UL
who conducted a number of fire tests and not just one.
Also, a flowing pressure of 175 p.s.i. is totally
unrealistic for a light hazard occupancy and undoubtedly
the resulting high water flow from the four closely
spaced operating sprinklers resulted in sufficient
cooling to prevent pipe failure. UL however, conducted
their many fire tests at much lower pressures consistent
with light hazard occupancies. The UL tests prove
beyond any doubt that plastic pipe sprinkler
installations protected by light weight ceiling panels
are at risk of failure during a fire. The manufacturer
of CPVC pipe obviously agrees with this finding because
his representative announced at the NFPA 13 Committee
Meeting (September, 1987) that the UL listing is to be
modified to require ceiling panels to have a minimum
density of 0.36 pounds per sq ft. This is strictly in
accordance with the ULC fire test results and you have to
wonder why this very important feature was missed in
the UL test program.

Regarding the problem of permanent ceiling openings,
both UL and the manufacturer's installation instructions
permit these openings provided that the CPVC pipe is not
installed directly above such openings. UL did not make
any fire tests to find out if the pipe could fail if
located away from such openings. UL did conduct these
tests which resulted in pipe failure. In UL
listing is inadequate so why not do something about it in
NFPA 13?

No one on the Committee disagreed with any of the
above findings by UL nor did they disagree with my
contention that the recent UL listing of exposed plastic
pipe introduces an arrangement which is dangerous and
totally unacceptable for reasons outlined in my
submission. What the majority of the Committee does
object to is any specific mention of plastic pipe at all
in NFPA 13. They are washing their hands entirely of
any potential problem with plastic pipe, preferring
instead to place the entire responsibility on the
listing organization, per Section 3-1.1.5 in the standard.
The effect of this negative approach is to remove plastic pipe requirements from normal periodic
revisions such as have taken place with ferrous pipe
sprinkler installations since the 1890's. I firmly
believe that plastic pipe technology should be
incorporated into NFPA 13 the same as the recent
addition of copper pipe technology so that improvements
in basic requirements can be made on an ongoing basis
rather than having this technology frozen in time like a
dinosaur out of the past by a one time listing which may
be deficient or incomplete. The Committee's present
attitude will no doubt be applauded by those who have a
vested interest in plastic pipe but the public stands to
lose, some of them likely with their lives if reasonable
safeguards are not incorporated into NFPA 13 without
further delay.

Mr. Wright voted negatively stating:
"Each of these proposals sought to provide guidance
in the use of non-metallic pipe. Their rejection leaves
the standard without guidance, other than to reference
unspecified listings to unspecified standards.

Segment 1 of this Report has also been submitted to
letter ballot of the Correlating Committee on Water
Extinguishing Systems which consists of 8 voting
members, of whom 7 voted affirmatively, and 1 negatively
(Mr. Smith).

Mr. Smith voted negatively stating:
"Insufficient consideration of negative ballots
offering excellent reasons for not rejecting the
proposals."

Segment No. 2 consists of Proposal 13-172 (Log
#132). Of the 29 voting members, 22 voted
affirmatively, 3 negatively (Messrs. Daly, Jensen and
Schirmer), 1 abstained (Mr. Martin) and 3 ballots were
not returned (Messrs. Comly, DeRoo and Smith).

Mr. Schirmer voted negatively stating:
"No fire test data was submitted to substantiate
this highly restrictive requirement. The requirement
will introduce significant difficulties in retrofit
installations and seems inappropriate based on
distribution tests only."
Mr. Daly voted negatively stating:

"I disagree with proposed Section 2-7.2 concerning pipe size. I feel the 4 in. and 6 in. piping should be specified as a minimum size, not the required size. This gives the option to use a larger size if desired. I feel the existing wording for 2-7.2 should be used with a period after Fire boat connections. The proposed exception should then be added."

Segment 3 of this report has also been submitted to letter ballot of the Correlating Committee on Water Extinguishing Systems which consists of 8 voting members; of whom all 8 voted affirmatively.

Mr. Ault voted negatively stating:

"Fire Test (or sprinkler distribution test) data not provided. Inadequate substantiation."

Segment No. 3 consists of Proposal 13-33 (Log #138). Of the 29 voting members, 26 voted affirmatively, 2 negatively (Messrs. Martin and Newman) and 3 ballots were not returned (Messrs. Comly, DeRoo and Smith).

Mr. Martin voted negatively stating:

"Existing language in standard is adequate. It should be up to authority having jurisdiction to allow deviations and need not be spelled out in the standard."

Mr. Newman voted negatively stating:

"I disagree with proposed Section 2-7.2 concerning pipe size. I feel the 4 in. and 6 in. piping should be specified as a minimum size, not the required size. This gives the option to use a larger size if desired. I feel the existing wording for 2-7.2 should be used with a period after fire boat connections. The proposed exception should then be added."

Segment 4 of this report has also been submitted to letter ballot of the Correlating Committee on Water Extinguishing Systems which consists of 8 voting members; of whom all 8 voted affirmatively.

Segment 4 consists of Proposal 13-220 (Log #139). Of the 32 voting members, 27 voted affirmatively, and 5 ballots were not returned (Messrs. Comly, DeRoo, Dowling, E. Smith and T. Smith).

Segment 4 of this Report has also been submitted to letter ballot of the Correlating Committee on Water Extinguishing Systems which consists of 8 voting members; of whom all 8 voted affirmatively. (See also Part III of the ballot statement.)

Segment No. 5 of this report consists of the balance of the proposals. Of the 29 voting members, 25 voted affirmatively, 1 negatively (Mr. Wright) and 3 ballots were not returned (Messrs. Comly, DeRoo, and Smith).

Mr. Wright voted negatively stating:

"In the absence of other specific references to standards, the Proposal in 13-94 is valid. The substantiation for 13-81 is adequate and the proposal covers a real potential problem regarding beam strength of piping. Also, what happened to Log #313, the proposal generated by SC3, discussed at length and rejected by a narrow margin? Such an important proposal should not be lost."
Mr. Glessner abstained from voting stating:

"I am refraining deliberately from voting so that the TCR can be offered for public comment without delay. I dislike this proposed document as presented in the TCR, and plan to vote negatively if not revised as a result of public comment. The bulk of the material is reiteration of existing NFPA standards outside the scope of the NFPA 14 Committee. Some material has already been refashioned to induce inconsistencies and conflict with the original standards. This proposed standard could be eliminated if pertinent material was included in a chapter of the proposed rewrite of NFPA 14.

Part IV of this Report has also been submitted to letter ballot of the Correlating Committee on Water Extinguishing Systems which consists of 8 voting members: of whom 5 voted affirmatively, and 3 negatively (Messrs. Smith, Schirmer and Slicer).

Mr. Smith voted negatively stating:

"The Committee has done a lot of work and made a big step towards developing recommended practices that are much needed. The negative vote is cast reluctantly. However, Sections 2-2, 2-3 and 2-4, partly taken from NFPA 20 and 22, are incomplete and do not correlate completely with those standards. Section 2-5 relates to NFPA 24 (hydrants), and hydrants are not on SP&H systems. Further, the second paragraph of 1-5.1 definitely places a liability exposure on the owner or occupant, which is a legally established liability and should not be addressed by an NFPA document.

Dealing with maintenance of SP&H system components like tanks and pumps in this document would present future correlation problems with the prime standards dealing with these subjects; i.e. NFPA 20 & 22. It is suggested that NFPA 14A merely reference those standards for maintenance and repair until such time as a water extinguishing system maintenance document (recommended practices) is developed."

Mr. Schirmer voted negatively stating:

"The second paragraph of the forward introduces conflict with NFPA 13. There is no inference or requirement in 13 indicating standpipes are "a necessary compliment" in sprinklered buildings. Sections 2-2, 2-4, 2-5 and 3-2.4 appears to be outside of the scope of NFPA 14. If a "Water Extinguishing System" care and maintenance publication is desired, it should be handled by a Committee constituted of representatives officially representing the various Technical Committees. Certainly a reference including a recommendation relative to the 71-72 series is helpful but questionable."

Mr. Slicer voted negatively stating:

"2nd paragraph foreword - first and second sentence are not true. These conflict with Pamphlet 13. Chapter 2 is on dangerous ground. Could have conflicts with Nos. 22, 20 and 24. Although "should" is used some officials could take this to mean "shall" and thus create confusion.

The above Correlating Committee ballot does not confirm the Committee Action because the necessary three-fourths affirmative vote was not achieved. Per 10-14 of the Regulations Governing Committee Projects, the Report is published in this TCR to allow for Public Comment."
PART I

13-1 - (Entire Standard): Reject
SUBMITTER: Walter J. Swinler, Same-Fire Protection Consultant
RECOMMENDATION: The entire standard requires updating and revisions. The primary change recommended at this time is to separate standard into two sections“A” and “B.” Section “A” to be sprinkler installation and water supply design criteria, and Section “B” to be hardware design specifications. In addition, much obsolete and extraneous data should be updated or eliminated during review and revisions.
SUBSTANTIATION: Primary reason for recommended changes is that present standard is cumbersome requiring the specification or design engineer to do much "flip-flopping" to locate desired specific design criteria.
COMMITTEE ACTION: Reject.
COMMITTEE COMMENT: No specific recommendation was provided in the proposal.

13-2 - (1-7.1.1) Accept in Principle
SUBMITTER: John J. Walsh, United Association
RECOMMENDATION: Add new paragraph:
"Listing of system components for an occupancy classification shall be without limitation."
SUBSTANTIATION: A component is either acceptable for an occupancy classification or it is not. The concept of listing for limited portions of otherwise lesser occupancy classification is not technically justifiable.
COMMITTEE COMMENT: Clarification so as to apply to horse stables which are not located at race tracks.

13-3 - (A-1-7.3.2): Accept in Principle
SUBMITTER: T.G. Daly/H. Moore, Hilton Hotels Corp.
RECOMMENDATION: Add "Race Track Stables".
COMMITTEE COMMENT: The Committee notes that various methods of protection after a major fire has collapsed portions of the building. The Committee notes that various methods of protection are available and should be identified on the plans.

13-4 - (1-8.1.3.1): Reject
SUBMITTER: John J. Walsh, United Assn.
RECOMMENDATION: Revise as follows:
1-8.1.3.1 System components subject to hydrostatic pressure shall require for listing a hydrostatic strength test meeting the safety factors in Table 1-8.3.1.
Exception: Sprinklers listed for 175 psi working pressure shall be tested at 500 psi.

Table 1-8.1.3.1

<table>
<thead>
<tr>
<th>Size</th>
<th>Safety Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 inches or less</td>
<td>5:1</td>
</tr>
<tr>
<td>8 inches and 10 inches</td>
<td>4:1</td>
</tr>
<tr>
<td>Greater than 10 inches</td>
<td>3:1</td>
</tr>
</tbody>
</table>

The safety factors indicated are those applied almost exclusively by the testing labs but there has been at least one instance where a 3:1 safety factor was utilized for small diameter pipe. All products should be subject to the same requirements without discrimination.
COMMITTEE ACTION: Reject.
COMMITTEE COMMENT: This proposal would be inconsistent with established safety factors for currently used and listed products.

13-5 - (1-9.2): Accept
SUBMITTER: Technical Committee on Automatic Sprinklers
RECOMMENDATION: Revise as follows:
Paragraph 1-9.2 (1) add "attics" after "closets."
(k) Add "and elevation relative to the test hydrant" after "results."
(hn)(New) Method of protection for nonmetallic piping.

SUBSTANTIATION: As attics are a form of a concealed space, they should be identified as such, the building elevation with respect to the test hydrant is useful in determining head loss (or gain) of the particular system. The Committee notes that various methods of piping protection are available and should be identified on the plans.
COMMITTEE ACTION: Accept.

13-6 - (1-9.2): Reject
SUBMITTER: Ernest E. Miller, Industrial Risk Insurers
RECOMMENDATION: Proposed wording as follows:
NOTE: The working drawing for an individual sprinkler system shall be restricted to few drawings as feasible. Practice has shown a scale of 1/8 in. = 1 ft to be feasible for the overall system layout, with 1/4 in. = 1 ft enlarged views of concentrated details such as a cross-section of riser, appropriate valving and trim.

COMMITTEE COMMENT: In complex installations, it is necessary to show the relationship of sprinklers and piping to other building components.
Note:
Figures Marked Thus + Denote Distance In Inches From Top Of Steel Joists Down To Center Of Pipe.

75# Static Pressure
70# Residual
500 G.P.M. Flowing
N. SECOND ST.

2½ x 2½ x 4 Fire Dept. Conn.

Water Motor Alarm Curb Line
City Gate Valve

14" U.H. * = 14°
C-Clamp Hgrs.
On Lines & Mains

10" Bar Joists
2"-6" O.C.
1½" Metal Deck

2x4 Nip & Cap
* = 22

Hang 2 End Pcs. To Bottom Of St. Joists

4" To F.D.C.
4" Alarm Chk. Valve
4" Approved Indicating Valve

John Doe Co., Inc.
22-32 N. Second St.
Smithville, New York

Surveyed 1-1-1989
By: H.T.
Contract No.

Drawn 10-3-1989
By: H.T.

Checked 10-10-1989
By: R.J.

Approved 10-1-1989
By: T.E.P.

Degree Of Sprk. 160° 212° 280° 360°
Sheet No. 1 of 1

This Sheet 72 4 8

Total On Contract 84

Scale 1/8" = 1'-0"

XYZ Automatic Sprinkler Co.
Newark, Ohio
The printing on the section should be turned around.
(c) Appendix C needs to be updated to reflect changes between Ordinary Hazard and High Piling, reference numbers, reference to distance between lines not applying to hydraulically designed systems (See proposal on 4-2.1 and 4-5), bar joist and wood bar joist recognized as smooth ceiling construction (See proposal on 4-1.3.3).

SUBSTANTIATION: Editorial. As noted in (c), several changes in Appendix C are dependent upon Committee Action on other proposals in two cases.

COMMITTEE ACTION: Accept in Principle.
(a) Accept.
(b) Entire drawing on Figure A-1-9.2(a) is corrected as shown to meet good drafting principals.
(c) Accept.

COMMITTEE COMMENT: See also Proposal 13-217 (Log #49).

COMMITTEE ACTION: Accept.

SUBMITTER: Technical Committee on Automatic Sprinklers

RECOMMENDATION: Paragraph 1-10.1 should be changed as follows:
(a) Change "(see Section 1-12)" to "(see Figures 1-10.1(a) and 1-10.1(b))."
(b) Label Contractors Material and Test Certificates Figures 1-10.1(a) and 1-10.1(b).
(c) Delete 1-12.

SUBSTANTIATION: Clarification of Code.

COMMITTEE ACTION: Accept.

COMMITTEE ACTION: Accept in Principle.

COMMITTEE ACTION: Accept in Principle.

COMMITTEE ACTION: Accept in Principle.

COMMITTEE ACTION: Accept in Principle.

COMMITTEE ACTION: Accept.

SUBMITTER: W. E. Wilcox, FHRC

RECOMMENDATION: In paragraph A-1-11.1.2, change 6 ft/sec. to 10 ft/sec.

SUBSTANTIATION: This is consistent with Proposal 13-9 (Log #121) to change Table 1-11.1 to conform to NFPA 24-1987.

COMMITTEE ACTION: Accept.

COMMITTEE ACTION: Accept.

COMMITTEE ACTION: Accept.

COMMITTEE ACTION: Accept in Principle.

COMMITTEE ACTION: Accept in Principle.

COMMITTEE ACTION: Accept in Principle.

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COMMITTEE ACTION: Accept in Principle.

COMMITTEE ACTION: Accept in Principle.

COMMITTEE ACTION: Accept.

SUBMITTER: Russell P. Fleming, National Fire Sprinkler Association

RECOMMENDATION: Revise Table 1-11.1.2 to appear as one section (1-11.1) and revise Table 1-11.1.2 to Table 1-11.1 as follows:

<table>
<thead>
<tr>
<th>Pipe Size (In.)</th>
<th>Flow Rate (gpm)</th>
<th>Flow Rate (L/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>390</td>
<td>1476</td>
</tr>
<tr>
<td>6</td>
<td>880</td>
<td>3331</td>
</tr>
<tr>
<td>8</td>
<td>1560</td>
<td>5905</td>
</tr>
<tr>
<td>10</td>
<td>2440</td>
<td>9235</td>
</tr>
<tr>
<td>12</td>
<td>3520</td>
<td>13323</td>
</tr>
</tbody>
</table>

Revised 1-12 (Contractor's Material and Test Certificates) to include revised flow rates in the Flushing section as follows:

"Flushing. Flow the required rate until water is clear as indicated by no collection of foreign material in burlap bags at outlets such as hydrants and blow-offs. Flush at flows not less than 390 GPM (1476 L/min) for 4-inch pipe, 880 GPM (3331 L/min) for 6-inch pipe 1560 GPM (5905 L/min) for 8-inch pipe, 2440 GPM (9235 L/min) for 10-inch pipe and 3520 GPM (13323 L/min) for 12-inch pipe. When supply cannot produce stipulated flow rates, obtain maximum available.

COMMITTEE COMMENT: The Committee agrees with the submitter, and furthermore the revisions to 1-11.1 clarifies the intent with respect to flushing of underground mains.

COMMITTEE ACTION: Accept in Principle.

SUBMITTER: Technical Committee on Automatic Sprinklers

RECOMMENDATION: In paragraph A-1-11.1.2, change 6 ft/sec. to 10 ft/sec.

SUBSTANTIATION: There have been a number of recent documented instances of sodium silicate being used by some sprinkler contractors. This proposal is directed at preventing or delaying operation.

COMMITTEE ACTION: Accept.

COMMITTEE ACTION: Accept in Principle.

COMMITTEE ACTION: Accept in Principle.

COMMITTEE ACTION: Accept in Principle.

COMMITTEE ACTION: Accept in Principle.

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COMMITTEE ACTION: Accept in Principle.

COMMITTEE ACTION: Accept in Principle.
2-2.2.1 Area/Density Method.

2-2.2.1.1 The water supply requirement for sprinklers only may be calculated from the density curves in Figure 2-2.1(b). System piping shall be calculated to satisfy a single point on the appropriate design curve. It is not necessary to meet all points on the selected curve.

2-2.2.1.1.1 The water supply requirement for sprinklers only may be calculated from the density curves in Figure 2-2.1(b), for use only with standard response sprinklers, for areas of sprinkler operation less than 2500 sq ft (232 m²).

2-2.2.1.1.2 The densities and areas provided in Figure 2-2.1(b) are for use only with standard response sprinklers.

2-2.2.1.1.3 Regardless of which of the above methods is used, the following restrictions apply:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-2.2.1.3.1</td>
<td>Present 2-2.1.2.9.</td>
</tr>
<tr>
<td>2-2.2.1.3.2</td>
<td>Present 2-2.1.2.11.</td>
</tr>
<tr>
<td>2-2.2.2</td>
<td>Present 2-2.1.2.3</td>
</tr>
<tr>
<td>2-2.2.3</td>
<td>Present 2-2.1.2.4</td>
</tr>
<tr>
<td>2-2.2.4</td>
<td>Present 2-2.1.2.5</td>
</tr>
<tr>
<td>2-2.2.5</td>
<td>Present 2-2.1.2.6</td>
</tr>
<tr>
<td>2-2.3</td>
<td>Present 2-2.1.2.7</td>
</tr>
<tr>
<td>2-2.3</td>
<td>Present 2-2.1.2.12 and 2-2.1.3.</td>
</tr>
</tbody>
</table>

2-2.2.2.1 Area/Density Method.

2-2.2.2.1.1 The water supply requirement for sprinklers only may be calculated from the density curves in Figure 2-2.1(b) for use only with standard response sprinklers.

2-2.2.2.1.2 The densities and areas provided in Figure 2-2.1(b) are for use only with standard response sprinklers.

2-2.2.2.1.3 Regardless of which of the above methods is used, the following restrictions apply:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-2.2.2.1.3.1</td>
<td>For areas of sprinkler operation less than 1500 sq ft (139 m²) use for Light and Ordinary Hazard Occupancies, the density for 1500 sq ft (139 m²) shall be used. For areas of sprinkler operation less than 2500 sq ft (232 m²) shall be used.</td>
</tr>
<tr>
<td>2-2.2.2.1.3.2</td>
<td>For construction having unsprinklered combustible concealed spaces (as described in 4.4.4) the minimum area of sprinkler operation shall be 3000 sq ft (279 m²).</td>
</tr>
</tbody>
</table>

2-2.2.2.2 The following shall be used in applying Table 2-2.1(b).

- Table 2-2.1(b) shall be used to determine the minimum volume of water and pressure normally required for a pressure schedule sprinkler system. THE TABLE IS TO BE USED ONLY WITH EXPERIENCED JUDGMENT.

- Table 2-2.1(b) shall be used to determine the minimum volume of water and pressure normally required for a hydraulically designed sprinkler system.

- Table 2-2.1(b) for areas of sprinkler operation less than 2500 sq ft (232 m²).

- Table 2-2.1(b) for construction having unsprinklered combustible concealed spaces (as described in 4.4.4) the minimum area of sprinkler operation shall be 3000 sq ft (279 m²).
Exception No. 1: Combustible concealed spaces filled entirely with noncombustible insulation.

Exception No. 2: Light or Ordinary Hazard Occupancies where noncombustible ceilings are directly attached to the bottom of solid wood joists so as to create enclosed joist spaces, each less than 160 ft³ (4.8 m³) in volume.

2-2.2.2 When inside hose stations are planned or are required by other standards, a water allowance of 50 gpm (189 L/min) for a one hose station installation (100 gpm (378 L/min) for a two hose station installation) shall be added to the sprinkler requirement at the point of connection to the system at the residual pressure required by the sprinkler system design.

2-2.2.3 Water demand of sprinklers installed in racks shall be added to the ceiling sprinkler water demand at the point of connection. Demands shall be balanced to the higher pressure.

2-2.2.4 Water allowance for outside hose shall be added to the sprinkler and inside hose requirement at the connection to the city water main, or at a yard hydrant, whichever is closer to the system riser.

2-2.2.5 The lower duration figure is ordinarily acceptable where remote station water flow alarm service or equivalent is provided.

2-2.2.6 When pumps, gravity tanks, or pressure tanks supply sprinklers only, requirements for inside and outside hose need not be considered in determining the size of such pumps or tanks.

2-2.3 For hazard classifications other than those indicated in appropriate NFPA standards for design criteria. When other NFPA standards have developed sprinkler system design criteria, they shall take precedence.

SUBSTANTIATION: This section has been revised many times over the past 10 years and now appears confusing.

COMMITTEE ACTION: Accept in Principle.

Delete Note 4 from Table 2-2.1(a).

Revise the submitted material to appear as follows:

2-2.2 Water Supply Requirements for Sprinkler Systems.

2-2.1 Water supply requirement tables shall be used in determining the minimum water supply requirements for Light, Ordinary, and Extra Hazard Occupancies. Occupancy classification shall be determined from Section 1-7.

Exception No. 1: Water supply requirements for dwelling units protected by residential sprinklers shall be in accordance with 7-4.4 in wet systems only.

Exception No. 2: The water supply requirements for large drop sprinkler systems shall be in accordance with Chapter 8.

Exception No. 3: The water supply requirements for exposure protection systems shall be in accordance with Chapter 6.

(a) Table 2-2.1(a) shall be used to determine the minimum volume of water and pressure normally required for a pipe schedule sprinkler system. The table is to be used only with experienced judgment.

(b) Table 2-2.1(b) shall be used to determine the minimum volume of water and pressure normally required for a hydraulically designed sprinkler system.

2-2.2 The following shall be used in applying Table 2-2.1(b).

2-2.2.1 The water supply for sprinklers only shall be calculated either from the area/density curves in Figure 2-2.1(b) or based on the largest room in the area.

2-2.2.1.1 Area/Density Method.

A-2-2.2.1.1 (Old A-2-2.1.1).

2-2.2.1.1.1 The water supply requirement for sprinklers only shall be calculated from the density curves in Figure 2-2.1(b). The calculations shall satisfy a single point on the appropriate design curve. It is not necessary to meet all points on the selected curve.

2-2.2.1.2 The densities and areas provided in Figure 2-2.1(b) are for use only with standard response, standard orifice (1/2 in.) and large orifice (17/32 in.) sprinklers. For use of other types of sprinklers see 4-1.1.3.

A-2-2.2.1.2.1 Present A-2-2.1.2.8 with additional sentence added as follows:

"Another example in which the room which creates the greatest demand is not the largest room would be where a large room is located near the system riser but a small room with the same hazard classification is located at the opposite end of the building or on an upper floor so as to produce a significantly higher demand."

2-2.1.1.3 For dry-pipe systems, increase the area of sprinkler operation by 30 percent without revising density.

2-2.2.1.4 When high-temperature sprinklers are used for Extra Hazard Occupancies, the area of sprinkler operation may be reduced by 25 percent without revising the density, but to not less than 2000 sq ft (186 m²).

2-2.2.1.2 Room Design Method. The water supply requirements for sprinkler only shall be based upon the area of the room which creates the greatest demand. The density selected shall be the sprinkler operation in Figure 2-2.1(b) corresponding to the room size. If the room is smaller than the area shown in the applicable curve in Figure 2-2.1(b) see Section 2-2.1.3.1. Such a room shall be enclosed with construction having a fire resistance rating equal to the water supply duration indicated in Table 2-2.1(b) with the minimum protection of openings as follows:

(a) Light hazard - automatic or self-closing doors.

Exception: When openings are not protected, calculations shall include the sprinkler in the room plus the two sprinklers in the communications closest to the opening. The selected calculating space sprinkler shall be calculated shall be that which produces the greatest hydraulic demand.

(b) Ordinary and Extra Hazard - automatic or self-closing doors with appropriate fire resistance ratings for the enclosure.

2-2.2.1.5 Regardless of which of the above methods is used, the following restrictions apply:

2-2.2.1.5.1 For areas of sprinkler operation less than 1500 sq ft (139 m²) used for Light and Ordinary Hazard Occupancies, the density for 1500 sq ft (139 m²) shall be used when the sprinkler protection less than 2500 sq ft (223 m²) for Extra Hazard Occupancies, the density for 2500 sq ft (223 m²) shall be used.

2-2.2.1.5.2 For construction having unsprinklered combustible concealed spaces (as described in 4-4.4) the minimum area of sprinkler operation shall be 3000 sq ft (279 m²).

Exception No. 1: Combustible concealed spaces filled entirely with noncombustible insulation.

Exception No. 2: Light or Ordinary Hazard Occupancies where noncombustible ceilings are directly attached to the bottom of solid wood joists so as to create enclosed joist spaces, each less than 160 ft³ (4.8 m³) in volume.

2-2.2.2 When inside hose stations are planned or are required by other standards, a water allowance of 50 gpm (189 L/min) for a one hose station installation (100 gpm (378 L/min) for a two or more hose station installation) shall be added to the sprinkler requirement at the point of connection to the system at the residual pressure required by the sprinkler system design.

Add A-2-2.2.2:

"When considering the 100 gpm allowance for several hose stations, it is the intent of 2-2.2 to apply a 50 G.P.M. allowance to each of the two most remote area connections to the sprinkler system, for an aggregate of 100 G.P.M."

2-2.2.3 When hose valves for fire department use are attached to wet-pipe sprinkler system risers in accordance with 3-8.7, the water supply requirements shall be as follows:

(a) For buildings protected in accordance with this standard, the water supply for sprinklers need not be added to standpipe demand as determined from NFPA 14, Standard for the Installation of Standpipe and Hose Systems.

Exception: When the sprinkler system demand, including hose stream allowance indicated in Table 2-2.1(b) exceeds the requirements of NFPA 14, Standard for the Installation of Standpipe and Hose Systems, the values in Table 2-2.1(b) shall be used.
For partially sprinklered buildings, the sprinkler demand, not including hose stream allowance, as indicated in Table 2-2.1(b) shall be added to the requirements given in NFPA 14, Standard for the Installation of Standpipe and Hose Systems.

2-2.2.4 Water demand of sprinklers installed in racks shall be added to the ceiling sprinkler water demand at the point of connection. Demands shall be balanced thus making this reference obsolete.

2-2.2.5 Water allowance for outside hose shall be added to the sprinkler and inside hose requirement at the connection to the city water main, or at a yard hydrant, whichever is closer to the system riser.

2-2.2.6 The lower duration figure in Tables 2-2.1(a) and (b) are ordinarily acceptable where remote station water flow alarm service or equivalent is provided. When pumps, gravity tanks, or pressure tanks supply sprinklers only, requirements for inside and outside hose need not be considered in determining the size of such pumps or tanks.

2-2.3 For hazard classifications other than those indicated see appropriate NFPA standards for design criteria. When other NFPA standards have developed sprinkler system designer criteria, they shall take precedence.

COMMITTEE COMMENT: Clarification, and this revision encompasses the intent of several proposals in this TCR regarding these sections.

13 - 18 - (Tables 2-2.1(a) and (b), 2-7.3.2 thru 2-7.3.4): Accept in Part

SUBMITTER: Rodney A. McPhee, Canadian Wood Council

RECOMMENDATION: (a) In Table 2-2.1(a) under High Risk delete reference "(See Chapter 8)."

(b) In Table 2-2.1(b) under "Sprinklers only gpm" heading change reference from 2-2.1.2.1 to 2-2.1.2.2.

(c) In 2-7.3.2 and 2-7.3.3 add the word "system" after the word "single." In 2-7.3.4 add the word "system" after the word "more."

SUBSTANTIATION: Editorial.

COMMITTEE ACTION: Accept in Part.

COMMITTEE COMMENT: See Proposal 13-17 (Log #123). See also 13-19 (Log #55).

13 - 19 - (Table 2-2.1(a)): Accept in Part

SUBMITTER: J.G. Barbeau, Insurers' Advisory Organization

RECOMMENDATION: Delete the reference to High Rise Buildings and to Chapter 8.

SUBMISSION: Chapter 8 in the 1985 Edition of this standard referring to High Rise Buildings has been deleted thus making this reference obsolete.

COMMITTEE ACTION: Accept in Part.

COMMITTEE COMMENT: Reference to high rise is helpful.

13 - 20 - (2-2.1.1): Accept in Principle

SUBMITTER: David Hammerman, Maryland Codes Administration

RECOMMENDATION: a. Revise as follows:

2-2.1.1* Water supply requirement tables shall be used in determining the minimum volume of water and pressure requirements for Light, Ordinary, and Extra Hazard Occupancies. Occupancy classification shall be determined from Section 1-7.

(a) Table 2-2.1(a) is used for a pipe schedule sprinkler system.

(b) Table 2-2.1(b) is used for a hydraulically designed sprinkler system.

b. Remove the asterisk after 2-2.1.1.

SUBSTANTIATION: a. For clarification.

b. The Appendix note is not related to this paragraph.

COMMITTEE ACTION: Accept in Principle.

COMMITTEE COMMENT: See Proposal 13-17 (Log #123).
13 - 25 - (2-2.1.2.5): Reject
SUBMITTER: J.G. Barbeau, Insurers' Advisory Organization
RECOMMENDATION: Line 3, insert "the nearest connection leading to it" after "at".
SUBSTANTIATION: The water allowance taken from a yard hydrant for outside hoses should be added in at the nearest connection leading to the yard hydrant and not at the yard hydrant itself. The wording applies to either a single connection to a hydrant or to more than one connection leading to a hydrant.
COMMITTEE ACTION: Reject.
COMMITTEE COMMENT: The current method is adequate considering the number of unpredictable variables that could be found.

13 - 26 - (2-2.1.2.5 Exception (New)): Reject
SUBMITTER: L.G. Keeping, Canadian Automatic Sprinkler Assn.
RECOMMENDATION: Add Exception to Section 2-2.1.2.5 as follows:
Exception: When 2 1/2 in. hose valves for fire department use are planned, the water allowance for outside hoses shall be added to the sprinkler and inside hose requirement at the point of connection to the system at the residual pressure required by the sprinkler system designer.
SUBSTANTIATION: Guidance is needed when outlets are provided for fire department use. If the water allowance for outside hoses is not added at the point of connection of the 2 1/2 in. hose valves for fire department use, operating these valves will impair the amount of water available for the sprinkler system.
COMMITTEE ACTION: Reject.
COMMITTEE COMMENT: This is outside the scope of NFPA 13. 2 1/2 inch hose valves are not permitted on sprinkler systems except if attached to the riser. Paragraph 3-8.7 already provides the intended requirements.

13 - 27 - (A-2-2.1.2.8): Accept in Principle
SUBMITTER: Rodney A. McPhee, Quispamsis, N.B. Canada
RECOMMENDATION: Revise proposed A-2-2.1.2.8 to read in part as follows:
A-2-2.1.2.8 Corridors are rooms and should be considered as such. This section allows calculating the sprinklers ... group of communicating spaces should also be calculated.
Where the building area or hazard zone being protected consists of one large open area of less than 1500 sq ft (139 sq m) with several small rooms located within, the largest room rule should be applied as it would result in a greater demand than a calculation based on a design area less than 1500 sq ft (139 sq m) which would allow exclusion of heads in these small rooms/ compartments as per subsection 7-4.3.1.6.
SUBSTANTIATION: Wording of appendix item is revised in part to correlate with new proposed wording by Committee in Proposal 13-11. The word "Exception" is changed to "section" as there is more than one exception to the section and also that the principle also applies to Ordinary Hazard/Extra Hazard designs. New paragraph at end is self-explanatory and self substantiating which basically ensures that the more demanding of a largest room rule or a 1500 sq ft (139 sq m) design area at the minimum density from the curves will be calculated in certain circumstances.
COMMITTEE ACTION: Accept in Principle.
REVISE 7-4.3.1.6 by adding in the third line after "calculations:"
"provided the requirements of 2-2.2.1.2 are met."
Remove the parenthesis in 7-4.3.1.6 and delete the exception.
COMMITTEE COMMENT: This action clarifies the Committee's intent and should satisfy the intent of the submitter. The reference corresponds to 13-17 (Log #123).

13 - 28 - (2-2.1.2.8): Accept in Principle
SUBMITTER: J.G. Barbeau, Insurers' Advisory Organization
RECOMMENDATION: (a) Line 2, delete "the" before "sprinkler".
(b) Line 3, insert "either" after "from".
(c) Line 4, remove "at the discretion of the designer" and insert instead "whichever area is hydraulically the most demanding."
SUBSTANTIATION: (a) and (b) are editorial changes.
(c) The phrase "at the discretion of the designer" should be removed because it means that the designer may select either an area from Table 2-2.1(B) or the area of the largest room regardless of which area creates the greater water demand. The new wording leaves no doubt as to which area should be selected.
COMMITTEE ACTION: Accept in Principle.
COMMITTEE COMMENT: See Proposal 13-17 (Log #123).

The phrase "at the discretion of the designer" adequately states the Committee's intent.

13 - 29 - (2-2.1.2.11 Exception No. 3 (New)): Reject
SUBMITTER: Rodney A. McPhee, Canadian Wood Council
RECOMMENDATION: Add new Exception No. 3 as follows:
Exception No. 3: Light or Ordinary Hazard Occupancies where noncombustible ceilings are directly attached to the bottom chord of composite wood joist construction so as to create enclosed joist spaces, each less than 160 ft³ (4.8 m³) in volume.
SUBSTANTIATION: The hazard of small joist spaces between composite wood joist members (wood I-beams) is no greater than that posed by wood joists where the space in both cases is limited to 160 cu ft in volume.
COMMITTEE ACTION: Reject.
COMMITTEE COMMENT: No fire test data was submitted. The Committee is concerned with the ability of the lightweight truss web to contain the fire to 160 cu ft. 3000 sq ft area of application is therefore appropriate.

13 - 30 - (2-2.1.3, 2-3.2, 2-4.1, 2-4.2, 2-5.1 and 2-6.1.1): Accept in Principle in Part
SUBMITTER: Rodney A. McPhee, Quispamsis, N.B. Canada
RECOMMENDATION: Agree with Committee's intent however additional changes in code are needed as follows:
Add a new subsection 2-2.1.3 as follows (renumber existing 2-2.1.3 as 2-2.1.4):
2-2.1.3 Water supply and pressure demand for exposure sprinklers and designs utilizing large-diameter sprinklers shall be in accordance with Chapter 6 and Chapter 8 respectively.
In 2-3.2 change the words "as required in" to "in accordance with".
In 2-4.1 2-5.1 and 2-6.1.1 change the reference to "Table (A) or 2-2.1 (B)"
Revise 2-4.2 to read:
2-4.2 The required capacity and elevation of the tank and the arrangement of the underground supply piping shall provide the volume and pressure in accordance with 2-2.1.
SUBSTANTIATION: New subsection 2-2.1.3 is needed to bring into subsection 2-2.1 the water supply requirements of other chapters of this code so that these are taken into consideration of sizing and arrangement of underground supply piping, gravity tanks, pumps, and pressure tanks. Refener to Table 2-2.1 (A) and Table 2-2.1 (B), as already substantiated in Proposal 17, do not encompass all other design criteria referenced including those in all other NFPA codes as referred to in Appendix 2-2.1.3 (New 2-2.1.4).
Reference to Chapter 8 on large-diameter sprinklers correlates with Proposal No. 181 to drop existing Chapter 8 and renumbering Chapters 9 and 10 accordingly. See also comment on Proposal No. 8.
COMMITTEE ACTION: Accept in Principle in Part.
REJECT submitted 2-4.2.
COMMITTEE COMMENT: See Proposal 13-17 (Log #123).

LOG #57

LOG #64

LOG #149

LOG #5

LOG #58
13-31 - (2-3.1.3 (New) and A-2-3.1.3 (New)): Reject
SUBMITTER: G. W. Wilcox, FMAC
RECOMMENDATION: Add new paragraphs:
2-3-1.3 Domestic Connections. Aboveground domestic
connections to sprinkler system piping shall be
metallic pipe.
A-2-3.1.3 Nonmetallic aboveground domestic pipe
connections may fail during a fire, diverting water from sprinklers.
SUBSTANTIATION: Failure or nonmetallic aboveground
domestic pipe connections could adversely affect
sprinkler system performance due to loss of water to sprinklers.
COMMITTEE ACTION: Reject.
COMMITTEE COMMENT: This is beyond the scope of NFPA 13.

13 - 32 - (A-2-5.1): Reject
SUBMITTER: J. G. Barbeau, Insurers' Advisory
Organization
RECOMMENDATION: Add the following paragraph:
"An Insurer or other Authority Having Jurisdiction
may require the installation of a secondary (redundant)
pump for reliability, based on the size and/or value of the
property being protected. Ideally one electric and a
back-up diesel pump should be installed when a secondary
can't be omitted for systems having 20 sprinklers or less.
SUBSTANTIATION: Many Insurers have rules which require
the installation of redundant water supplies (for
reliability), based on the size and/or value of the
property being protected. These rules often call for
the installation of a back-up fire pump. When this is
pointed out to consultants they often maintain that
their single pump installations comply 100 percent with
NFPA 13 and that nothing further need be done.
The proposed added paragraph will make it clear that
Section 2-5.1 is a minimum requirement which can
sometimes be increased by the Authority Having Jurisdiction when all factors are taken into
consideration.
COMMITTEE ACTION: Reject.
COMMITTEE COMMENT: This is beyond the scope of NFPA 13.

13 - 33 - (2-7.2): Accept in Principle
SUBMITTER: Russell P. Fleming, National Fire Sprinkler
Association
RECOMMENDATION: Revise to read as follows:
"Size. Pipe size shall be not less than 4 in.
(10 cm).
Exception: Pipe may be as small as the system riser
for hydraulically designed systems.
SUBSTANTIATION: The above wording provides more
flexibility than the present section for the size of the
fire department connection piping.
COMMITTEE ACTION: Accept in Principle.
REVISE AS FOLLOWS:
2-7 Fire Department Connections.
2-7.1 A fire department connection shall be
provided as described in this section.
Exception No. 2: When permission of the authority
having jurisdiction has been obtained for its omission.
2-7.2 Size. Pipe size shall be 4 in. (10 cm) for fire
engine connections and 6 in. (15 cm) for fireboat
connections.
Exception: Pipe may be as small as the system riser.
COMMITTEE COMMENT: The revised changes will give
guidance for the need of a fire department connection
based on system size. The pipe sizes that are
stipulated will allow the flexibility that the
submitter is looking for.

13 - 34 - (2-7.3.7 (New)): Reject
SUBMITTER: Dennis Kirson, Sandia National Laboratories
RECOMMENDATION: Add a new paragraph 2-7.3.7:
2-7.3.7 The fire department connection shall be
installed between 18 in. and 36 in. above grade. A
45-degree type fire department connection shall be
installed when the centerline of the pipe opening is
located more than 24 in. above grade.

13 - 35 - (2-7.6.2): Reject
SUBMITTER: Gordon H. Smith, Fire Marshal's Office,
Halifax, Nova Scotia
RECOMMENDATION: It is recommended that the Committee
consider the desirability of installing a wire grid at the
base of the female swivel connection.
SUBSTANTIATION: Though these connections are
originally provided with approved plugs or caps, in
practice it is not unusual to discover the plug or cap
missing and debris pushed into the unguarded opening.
If this debris is not detected before the fire
department makes its "hook up", this debris can be
pushed at great velocity to the first bend in the pipe
and then jam there (especially "pop cans").
The presence of an unobstructed and undamaged grid
(screen) would indicate to the fire department that no
large obstructions were in the piping. It is also felt
that any additional friction loss incurred by this
device could be easily made up by the pump operator.
COMMITTEE ACTION: Reject.
COMMITTEE COMMENT: This is a maintenance problem. See
also Proposal 13-37 (Log #30).

13 - 36 - (2-7.6.2): Reject
SUBMITTER: Gordon H. Smith, Fire Marshal's Office,
Halifax, Nova Scotia
RECOMMENDATION: Continue 2-7.6.2 with:
"or caps, and directly behind the swivel fitting a
wire mesh screen shall be rigidly installed. This
screen to be of brass or copper with 1/2 in. mesh of
#14 bends gauge wire.
SUBSTANTIATION: To prevent accidental (or intentional)
blocking of the system.
The frictional resistance of the screen will not be
critical when fire departments pump in to the system at
150 psi. (However, it can be very critical when a "pop
 cán" jams the system.)
COMMITTEE ACTION: Reject.
COMMITTEE COMMENT: Caps and plugs are intended to
prevent these problems. NFPA 13A, paragraph 2-8.2
recommends that you verify an open waywater.

13 - 37 - (2-9.1): Reject
SUBMITTER: Joseph G. Radzik, Victaulic Company of
America
RECOMMENDATION: Revise first sentence to read as
follows:
SUBSTANTIATION: Presently, no guidance or thought is
given anywhere to the location of fire department
connections. In practice they are found anywhere from
at grade (where Fire Fighters would have to scrape
their knuckles to attach hose) to above fire fighters
heads.
COMMITTEE ACTION: Reject.
COMMITTEE COMMENT: The necessary guidance is already
in Appendix as A-2-7.1.
"Test connection, which may also be used as drain pipes, shall be listed and shall be provided at locations that will permit flow tests to be made to determine whether water supplies and connections are in order."

Remainder of section remains the same.

COMMITTEE COMMENT: Not intended to require listing of piping which is not in supply to pipe system (3-14.1).
provide equivalent protection and if so they should not be used in certain applications. For example PB pipe is UL listed for use above ceilings having a specific fire resistance rating and CPVC pipe is UL listed for use above ceilings having certain surface characteristics. However, there is no requirement in either listing for lay-in ceiling panels used in a suspended ceiling to have a minimum specified density to prevent heat from causing the panel to warp (e.g. by the external vertical fire plume, thus exposing the sprinkler pipes above. Recent fire tests made in Canada on plastic pipe show that unless such ceiling panels are a minimum density they can easily be displaced by heat from the fire and expose the piping above which can be ruptured by heat from the fire.

The recent UL listing of exposed CPVC pipe (installation based on certain limitations) will not generally provide equivalent protection, for example:

(a) It is always possible that sometime after the sprinkler installation floor-to-ceiling partitions may be installed (and in the writer's experience this is fairly common) and these often terminate near some of the ceiling sprinklers. This leaves one side of the partitions unprotected for a certain distance away. If a fire occurs in these unprotected areas where there is exposed plastic piping, the heat from the fire would surely cause these pipes to fail within a few minutes with possible disastrous consequences. Such an installation cannot therefore be considered to be equivalent to a similar metal piping installation which could withstand a fire for a longer period without failure by burning or dislodging.

(b) Also, with exposed plastic piping, if one or more sprinklers were plugged with dirt from an improperly flushed underground main or if they were heavily painted or stained such as to impair their proper operation, the same results could be expected as outlined in (a) above if a fire occurred under the sprinklers in question.

The installation of the exposed plastic piping therefore poses a potential threat to the protected property and to the lives of the occupants and such piping should be installed with possible consequences into consideration (in my opinion exposed plastic pipe should never be installed - why play Russian Roulette with other peoples lives or tempt Murphy's Law which says that what can happen will happen.)

II. This proposed addition to paragraph A-3-1.1.5 provides guidance for designers, building owners and others to make them aware of some of the potential problems which could result from the installation of plastic piping systems.

The proposed amendment to paragraph 3-1.1.5 and the new proposed paragraph A-3-1.1.5 came about mainly as a result of information which I received regarding recent fire tests conducted on CPVC pipe by Underwriters' Laboratories of Canada (ULC). It is understood that the NFPA 13 New Technology Subcommittee have been provided with full details of these fire tests. The results of some of these tests were very poor and they appear to contradict the UL listings in some respects.

Referring to the copy of the correspondence which I have had with UL on their plastic pipe listings, as mentioned under Item I in their letter they are unconcerned about lay-in ceiling tiles becoming dislodged during a fire and exposing the plastic pipe above, apparently because their tests did not result in any piping failures. It is believed that UL used the UL 199 crib test. ULC used the same crib test for three of the tests. Two of these tests resulted in satisfactory results even though the pipe was charred. However, one test resulted in charring and distortion of the pipe which failed at 140 psi when hydrostatically tested. ULC conducted two additional fire tests with light weight lay-in ceiling tiles but using a fire of lower magnitude. This is the ULC S508 2A crib fire test used for 2A fire extinguishers (for light hazard occupancy). The ceiling tiles were displaced by the fire plumes resulting from these two tests. In one of these tests, using standard sprinklers none of which operated, the pipe was charred and it failed in just over two minutes. This same test was repeated using quick-response sprinklers and two sprinklers were plugged with dirt and the pipe was charged at 170 psi. In view of all of these piping failures, light weight lay-in ceiling tiles obviously should not be installed, per Item II (a) in my submission.

Additional fire tests conducted by ULC showed that where lay-in ceiling tiles are used, they should have a minimum density of about 0.35 lbs/ft² to prevent their being dislodged by a fire plume.

Regarding the problem of permanent ceiling openings such as those used for return air, Item 2 in the UL letter indicates that there may be a problem when the plastic pipe is installed directly above such openings. However, a fire test was run by ULC with a grill replacing the center ceiling tile in the test room with the piping located 24 in. away from the edge of the grill. The fire plume from the test fire entered the grilled opening and ruptured the plastic pipe after two minutes immersion and without operating any sprinklers. Additional ULC fire tests with grilled openings located adjacent to a sprinkler seemed to indicate that if such openings are located near a sprinkler which operates during a fire the pipe may be adequately protected; however, maximum distance from the edge of the opening to the sprinkler protecting this opening was not determined and the test results were inconclusive because a pinhole leak developed at 60 psi during one test and its cause was not determined. Also, it is possible that a sprinkler intended to protect a specific opening may not always operate during a fire due to the location of the fire, its intensity, or due to variations in air currents. Or, the opening may be too large for one sprinkler to be effective. Sprinkler blockage could also occur as outlined in Item II (c) in my submittal.

Items II (c) and II (d) in my submittal are self explanatory. It can easily be argued that I am amazed and dismayed that UL saw fit to list exposed plastic piping even with certain limitations. In my view this listing does not make any sense because of the obvious potential for serious fire losses.

Referring to Item II (e) in my submittal, manufacturers may in future want to list other types of plastic pipe for use in sprinkler systems such as ABS or polyethylene. Should we provide separate listing criteria for each type of plastic pipe to accommodate each manufacturer as has been done with the two presently listed plastic pipes? Surely this is a wrong approach because the mixing of different types of plastic pipe under one roof will lead to confusion. A more logical and realistic approach would be to establish a single standard applicable to all types of plastic pipe to avoid this potential confusion.

The UL listing which includes limited ordinary hazard areas does not make sense to me because if these listings are acceptable for limited O.H. areas, there is no reason why they cannot be accepted for all O.H. areas. It opens the doors to broaden the listings along these lines in the future which, in my opinion, would be a retrogressive step.

In some of the literature which I have seen For the UL listed thermoplastic pipe, one advantage stressed by the manufacturer is that when a freeze-up occurs in this pipe, it will expand and not rupture as would happen with other types of sprinkler pipe. However, this condition could not worse because it have in effect the equivalent of a closed valve (because water cannot flow through the Frozen pipe) without the benefit of an alarm or any visual indication that the system or part of it is out of service. If a fire occurs during such a freeze-up no water will flow through the frozen section and a disastrous loss could occur.

Plastic pipe sprinkler installations are being offered to the public as providing protection equivalent to metal piping systems. I firmly believe that the NFPA 13 Committee has a moral obligation to amend the standard to caution potential users and fire protection professionals that such installations may not always provide equivalent protection and may in fact introduce one or more elements of risk, which could in some situations lead to serious property losses and to the loss of life.

NOTE: Supporting material is available for review at NFPA Headquarters.

COMMITTEE ACTION: Reject.  
COMMITTEE COMMENT: The proposed wording is overly restrictive for a performance standard.
13-44 - (3-1.1.5): Reject
SUBMITTER: R. J. Wright, Underwriters Laboratories of Canada
RECOMMENDATION: New paragraph:
"Piping subject to loss of more than 50 percent of its hydrostatic strength at any temperature up to 300°C shall be capable of withstanding not less than 350 psi for a period of one hour when conditioned at the maximum ambient temperature for which it has been listed."

SUBSTANTIATION: Loss of integrity through elevated temperature and pressure is a characteristic of certain types of piping. Listing organizations have different requirements for such piping. This paragraph would bring a degree of consistency into the acceptance of these products.

COMMITTEE ACTION: Reject.
COMMITTEE COMMENT: The Committee believes that the criteria addressed in this proposal should be left in the domain of the testing/approval laboratories.

13-45 - (3-1.1.5): Accept in Principle
SUBMITTER: R. J. Wright, Underwriters Laboratories of Canada
RECOMMENDATION: Add to the end of this paragraph:
"... and installed in accordance with the product manufacturer's printed instructions."

SUBSTANTIATION: Adherence to the manufacturer's instructions is of paramount importance in the installation of nongeneric piping or tubing systems.

COMMITTEE ACTION: Accept in Principle.
COMMITTEE COMMENT: The revised wording should satisfy the submitter's intent.

13-46 - (3-1.1.6): Reject
SUBMITTER: R. J. Wright, Underwriters Laboratories of Canada
RECOMMENDATION: New paragraph:
"Piping subject to loss of more than 50 percent of its hydrostatic strength at any temperature up to 300°C shall be capable of withstanding not less than 350 psi for a period of one hour when conditioned at the maximum ambient temperature for which it has been listed."

SUBSTANTIATION: Loss of integrity through elevated temperature and pressure is a characteristic of certain types of piping. Listing organizations have different requirements for such piping. This paragraph would bring a degree of consistency into the acceptance of these products.

COMMITTEE ACTION: Reject.
COMMITTEE COMMENT: The Committee believes that the criteria addressed in this proposal should be left in the domain of the testing/approval laboratories.

13-47 - (3-1.1.7): Reject
SUBMITTER: R. J. Wright, Underwriters Laboratories of Canada
RECOMMENDATION: New paragraph:
"Combustible piping or piping subject to loss of more than 50 percent of its hydrostatic strength at any temperature up to 300°C shall not be used for sprinkler risers or in combustible concealed spaces unless fully enclosed with fire resistance materials."

SUBSTANTIATION: Restrictions on the use of such piping in the standard are not currently provided. Listing information and installation instructions may not be available during inspections.

COMMITTEE ACTION: Reject.
COMMITTEE COMMENT: The Committee believes that this type of information must be established in the listing.

13-48 - (3-1.1.8 (New)): Reject
SUBMITTER: R. J. Wright, Underwriters Laboratories of Canada
RECOMMENDATION: Add new paragraphs:
"The use of combustible piping or piping subject to loss of more than 50 percent of its hydrostatic strength at any temperature up to 300°C shall be restricted to Light Hazard and Residential applications."

SUBSTANTIATION: Such restrictions do not appear in the standard but are referenced in current listing information. Problems have been encountered in interpreting such information.

COMMITTEE ACTION: Reject.
COMMITTEE COMMENT: The proposal is overly restrictive for a performance standard.

13-49 - (3-2): Reject
SUBMITTER: Rodney A. McPhee, Quispamsis, N.B. Canada
RECOMMENDATION: Add a new definition to 3-2 as follows: Water Supply. The underground and/or part aboveground supply pipe directly connected to the system riser from the private fire service main. (See NFPA 24.)

To Figure A-3-2 add "Water Supply" to list as "G" part and place letter G at flange on supply as it penetrates the floor in the sketch.
With the new definition of Water Supply added, it removes the implications of the present definition of System Riser.

COMMITTEE ACTION: Accept.
COMMITTEE COMMENT: The existing definition of system riser is in conjunction with paragraph 3-3.1 more clearly expresses the committee's intent.

13-50 - (3-2): Accept

SUBMITTER: Rodney A. McPhee, Canadian Wood Council

RECOMMENDATION: Reject the proposed new definition for "Water Supply" and revisions to Figure A-3-2.

SUBSTANTIATION: In reviewing the requirements for sprinkler systems it would appear that the standard permits only 50,000 sq ft of Light or Ordinary Hazard Occupancy per floor to be protected by one or more "systems" fed by one water supply connection. Should the floor area exceed 50,000 sq ft then the standard requires another "System Riser" as presently defined in the text or in other words, another completely separate water supply connection from the street or supply main. This is so that not more than 52,000 sq ft on any one floor will be subject to impairment as a result of loss of the water supply connection (System Riser). If it is intended however to permit several "System Risers" to be installed on this new defined "Water Supply" then the area limit on "System Risers," which is 52,000 sq ft should be removed as it doesn't make sense to restrict the area protected by one system to reduce the building area which might be subject to a single impairment when we already are permitting a building over 52,000 sq ft in area to be fed by a single water supply. This limit was based on the maximum number of heads originally permitted on an 8 in. pipe (400 heads) for Ordinary Hazard Occupancies spaced at the maximum protection area of 130 sq ft per head. This does not directly relate to Light Hazard pipe schedule designs which permits up to 200 sq ft per head. If you went to 400 sprinklers in this case you'd be allowed to protect 80,000 sq ft per floor. Also, how does this relate to limiting hydraulically designed systems to similar maximum areas per system? No limit can be justified except by good engineering practice and insurance regulations. Building designers and owners should be afforded that flexibility.

COMMITTEE ACTION: Accept.
COMMITTEE COMMENT: While the Committee agrees with the submitter on the action to be taken, it does not agree with his rationale.

13-51 - (3-3): Accept

SUBMITTER: Technical Committee on Automatic Sprinklers

RECOMMENDATION: Relocate existing Section 3-3 as a new paragraph 4-2-2.2.

Remumber as needed.

SUBSTANTIATION: The requirements for area limitations are mislocated in Chapter 3.

COMMITTEE ACTION: Accept.

13-52 - (3-3.1 and 3-3.1 Exception): Accept in Principle

SUBMITTER: L.G. Keeping, Canadian Automatic Sprinkler Assn

RECOMMENDATION: Revise the present text beginning "Extra Hazard ... " to read:

"Extra Hazard - Pipe Schedule - 25,000 sq ft (2323 m²)
- Hydraulically Calculated = 40,000 sq ft (3716 m²)"

Revise the Exception to read:

Exception: When single systems protect both extra hazard, high piled storage or storage covered by other NFPA standards and ordinary hazard areas, the extra hazard or high piled storage area protected by one system shall not exceed the limit specified for that hazard and the total area coverage shall not exceed 52,000 sq ft (4831 m²).

SUBSTANTIATION: The present 25,000 sq ft limitation was originally determined for pipe schedule systems prior to the advent of the density/design area curves of Figure 2-2.1(b). The curve for Extra Hazard Group 1 occupations is not quite as severe as the Class IV curve in NFPA 231-1987 (2323 m²). The curve for Extra Hazard Group 2 is comparable to Curve F of Figure 6-11.1c in NFPA 231-1986. The conclusion can thus be drawn that the respective combustible contents are roughly equivalent. Such similar fire loading should be allowed similar sprinkler protection in terms of system size as well as the density and design area combination.

COMMITTEE ACTION: Accept in Principle.

In the submittal, in the exception delete the word "both" in the first line and replace the word "limit" with "floor area."

COMMITTEE COMMENT: The revised wording should satisfy the submitter's intent.

13-53 - (3-3.1): Accept in Principle

SUBMITTER: J.G. Barbeau, Insurers' Advisory Organization

RECOMMENDATION: Line 6, replace "Extra Hazard - 25,000 sq ft (2323 m²)" with the following:

"Extra Hazard Group 1 - 40,000 sq ft (3716 m²)"
"Extra Hazard Group 2 - 25,000 sq ft (2323 m²)."

SUBSTANTIATION: Both NFPA standard 231 and 231C include the storage of plastics and both permit 40,000 sq ft of such storage to be protected by one sprinkler system. Plastics storage is at least as hazardous as the listed Extra Hazard Group 1 occupancies, for example: rubber reclaiming, compounding -- drying, milling and vulcanizing. It is therefore felt that to impose a 25,000 sq ft maximum area restriction for EH-1 occupancies is not justified and adds unnecessarily to the cost of the protection.

COMMITTEE ACTION: Accept in Principle.

COMMITTEE COMMENT: See Proposal 13-52 (Log #85).

13-54 - (3-3.1 Exception): Accept

SUBMITTER: Rodney A. McPhee, Quispamsis, N.B. Canada

RECOMMENDATION: In addition to proposal add the words "or light" after the word "ordinary."

SUBSTANTIATION: These words are needed editorially to clarify the intent as by their absence it implies that the exception does not apply where we have 40,000 sq ft of storage and 12,000 sq ft of light hazard area. As such, we would then require two sprinkler systems instead of one, for the 52,000 sq ft area.

COMMITTEE ACTION: Accept.

13-55 - (3-4, 3-5, 3-6 and 3-7): Accept

SUBMITTER: Technical Committee on Automatic Sprinklers

RECOMMENDATION: Relocate Sections 3-4, 3-5, 3-6 and 3-7 as a new chapter after existing Chapter 7.

Remumber as needed.

SUBSTANTIATION: The requirements for pipe schedule systems are mislocated in a chapter on system components. They should be in a separate chapter located after the chapter on the more commonly installed hydraulically designed systems.

COMMITTEE ACTION: Accept.

13-56 - (3-4.1, 7-4.3.1.7): Accept in Principle in Part

SUBMITTER: Walter J. Swingler, Same-Fire Protection Consultant

RECOMMENDATION: 1. The pipe schedules in Chapter 3 "System Components" should preferably be placed in Appendix for reference only. If not done at this time reference should be added to 3-4.1 "See Chapter 7 for hydraulically designed system."
2. Revise 7-4.3.1.7 to read:

"7-4.3.1.7 Velocity pressure shall be included where velocity exceeds 20 ft/sec."
COMMITTEE ACTION: Accept.

COMMITTEE ACTION: Accept in Principle.

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COMMITTEE ACTION: Accept.
I RECOMMENDATION: Add 'in an area' to the end of the section.

SUBMITTER: Engineering and Standards Committee, National Fire Sprinkler Assn.

COMMITTEE ACTION: Accept.

SUBSTANTIATION: For a revamped system, the nipple supply can be provided through the nipple section.

COMMITTEE ACTION: Accept in Part.

SUBSTANTIATION: AS sprinkler systems become more prevalent in "spec" office buildings, the use of 1/2 in. outlets to supply sprinklers is becoming more common. This is a poor practice because the original "rough-in" usually does not have enough sprinklers to supply tenant needs, and often more than one sprinkler is supplied from the 1/2 in. outlet. There does not seem to be accurate hydraulic loss data for flow thru the 1/2 in. nipple, and increaser, so calculation is difficult or impossible. A minimum 1 in. outlet would at least help ensure a better supply.

COMMITTEE ACTION: Accept in Principle.

COMMITTEE COMMENT: See Committee Proposal 13-61.

The Committee is not prepared to allow up to 800 square feet in a single area to be protected relying on a 1/2 in. outlet.

SUBSTANTIATION: The standard presently is unclear on pipe sizing for runs serving more than one hose station.

COMMITTEE ACTION: Accept.

SUBSTANTIATION: The "System Test Pipe" shown in the referenced Figure is the traditional "double loop" system. A new type of system (see Figure) has been developed which offers some distinct advantages without the compromise of functional integrity. Briefly, this is a three component, straight line system consisting of a globe valve, a test selector valve, and a sight glass. The globe valve would naturally provide the shut off function for the system. The Inspector's Test Valve is a ball type, 2 position selector. The primary position would provide full flow. The secondary position would provide an orifice equivalent to the smallest sprinkler orifice, replacing the orifice union. The brass sight glass is equipped with a durable poly-carbonate window. The resulting system offers faster, easier installation, uses fewer components, and dramatically reduces the number of potential leak points. In short, it's a cleaner, safer, and less expensive method of performing the same task.

COMMITTEE ACTION: Reject.

COMMITTEE COMMENT: See Proposal 13-17 (Log #123) the reference would be 2-2.2.2.

SUBSTANTIATION: The standard presently is unclear on pipe sizing for runs serving more than one hose station.

COMMITTEE ACTION: Accept.

SUBSTANTIATION: The "System Test Pipe" shown in the referenced Figure is the traditional "double loop" system. A new type of system (see Figure) has been developed which offers some distinct advantages without the compromise of functional integrity. Briefly, this is a three component, straight line system consisting of a globe valve, a test selector valve, and a sight glass. The globe valve would naturally provide the shut off function for the system. The Inspector's Test Valve is a ball type, 2 position selector. The primary position would provide full flow. The secondary position would provide an orifice equivalent to the smallest sprinkler orifice, replacing the orifice union. The brass sight glass is equipped with a durable poly-carbonate window. The resulting system offers faster, easier installation, uses fewer components, and dramatically reduces the number of potential leak points. In short, it's a cleaner, safer, and less expensive method of performing the same task.

COMMITTEE ACTION: Reject.

COMMITTEE COMMENT: See Proposal 13-17 (Log #123) the reference would be 2-2.2.2.

SUBSTANTIATION: The standard presently is unclear on pipe sizing for runs serving more than one hose station.

COMMITTEE ACTION: Accept.

COMMITTEE COMMENT: Note that per Proposal 13-17 (Log #123) the reference would be 2-2.2.2.
Move Figure A-3-10.3.1 to become Figure 3-10.3.1. Extend Zone 3 into Vancouver, B.C. area.

Delete last paragraph of present A-3-10.3.1. Add the following:

"The following states and counties are shown to be within Zones 1, 2, or 3 in Figure 3-10.3.1: (indicates states and counties)."

A-3-10.3.2 Insert new paragraph following first paragraph as follows:

"A flexible coupling is a mechanical coupling or fitting which permits some angular displacement and rotation of the piping without failure of the pipe or fitting."

A-3-10.3.2(b) Add: "...below, the connection to the sprinkler system piping... to the end of this subsection.

A-3-10.3.2(c) Delete - (this is covered by 3-10.3.4 and Exception 3 to that section(s).

A-3-10.3.2(d) Delete first paragraph. Also, move last paragraph and figure to become appendix material for paragraph 3-10.3.2(a). Retitle figure as "Seismic Swing Joint for 4-in. Separation Crossed by Main of 4-in. or Smaller Nominal Diameter." Modify figure to show a "vertical movement" dashed line drawing in conjunction with the elevation drawing. This would show pipe segment "B" higher by about 8 in. with pipe segment "D" brought up even with pipe segment "C", and with nipple "E" appearing much shorter because it would be leaning into the page. The ells connecting "C" to "D" and "D" to "E" would also not be visible in the dashed-line drawing, since their curve would be perpendicular to the page.

Also, add additional paragraph to new A-3-10.3.3(a) as follows:

"A seismic swing joint is considered to be an assembly of fittings, pipe and couplings or an assembly of pipe and couplings that permits movement in all directions. The extent of permitted movement should be sufficient to accommodate calculated differential motions during earthquakes. In lieu of calculations, permitted movement can be made at least twice the actual separations at right angles to the separation as well as parallel to it."

A-3-10.3.3(b) Add new exception as follows:

"If the top of the racks are rigidly anchored to the roof structure, a single flexible coupling may be installed on each drop."

A-3-10.3.4 Delete phrase "firmly attached to the wall" from Exception No. 3.

A-3-10.3.4(b) Add "frangible material or" prior to "flexible material."

A-3-10.3.5 Add new Exception No. 3:

Exception No. 3: Braces may be spaced further apart if primary structural members exceed 40 ft (12 m) on center.

Table A-3-10.3.5.1(3) Redraw figures for clarity and revise Figure B and the second part of Figure E. The diagonal line should stop at the vertical line, which represents the wall surface.

"A-3-10.3.5.1 Change wording from "should" to "shall" and merge with 3-10.3.5 including tables. Retain figures within A-3-10.3.5."

SUBSTANTIATION: Revisions to the 1987 edition of NFPA 13 have answered many questions on earthquake protection, but some sections need to be clarified. There is also a need to specify clearly what areas require earthquake protection.

COMMITTEE ACTION: Accept in Part in Principle.

Revisit Figure A-3-10.3.1 as follows:

Add "4 and 5 - Earthquake protection not Required." Eliminate "ISO" from title but add line to identify "Source - Insurance Services Office." Delete individual maps of localities other than Alaska and Hawaii.

Add additional paragraph to A-3-10.3.3 as follows: "A flexible coupling is a mechanical coupling or fitting which permits some angular displacement, axial displacement, and rotation of the piping without failure of the pipe or fitting. "Rigid-type" mechanical couplings that do not permit movement at the grooved connections are not considered flexible couplings."

Revise 3-10.3.2(c) to read as follows:

(c) on one side of concrete or masonry walls within 3 feet (0.9 m) of the wall surface.
Revise A-3-10.3.2(d) and Figure A-3-10.3.2(a) as suggested by submitter, but renumber Figure as Figure A-3-10.3.3. Move existing third paragraph of A-3-10.3.2(d) to become A-3-10.3.3.

Paragraph proposed by submitter for A-3-10.3.2(a) to become second paragraph of A-3-10.3.3. Reference to figure revised as indicated above.

Revise 3-10.3.3 to read as follows:

"Swing Joint. Swing joints assembled with flexible fittings shall be installed where sprinkler piping, regardless of size, crosses building seismic joints."

Revise 3-10.3.2(e) to read:

"At the top of drops to hose lines, rack sprinklers, and mezzanines, regardless of pipe size."

Add 3-10.3.2(f) as follows:

"At the top of drops exceeding 15 feet in length to sprinklers or portions of systems regardless of pipe size."

Revise Exception No. 3 to 3-10.3.4 to read as follows:

"No clearance is necessary if flexible couplings or swing joints are located within 1 foot (0.3 m) of each side of a wall."

Revise 3-10.3.5.1 and A-3-10.3.5.1 as follows:

3-10.3.5.1 Both lateral and longitudinal sway braces shall be sized and fastened such that the horizontal loads assigned to the braces in Table 3-10.3.5.1(1) do not exceed the allowable loads on the braces as shown in Table 3-10.3.5.1(2) and the allowable loads on fasteners as shown in Table 3-10.3.5.1(3). Sway bracing shall be tight and concentric. All parts and fittings of a brace shall lie in a straight line to avoid eccentric loadings on fittings and fasteners. For longitudinal braces only, the brace may be connected to a tab welded to the pipe in conformance with 3-12.2.

---

**Table 3-10.3.5.1(1)** Assigned Load Table

(Based on half the weight of the water filled pipe)

<table>
<thead>
<tr>
<th>Spacing of Lateral Braces (Feet)</th>
<th>Spacing of Long. Braces** (Feet)</th>
<th>Assigned Load For Pipe Size to be Braced (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>2</td>
<td>300  305  410  435  470  655  915</td>
</tr>
<tr>
<td>20</td>
<td>2</td>
<td>360  365  475  500  550  775  1020</td>
</tr>
<tr>
<td>25</td>
<td>2</td>
<td>420  425  535  560  610  815  1090</td>
</tr>
<tr>
<td>30</td>
<td>2</td>
<td>480  485  600  635  700  915  1220</td>
</tr>
<tr>
<td>40</td>
<td>2</td>
<td>540  545  675  710  770  975  1405</td>
</tr>
<tr>
<td>50**</td>
<td>2</td>
<td>600  605  740  775  850  1040  1480</td>
</tr>
</tbody>
</table>

*Permitted only under Exception No. 4 to 3-10.3.5.4.

**If branch lines are provided with lateral bracing or hung with U-hooks bent out at least 10 degrees from vertical, half the assigned load may be used for longitudinal braces.

---

Exception: In lieu of using Table 3-10.3.5.1(1) horizontal loads for braces may be determined by analysis. Sway braces shall be designed to withstand a force in tension or compression equivalent to not less than half the weight of water-filled piping. For lateral braces, the load shall include all branch lines and mains within the zone of influence of the brace. For longitudinal braces, the load shall include all mains within the zone of influence of the brace. For individual braces the slenderness ration l/r shall not exceed 200, where l is the distance between the center lines of support and r is the least radius of gyration, both in inches."

Retain Figure A-3-10.3.5.1(a).

Revise Figure A-3-10.3.5.1(b) to show second bolt flange, permitting concentric loading.

A-3-10.3.5.1 Use existing A-3-10.3.5.

Also add existing A-3-10.3.5.1 except for first, second, and fourth paragraphs. Add new paragraph in place of existing first two paragraphs to read as follows: "Listed devices permitting connection of braces to both the pipe and the building structure are available and are recommended. However, alternate means of attachment capable of handling the expected loads are acceptable."

Revise beginning of existing third paragraph as follows:

"connection of the brace to the pipe . . . "

Revise second sentence of existing sixth paragraph to read as follows:

"For all threaded connections, holes or other means should be provided to permit indication that sufficient thread is engaged."
Add following new second sentence to note for Table A-3-10.3.5.1(3):
"These values are based on concentric loadings."

Retain Table A-3-10.3.5.1(2) as Table A-3-10.3.5.1

Renumber Tables A-3-10.3.5.1(1) and A-3-10.3.5.1(3) as Tables 3-10.3.5.1(2) and 3-10.3.5.1(3).

In present Table A-3-10.3.5.1(1) correct least radius of gyration for flats to read "0.29h" instead of "29h."

Revise present Table A-3-10.3.5.1(3) (New Table 3-10.3.5.1(3) to clarify figures and to add new figures showing shear connection through side of beam or wall as follows:

---

Additions to Table 3-10.3.5.1:
Note changes in Figures:

<table>
<thead>
<tr>
<th>Old</th>
<th>New</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>B</td>
<td>D</td>
</tr>
<tr>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>D</td>
<td>F</td>
</tr>
<tr>
<td>E1</td>
<td>E2</td>
</tr>
</tbody>
</table>

---

Lag Screws in Wood

<table>
<thead>
<tr>
<th>Length Under (inches)</th>
<th>3/8</th>
<th>1/2</th>
<th>5/8</th>
<th>7/8</th>
</tr>
</thead>
<tbody>
<tr>
<td>G H I</td>
<td>G H I</td>
<td>G H I</td>
<td>G H I</td>
<td>G H I</td>
</tr>
<tr>
<td>3</td>
<td>230 324 400</td>
<td>-- -- --</td>
<td>-- -- --</td>
<td>-- -- --</td>
</tr>
<tr>
<td>4</td>
<td>250 352 435</td>
<td>360 507 626</td>
<td>-- -- --</td>
<td>-- -- --</td>
</tr>
<tr>
<td>5</td>
<td>265 373 461</td>
<td>385 592 670</td>
<td>515 725 896</td>
<td>-- -- --</td>
</tr>
<tr>
<td>6</td>
<td>270 380 470</td>
<td>395 556 687</td>
<td>550 775 957</td>
<td>-- -- --</td>
</tr>
<tr>
<td>8</td>
<td>-- -- --</td>
<td>465 570 704</td>
<td>570 803 991</td>
<td>965 1359 1678</td>
</tr>
</tbody>
</table>
Committee Comment: While modifications were made to the appendix map for clarity, it is felt that the local Authority Having Jurisdiction is in the best position to determine if earthquake protection is needed. The map is presented simply as an example of one insurance rating organization's recommendations. Building codes sometimes contain alternate requirements.

With regard to 3-10.3.2(b) it should be noted that the standard permits the flexible coupling to be located either above or below the connection to the sprinkler piping on each story as a means of providing occasional points of stress relief. Typically, the use of an additional flexible coupling on the opposite side will provide greater stress relief.

3-10.3.3 has been revised to indicate that even branch lines require swing joints if necessary to cross building seismic joints.

Revision to 3-10.3.2(e) and (f) reflects the Committee's intent to provide stress relief points at the top of all drop connected to racks or other parts of the building structure, and long drops serving individual sprinklers or parts of systems which might be subjected to differential movements between roof and ceiling.

The exception which permits elimination of clearance when flexible couplings are provided on both sides of a wall as compared to one side as required in 3-10.3.2 does not apply to floors due to the expected differential motion.

Frangible material is not permitted to fill clearances since it is desirable to have the filling material remain in place following movement of the pipe.

Revisions to 3-10.3.5.1 are intended to simplify the method of selecting brace sizes and fastener details, while retaining the option of individually sizing braces to handle assigned loads as presently mandated in the standard. Permission is given to connect braces to tabs welded on the pipe for longitudinal bracing only, in recognition of the difficulty of securely anchoring a brace to prevent movement in line with the pipe. The "assigned loads" for various sizes of pipes at the maximum lateral brace spacing of 50 feet are based on half the weight of 40 feet of water-filled main plus the larger of 8 standard schedule 40 water-filled 8-head ordinary hazard pipe schedule lines, or 125 feet of reasonably large branch lines simulating a gridded system.

13- 73 - (3-10.3.5.4 and 3-10.3.5.8): Accept

Submitter: Technical Committee on Automatic Sprinklers

Recommendation: Delete 3-10.3.5.8 and create a new Exception No. 3 to 3-10.3.5.4 as follows:

Exception No. 3: When flexible couplings are installed on mains other than as required in 3-10.3.2, a lateral brace shall be provided within 24 inches (610 m) of every other coupling, but not more than 40 feet (12 m) on center.

Substantiation: The requirement for additional braces on mains with flexible couplings is based on concern for excessive "snaking" or "accordion" effects which might result from oscillations. Limiting the number of flexible couplings to one between lateral braces will prevent such motion. Since this is an exception to the normal placement of lateral braces, it is more appropriately placed within 3-10.3.5.4.

Committee Action: Accept.

13- 74 - (3-10.3.5.4 Exception No. 4 (New)): Accept

Submitter: Technical Committee on Automatic Sprinklers

Recommendation: Add new Exception No. 4 as follows: Exception No. 4: When building primary structural members exceed 40 feet (12 m) on center, lateral braces may be spaced up to 50 feet on center.

Substantiation: Where main buildings structural members are 40 to 50 feet on center, it is preferable to increase spacing of lateral braces rather than attach braces to minor structural members, provided the braces are properly sized to accommodate expected loads.

Committee Action: Accept.

13- 75 - (3-10.3.5.9 Exception No. 1 and No. 2 (New)): Accept

Submitter: Technical Committee on Automatic Sprinklers

Recommendation: Designate existing exception as Exception No. 1 and add new second exception as follows: Exception No. 2: Branch lines 2 1/2 in. (63 mm) larger shall be provided with lateral bracing in accordance with 3-10.3.5.4.

Substantiation: New system designs sometimes call for branch lines larger than originally contemplated using the earthquake provisions of the standard.

Committee Action: Accept.
13- 76 - (3-10.3): Reject

SUBMITTER: R. J. Wright, Underwriters Laboratories of Canada

RECOMMENDATION: Add a new section titled:

"Protection of Piping Against Heat & Flame."

SUBSTANTIATION: Certain types of piping materials are particularly vulnerable to the effects of heat and flame and require supplementary protection. The standard does not address this concern.

COMMITTEE ACTION: Reject.

COMMITTEE COMMENT: See Committee Comment on 13-47 (Log #142).

13- 77 - (3-10.3.1): Reject

SUBMITTER: R. J. Wright, Underwriters Laboratories of Canada

RECOMMENDATION: New paragraph:

"Combustible piping or piping which loses more than 50 percent of its hydrostatic strength at any temperature up to 300°C shall be separated from the protected area by a fire resistance membrane consisting of not less than 1/2 in. thick plywood, 3/2 in. thick gypsum wallboard, 1 in. thick plaster on framing or any other noncombustible, fixed in-place material."

SUBSTANTIATION: Certain types of piping materials are particularly vulnerable to the effects of heat and flame and require supplementary protection. The standard does not address this concern. Provision of this information in certification listings and in the manufacturer's installation instructions is considered inadequate and inaccessible to inspection authorities who may be called upon to inspect installation at any time in accordance with this standard.

COMMITTEE ACTION: Reject.

COMMITTEE COMMENT: See Committee Comment on 13-47 (Log #142).

13- 78 - (3-10.3.2): Reject

SUBMITTER: R. J. Wright, Underwriters Laboratories of Canada

RECOMMENDATION: New paragraph:

"The protective membrane described in 3-10.1 shall not be penetrated by grilles, fixtures or other construction which would allow the passage of heat or flame or which would burn, or fall out of place at any temperature up to 300°C."

SUBSTANTIATION: Tests have shown that the presence of such interruptions in the protective membrane can, in the event of a fire, result in failure of the piping system prior to operation of the sprinkler.

COMMITTEE ACTION: Reject.

COMMITTEE COMMENT: See Committee Comment on 13-47 (Log #142).

13- 79 - (3-10.3.3): Reject

SUBMITTER: R. J. Wright, Underwriters Laboratories of Canada

RECOMMENDATION: New paragraph:

"During maintenance or renovation in which combustible piping, or piping which loses more than 50 percent of its strength at a temperature of 300°C, is exposed or an adjacent protective membrane is removed, protection of the piping by encasement in a noncombustible sheath or by wrapping with glass fibre or similar insulation shall be provided."

SUBSTANTIATION: When the required membrane is removed either directly below the piping or in its vicinity, such piping is at risk in the event of a fire.

COMMITTEE ACTION: Reject.

COMMITTEE COMMENT: See Committee Comment on 13-47 (Log #142).

13- 80 - (3-10.3.4): Reject

SUBMITTER: R. J. Wright, Underwriters Laboratories of Canada

RECOMMENDATION: New paragraph:

"Combustible piping or piping subject to loss of more than 50 percent of its strength at any temperature up to 300°C shall be plainly marked at intervals of not more than every 2 metres with the caution:

WARNING: This pipe is at risk if exposed -- sheath or wrap with noncombustible insulation during service and renovation."

SUBSTANTIATION: The need for such protection is not covered in the standard. Workmen should be aware of the need to protect the piping immediately upon its exposure during service and renovation.

NOTE: Supporting material is available for review at NFPA Headquarters.

COMMITTEE ACTION: Reject.

COMMITTEE COMMENT: See Committee Comment on 13-47 (Log #142).

13- 81 - (3-10.4 (New) and 3-10.4.1 (New)): Reject

SUBMITTER: Daniel M. McGee, American Iron and Steel Institute

RECOMMENDATION: Add the following new paragraph 3-10.4 Protection of Piping Against Structural Damage.

3-10.4 Protection of Piping Against Structural Damage.

3-10.4.1 Piping shall be capable of supporting a concentrated load of not less than 200 pounds located at the center of two supports at their maximum permitted spacing.

SUBSTANTIATION: Appendix Note A3-10 suggests that piping be protected against damage due to impact. This general note may have been adequate many years ago. However, with the development of lighter and thinner types of piping it is believed necessary to establish some minimum criteria for the structural strength of sprinkler piping.

The standard establishes significant loading requirements for pipe hangers to assure their ability to withstand unforeseen forces. Piping materials if exposed must also be of sufficient strength to transmit unforeseen loads to the hangers.

COMMITTEE ACTION: Reject.

COMMITTEE COMMENT: The submitter has provided no supporting data to justify acceptance of the proposal.

13- 82 - (3-11.2.3): Reject

SUBMITTER: Joseph G. Radzik, Victaulic Company of America

RECOMMENDATION: Revise first sentence to read as follows:

"Each interior sectional control valve shall be listed and shall be provided with a listed drain connection sized as shown in Table 3-11.2.2 so as to drain that portion of the system controlled by the sectional valve."

Remainder of section remains the same.

SUBSTANTIATION: The addition of the "listed" requirement will prevent the use of equipment or materials which do not meet or have not been tested to appropriate standards.

COMMITTEE ACTION: Reject.

COMMITTEE COMMENT: It is not the intent of the Committee to require the listing of valves not in supply pipes to sprinklers. See 3-14.1.

13- 83 - (3-11.3.2.1, 3-11.3.3.1 and 3-11.3.4.2 Exception No. 2): Reject

SUBMITTER: L.G. Keeping, Canadian Automatic Sprinkler Assn.

RECOMMENDATION: In all three of these sections change "3/4 in." to "1/2 in."

SUBSTANTIATION: The present wording results from a desire to provide consistency regarding the sizing of auxiliary drains according to the 1984 Fall Meeting Technical Committee Reports. There was no other substantiation for increasing the size of the drain in Section 3-11.3.3.1 from 1/2 in. to 3/4 in. A 1/2 in. drain, for trapped portions of 5 gal or less, on dry pipe systems was acceptable for at least the previous 20 years (NFPA 13-1963 through NFPA 13-1983). A 1/2 in. drain should therefore still be acceptable for a dry system. In addition to this, the Exceptions to 3-11.3.2.1 and 3-11.3.4.2 in the 1987 edition do not mandate auxiliary drains for piping that can be drained.
by removing a single pendent sprinkler - presumably with a 1/2 in. thread. From this it follows that it should also be acceptable for wet or preaction systems.

COMMITTEE ACTION: Reject.

COMMITTEE COMMENT: The existing wording is in accordance with the intent of the Committee.

13-84 - (3-12.2.6(e)) Accept in Principle

SUBMITTER: James Yager, Normal Fire Systems, Inc.

RECOMMENDATION: Revise as follows:

(e) Properly sized circular steel weld plates are permissible except at the end of a cross main.

SUBSTANTIATION: Steel weld plates are a useful, practical and economical weld fitting that should not be indiscriminately prohibited.

The reasons cited for adding terminology prohibiting the use of steel plates in NFPA 13-1987 were that, in some instances, both of the following occurred. Cross mains were terminated with a steel plate and steel plates which were irregular in size and shape were being used.

The text as revised should satisfy those objections.

COMMITTEE ACTION: Accept in Principle.

Delete 3-12.2.6(e) in its entirety.

COMMITTEE COMMENT: Approved welded fittings are available to effect a welded closure and should be used in accordance with 3-12.2.4 (see 3-12.2.4).

13-85 - (3-12.6.6(g) Exception): Accept

SUBMITTER: Technical Committee on Automatic Sprinklers

RECOMMENDATION: Add the following:

Exception: Tabs may be welded to pipe for longitudinal earthquake braces only. See 3-10.3.5.1.

SUBSTANTIATION: The exception is necessary in order to be compatible with the new requirements in paragraph 3-10.3.5.1.

COMMITTEE ACTION: Accept.

13-86 - (3-13.3 Exception): Reject

SUBMITTER: Ivan M. Hibur, Prospect, KY

RECOMMENDATION: Change Exception to read:

Exception: (For other than calculated systems) hexagonal or face bushings may be used in reducing the size of openings or fittings when standard (reducers) of the required size are not available (as they are not made).

SUBSTANTIATION: Extensive use of bushings in a hydraulically designed sprinkler system(s) presented major problems when trying to obtain equivalent feet for bushings in calculations as there are no guidelines to them. Systems were rejected for approval during field inspection, making recalculating impossible, refitting with reducers necessary. By restricting the use of bushings to noncalculated systems this problem is avoided. Further pipes are of standard size, reducers are made for them, why is the Exception needed?

COMMITTEE ACTION: Reject.

COMMITTEE COMMENT: The hydraulics information is available and it is not the intent of the Committee to outlaw bushings if fittings are manufactured but cannot be reasonably secured.

13-87 - (3-13.3 Exception No. 2 (New)): Accept

SUBMITTER: Technical Committee on Automatic Sprinklers

RECOMMENDATION: In paragraph 3-13.3 make the exception Exception No. 1.

Add new Exception No. 2 to read:

"Hexagonal bushings as permitted in 3-8.5.1 are acceptable.

SUBSTANTIATION: Guidance is needed.

COMMITTEE ACTION: Accept.

13-88 - (3-14.1.4 (New)): Accept

SUBMITTER: Technical Committee on Automatic Sprinklers

RECOMMENDATION: New 3-14.1.4.

"When water type valves are used the disc may extend beyond the end of the valve body. Valve discs shall not interfere with the operation of other system components.

SUBSTANTIATION: Guidance is needed.

COMMITTEE ACTION: Accept.

13-89 - (3-14.2.3(a) Exception No. 1 and Exception No. 2 (New)): Accept in Principle

SUBMITTER: Rodney A. McPherson, Canadian Wood Council

RECOMMENDATION: Number existing Exception as No. 1.

Add new Exception No. 2 to read:

Exception No. 2: Locking or sealing valves open is not recognized as appropriate supervision for floor control valves in high-rise buildings (See 3-17.6).

SUBSTANTIATION: Self explanatory. As per 3-16.6(b) a distinct signal is required to indicate a condition that will impair satisfactory operation of a sprinkler system i.e., a closed control valve.

COMMITTEE ACTION: Accept in Principle.

Modify the submitted Exception to read:

Exception No. 2: For floor control valves in high rise buildings, see 3-17.6; for circulating closed loop systems, see 5-6.1.6.

COMMITTEE COMMENT: The revised wording expresses the Committee's intent to present other areas where other forms of supervision are necessary.

13-90 - (3-14.2.8 (New)): Accept in Principle

SUBMITTER: Engineering and Standards Committee, National Fire Sprinkler Assn.

RECOMMENDATION: Add new paragraph 3-14.2.8 as follows:

3-14.2.8 In portions of buildings where the potential exists for water pressure to exceed 175 psi the following shall apply:

(a) A listed pressure reducing valve shall be installed set for an outlet pressure not exceeding 175 psi at the maximum inlet pressure condition.

(b) Pressure gauges shall be installed on the inlet and outlet sides of each pressure reducing valve.

(c) For hydraulically calculated systems, losses through the pressure reducing valve shall be included based on the normal inlet pressure condition. Pressure loss data from manufacturers literature shall be used.

(d) A relief valve not less than 1/4 in. in size shall be provided on the discharge side of the pressure reducing valve set to operate at a pressure not exceeding 175 psi.

(e) A listed indicating valve shall be provided on the inlet side of the pressure reducing valve.

(f) Each pressure reducing valve shall be tested at least annually to insure proper pressure reduction at both maximum and normal inlet pressures.

SUBSTANTIATION: A number of field problems have been reported with pressure reducing valves. In many cases the valve setting is based on an expected inlet pressure. These valves appear to often create a proportional reduction in pressure, making what would normally be an adequate yet reduced inlet pressure into an inadequate outlet pressure.

Many pressure reducing valves are being promoted as floor control valves, yet the laboratory requirements for these devices do not meet the same level of performance in that regard. The reliability of these devices is also a concern. Although maintenance provisions are more appropriate for NFPA 13A, it is suggested that a statement regarding annual testing be added to NFPA 13 as well.

COMMITTEE ACTION: Accept in Principle.

Accept the submitter's wording except in item (d), change "1/4" to "1/2," and in (f) add the words: "upon completion of the initial installation and"

between the words "tested" and "rat."

Delete B-2-3.4 in its entirety.

COMMITTEE COMMENT: The revised wording should satisfy the submitter's intent.

13-91 - (A-3-15.1): Accept in Principle

SUBMITTER: Ray R. Rumble, Michigan Hanger Co., Inc.

RECOMMENDATION: See sketches below:
SUBMITTER: Michigan Hanger Co., Inc., manufacturers of approximately one half of the pipe supports used in the automatic fire sprinkler business in the U.S., wish to petition the NFPA to up-date the drawings found in Pamphlet 13, Appendix A, Figure A-3-15.1. Many of the hangers shown on this figure are obsolete and are no longer manufactured, causing great confusion among the owner/engineers who look at pictures and do not read the fine print found in 3-15.1 through 3-15.4.8. Also, the "swivel loop band hangers," similar to our Models #130 and #115 and the "universal top beam clamp," similar to our #300 and #310 and which are used in 95-96% of all sprinkler installations, are not shown in A-3-15.1 at all.

Those items which are obsolete are as follows:
1. Type D: Wire U Hanger
2. Type C: Structural attachment in its entirety
3. Type E: Hanger ring
4. Type F: Hanger ring
5. Type J: Bracket and ring
6. Type J: Ring
7. Type K: Ring
8. Type M: Ring
9. Tyoe Q: Ring

Also, the statement under A-3-15.1 causes confusion as the word "acceptable" has no relation to what paragraphs 3-15.1 through 3-15.6 say; namely, to use supports which have been tested by a nationally recognized testing laboratory at a five times safety factor plus 250 pounds.

Our recommendation is "either/or". Either eliminate Figure A-3-15.1 entirely or update it now and on a regular basis in future.

Our suggestion in drawing form is noted above and does not only lean toward our product line but takes into account our competitors products.

COMMITTEE COMMENT: The revised wording should satisfy the submitter's intent.

13- 92 - (Table 3-15.1.7(b)): Accept
SUBMITTER: Technical Committee on Automatic Sprinklers
RECOMMENDATION: Modify Table 3-15.1.7(b) to provide required section moduli for pipe sizes 1 in. through 2 in. as indicated below:
Additions to Table 3-15.1.7(b)
Section Modulus Required for Trapeze Members (in^3)
<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>1 in.</th>
<th>1-1/4 in.</th>
<th>1-1/2 in.</th>
<th>2 in.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 ft 6 in.</td>
<td>0.082</td>
<td>0.084</td>
<td>0.087</td>
<td>0.090</td>
</tr>
<tr>
<td>2 ft 0 in.</td>
<td>0.106</td>
<td>0.108</td>
<td>0.111</td>
<td>0.114</td>
</tr>
<tr>
<td>2 ft 6 in.</td>
<td>0.130</td>
<td>0.132</td>
<td>0.135</td>
<td>0.138</td>
</tr>
<tr>
<td>3 ft 0 in.</td>
<td>0.154</td>
<td>0.156</td>
<td>0.159</td>
<td>0.162</td>
</tr>
<tr>
<td>3 ft 6 in.</td>
<td>0.178</td>
<td>0.180</td>
<td>0.183</td>
<td>0.186</td>
</tr>
<tr>
<td>4 ft 0 in.</td>
<td>0.202</td>
<td>0.204</td>
<td>0.207</td>
<td>0.210</td>
</tr>
<tr>
<td>5 ft 0 in.</td>
<td>0.226</td>
<td>0.228</td>
<td>0.231</td>
<td>0.234</td>
</tr>
<tr>
<td>6 ft 0 in.</td>
<td>0.250</td>
<td>0.252</td>
<td>0.255</td>
<td>0.258</td>
</tr>
<tr>
<td>7 ft 0 in.</td>
<td>0.274</td>
<td>0.276</td>
<td>0.279</td>
<td>0.282</td>
</tr>
<tr>
<td>8 ft 0 in.</td>
<td>0.298</td>
<td>0.300</td>
<td>0.303</td>
<td>0.306</td>
</tr>
<tr>
<td>9 ft 0 in.</td>
<td>0.322</td>
<td>0.324</td>
<td>0.327</td>
<td>0.330</td>
</tr>
<tr>
<td>10 ft 0 in.</td>
<td>0.346</td>
<td>0.348</td>
<td>0.351</td>
<td>0.354</td>
</tr>
</tbody>
</table>

As indicated in the table above, the submitter's intent can be met by reducing the values in Table 3-15.1.7(b) to two decimal places and removing the decimal points from the table.

COMMITTEE ACTION: Accept.

13- 93 - (A-3-15.1.11.2 (New)): Accept
SUBMITTER: Technical Committee on Automatic Sprinklers
RECOMMENDATION: New A-3-15.1.11.2.
When copper tube is to be installed in moist areas or other environments conducive to galvanic corrosion, copper hangers or ferrous hangers with an insulating material should be used.

SUBSTANTIATION: Guidance is necessary.
COMMITTEE ACTION: Accept.

13 - 94 - (3-15.4.6): Reject
SUBMITTER: L.G. Keeping, Canadian Automatic Sprinkler Assn.
RECOMMENDATION: Change the words "of the beam" to "wood beams".
SUBSTANTIATION: Clarification. Presumably this section only applies to wood construction.
COMMITTEE ACTION: Reject.
COMMITTEE COMMENT: The section addresses both wood and other types of construction.

13- 95 - (3-15.4.7): Accept
SUBMITTER: Technical Committee on Automatic Sprinklers
RECOMMENDATION: Relocate the first sentence in 3-15.4.7 to become a second sentence in 3-15.4.2 and add the phrase: "In conjunction with U hangers only."

SUBSTANTIATION: Guidance is necessary.
COMMITTEE ACTION: Accept.

13 - 96 - (3-15.5.5 Exception and 3-15.5.6 Exception): Reject
SUBMITTER: L.G. Keeping, Canadian Automatic Sprinkler Assn.
RECOMMENDATION: In both Exceptions, after the words ". . . below the ceiling" and before the words "the hanger assembly . . . " insert the following: "When the sprinkler is not installed with a ceiling plate that will prevent upward movement."

SUBSTANTIATION: According to manufacturers literature for CPVC pipe, sprinkler escutcheons capable of preventing upward movement are a listed means of securing the sprinkler. If this is acceptable for CPVC, it should also be acceptable for steel and copper pipe.
COMMITTEE ACTION: Reject.
COMMITTEE COMMENT: The proposal does not address the ability of the ceiling to resist the upward motion of the pipe.
SUBSTANTIATION: The requirement for a hanger between each two branch lines as developed for pipe joists with threaded cast iron fittings. Mains constructed in the fashion described above should not need to comply with this criteria.

COMMITTEE ACTION: Reject.

COMMITTEE COMMENT: The submitter has provided no supporting data to justify acceptance of the proposal.

13-96 - (3-16.1(h) and (i)): Accept
SUBMITTER: John A. Antola, American Insurance Services Group

RECOMMENDATION: Add an asterisk to the subject paragraphs. Add the following to Appendix A: A-3-16.1(h) and (i) Under certain ambient conditions, wet-pipe systems having dry-pendant (or upright) sprinklers may freeze due to heat loss by conduction. Therefore, due consideration should be given to the amount of heat maintained in the heated space, the length of the nipple in the heated space, and other relevant factors.

SUBSTANTIATION: The use of dry pendant (or upright) sprinklers in cold spaces, connected to wet-pipe systems in heated spaces, presents potential problems of freezing of the wet-pipe system. Figure 3-11.2 and Figure A-3-9.1.1 provide guidance for certain potential freezing situations, but we cannot find any guidance for piping (in particular, dry pendant (or upright) nipples extending into cold spaces or locations). The proposal is simply intended to call attention to the potential problem. One sprinkler manufacturer has informed us of an incident of the type described.

COMMITTEE ACTION: Accept.

13-99 - (3-16.1(r)): Accept in Principle
SUBMITTER: Russell P. Fleming, National Fire Sprinkler Association

RECOMMENDATION: Revise definition of quick response sprinkler to read as follows: (r) Quick-Response Sprinkler. A type of special sprinkler with sensitivity characteristics comparable to a residential sprinkler, intended to be installed at standard spacings when permitted for use in accordance with the largest room rule of paragraph 2-2.1.

SUBSTANTIATION: A better definition is needed for the listed quick response sprinkler, one that recognizes its sensitivity characteristics and its spacing limitations. Allowable use of the sprinkler in accordance with the "largest room rule" should also be recognized.

COMMITTEE ACTION: Accept in Principle.

Change to read: "A type of special sprinkler incorporating a fast actuating heat responsive element." 

COMMITTEE COMMENT: The submitter has not provided supporting data. The revised definition is more specific to this type of sprinkler.

13-100 - (3-16.1(j) and (k)): Reject
SUBMITTER: Rodney A. McPhee, Canadian Wood Council

RECOMMENDATION: Add the following definitions as items (j) and (k) respectively and reletter other definitions accordingly.

(j) 45° dry pendant - A type of special sprinkler having a 45° deflector designed for protecting small loading docks or similar areas subject to freezing.

(k) Horizontal dry sidewall - A type of special sprinkler which can be installed horizontally and located to protect areas subject to freezing.

SUBSTANTIATION: The Committee, in the previous Proposal/Comment period in 1985-86, indicated in their comments regarding a proposal on protection of small loading docks, platforms, or similar areas which were unheated that these two types of sprinklers should not be specifically identified as being appropriate for this use as they were "special sprinklers." In view of this, it is appropriate to identify them in the list of "commonly used sprinklers" and define them as a type of special sprinkler so that system designers are aware of their special application.

COMMITTEE ACTION: Reject.

COMMITTEE COMMENT: The listing in 3-16.1 of commonly used sprinklers is not intended to be all inclusive.

13-101 - (A-3-16.2.1(b)): Accept
SUBMITTER: Engineering and Standards Committee, National Fire Sprinkler Assn.

RECOMMENDATION: Renumber this section as A-3-4.1 and reword as follows: A-3-4.1 The demonstrated effectiveness of pipe schedule systems is limited to their use with 1/2 in. orifice sprinklers. The use of other size orifices requires hydraulic calculations to prove their ability to deliver the required amount of water within the available water supply.

SUBSTANTIATION: The guidance provided in this section needs to be expanded beyond the use of large orifice sprinklers. It applies equally well to small orifice and extra-large orifice sprinklers.

COMMITTEE ACTION: Accept.

13-102 - (A-3-16.2.6): Accept
SUBMITTER: George Laverick, Underwriters Laboratories, Inc.

RECOMMENDATION: Delete entire paragraph.

SUBSTANTIATION: UL requirements recently adopted in UL 199 For Extended Coverage Sprinklers address the parameters in paragraph 4-1.1.3 of NFPA 13. These requirements, which become effective on January 31, 1989, do not include limitations relative to ceiling heights.

2. The installation parameters for back-to-back sprinklers are now specified in paragraph 4-5.1.

COMMITTEE ACTION: Accept.

13-103 - (3-16.2.9.1 and A-3-16.2.9.1 (New)): Reject
SUBMITTER: J.G. Barbeau, Insurers' Advisory Organization, Inc.

RECOMMENDATION: Line 1, replace "may be used" with "shall be installed". Lines 2 and 3, delete "provided they are installed".

Insert an asterisk after 3-16.2.9.1 and add the following Appendix item:

A-3-16.2.9.1 The fast response and improved water distribution pattern of listed residential sprinklers have been shown by extensive fire testing to provide better extinguishment with lower water demands than with conventional sprinklers in residential occupancies. These sprinklers will normally prevent flashover in the room of fire origin thus improving the chance of occupants to escape or be evacuated.

SUBSTANTIATION: Because of the proven life safety characteristics of residential sprinklers, their installation should be mandatory in all newly sprinklered residential occupancies.

COMMITTEE ACTION: Reject.

COMMITTEE COMMENT: There are no residential sprinklers listed for all the types of ceiling construction found in residential occupancies covered by NFPA 13. Flexibility is needed.

13-104 - (3-16.2.9.1 and A-16-2.9.1 (New)): Accept in Principle
SUBMITTER: J.G. Barbeau, Insurers' Advisory Organization

RECOMMENDATION: Insert an asterisk after 3-16.2.9.1 and add the following Appendix item:

A-3-16.2.9.1 The fast response and improved water distribution pattern of listed residential sprinklers have been shown by extensive fire testing to provide better extinguishment with lower water demands than with conventional sprinklers in residential
occupancies. These sprinklers will normally prevent flashover in a room of fire origin thus improving the chance for occupants to escape or be evacuated. Their use in residential occupancies is therefore highly desirable and is especially recommended in hospital patient rooms, nursing homes and the like where ill or elderly people may not be capable of making a quick exit during a fire.

SUBSTANTIATION: Not all sprinkler designers, fire officials and others involved in sprinkler installations are aware of the superior characteristics of residential sprinklers. This Appendix item will make them aware of these characteristics and help them make an informed choice of sprinklers for residential occupancies.

NOTE: This proposal is submitted in the event that my separate proposal to make the installation of residential sprinklers mandatory in all newly sprinklered residential occupancies is rejected.

COMMITTEE ACTION: Accept in Principle.

Modify submitter's proposal to read:

A-3-16.2.9.1 The response and water distribution pattern of listed residential sprinklers have been shown by extensive fire testing to provide better control than conventional sprinklers in residential occupancies. These sprinklers are intended to prevent flashover in the room of fire origin thus improving the chance for occupants to escape or be evacuated.

COMMITTEE COMMENT: The revised wording should satisfy the submitter's intent.

13 - 105 - (3-16.2.10 (New)): Accept in Principle

SUBMITTER: Engineering and Standards Committee, National Fire Sprinkler Assn.

RECOMMENDATION: Add new section as follows:

3-16.2.10 Escutcheon plates used to create a recessed or flush type sprinkler shall be part of a listed sprinkler assembly.

SUBSTANTIATION: Although 4-3.1 presently provides guidance as to the minimum distance of sprinkler operating elements and deflectors below ceilings for other than special listed sprinklers, this guidance is not being fully observed in the field. New sprinklers with small frames are being used with recessing cups that can adversely affect sprinkler performance. The proposed wording will require that such cups be listed with the sprinkler they serve.

COMMITTEE ACTION: Accept in Principle.

New section:

3-16.2.8.1 Existing 3-16.2.8.

3-16.2.8.2 Proposal 13-105 (Log #26) as submitted.

COMMITTEE COMMENT: The revised wording should satisfy the submitter's intent.

13 - 106 - (3-16.5): Reject

SUBMITTER: Engineering and Standards Committee, National Fire Sprinkler Assn.

RECOMMENDATION: Change by adding new line to recognize extra-large orifice sprinkler with entries as follows:

Nominal orifice size - 2" or larger
Orifice type - Extra Large
(K) Factor - 11.0-11.5
Percent of nominal 1/2 in. discharge - 200
Thread type - 3/4 in. NPT
Pintle - no
Nominal orifice size marked on frame - special deflector

SUBSTANTIATION: Extra-large orifice sprinklers are presently listed under UL 199 and are useful in providing high densities required for extra hazard occupancies in Figure 2-2.1(b) without the use of high pressures that might adversely affect droplet size distribution and penetration abilities of the sprinkler discharge.

COMMITTEE ACTION: Reject.

COMMITTEE COMMENT: The submitter has provided no data to indicate comparable performance to 1/2 in. and 17/32 in. sprinklers on a density design basis.

13 - 107 - (3-16.5.2): Accept

SUBMITTER: Engineering and Standards Committee, National Fire Sprinkler Assn.

RECOMMENDATION: A. In Exception No. 3 add "and 5-6.1.4.1" to the end of the sentence.

B. In Exception No. 4 add "or required" after the word "permitted."

SUBSTANTIATION: A. Reference is required to 5-6.1.4.1 as this section specifies where sprinklers of other than Ordinary Temperature classification shall be provided.

B. Other NFPA Standards not only permit sprinklers of other than Ordinary Temperature classification but also in a good number of cases require it and therefore this exception should be revised to reflect this and clarify intent.

COMMITTEE ACTION: Accept.

13 - 108 - (Table 3-16.6.1): Accept in Principle

SUBMITTER: Layard E. Campbell, Reliable Automatic Sprinkler Co., Inc.

RECOMMENDATION: Revise Table 3-16.6.1, line 2 to read:

<table>
<thead>
<tr>
<th>Color</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yellow</td>
<td>Yellow</td>
</tr>
<tr>
<td>or</td>
<td>or</td>
</tr>
</tbody>
</table>

Committee Comment: This change results in there being no requirements for color coding for extra-high, very extra-high and ultra-high temperature rated sprinklers.

13 - 109 - (3-16.6.2 Exceptions No. 3 and No. 4): Accept

SUBMITTER: Rodney A. McPhee, Canadian Wood Council

RECOMMENDATION: A. In Exception No. 3 add "and 5-6.1.4.1" to the end of the sentence.

B. In Exception No. 4 add "or required" after the word "permitted."

SUBSTANTIATION: A. Reference is required to 5-6.1.4.1 as this section specifies where sprinklers of other than Ordinary Temperature classification shall be provided.

B. Other NFPA Standards not only permit sprinklers of other than Ordinary Temperature classification but also in a good number of cases require it and therefore this exception should be revised to reflect this and clarify intent.

COMMITTEE ACTION: Accept.

13 - 110 - (Table 3-16.6.3(a)): Accept

SUBMITTER: Technical Committee on Automatic Sprinklers

RECOMMENDATION: Modify the title of Table 3-16.6.3(a) to:

"Temperature Ratings of Sprinklers Based on Distance From Heat Sources."

SUBSTANTIATION: The title should more clearly express the use of the table.

COMMITTEE ACTION: Accept.
13-111 - (3-16.6.3(a)): Accept

RECOMMENDATION: In paragraph 3-16.6.3(a) delete the phrase: "When steam pressure is not more than 15 psi."

RECOMMENDATION: In addition, revise the end of the first paragraph to appear as:

"... used throughout (See Tables 3-16.6.3(a) and (b) and Figure 3-16.6.3(a))."

SUBSTANTIATION: Clarification of the Committee's intent is needed.

COMMITTEE ACTION: Accept.

13 - 112 - (3-16.7.3): Reject

SUBMITTER: Phillip W. Green, Fort Walton Beach Fire Dept.

RECOMMENDATION: Revise as follows:

3-16.7.3 The stack of space sprinklers shall be as follows:

For equipment not over 300 sprinklers, not less than 6 sprinklers of each type and temperature rating.

For equipment above 300 sprinklers not less than 12 sprinklers of each type and temperature rating.

Each type and temperature rated sprinkler shall be stored in its own cabinet with its own wrench.

SUBSTANTIATION: The present section 3-16.7.3 does not address what ratio sprinklers should be stored in if there are more than one type of sprinkler in use. In my experience I have found that there is not an adequate ratio of heads stored to heads in use. To alleviate this I propose the change as is written above.

COMMITTEE ACTION: Reject.

COMMITTEE COMMENT: The quantities specified are excessive.

13 - 113 - (3-16.7.4 (New)): Reject

SUBMITTER: Gregory Jakubowski, Lansdale, PA

RECOMMENDATION: Add new text as follows:

3-16.7.4 There shall be maintained on the premises, in the spare sprinkler cabinet, a device that may be used to individually shut off activated sprinklers present on the premises. The number of devices stored shall not be less than the stock of space sprinklers required for each type of sprinkler present on the premises.

SUBSTANTIATION: Many new sprinkler heads cannot be individually shut down by traditional means. Therefore, fire departments or other responding agencies may shut entire systems down to replace one head or prevent further water damage. This will eliminate sprinkler protection in unaffected areas. If shut-down devices are present on-site, it will eliminate the need for responding agencies to carry a large selection of shut-down devices. This also will guarantee that the proper shut-down devices are available on the premises.

COMMITTEE ACTION: Reject.

COMMITTEE COMMENT: The Committee does not see this as a practical requirement for all installations.

13 - 114 - (3-16.9.3): Reject

SUBMITTER: J.G. Barbeau, Insurers' Advisory Organization

RECOMMENDATION: Delete this section.

SUBSTANTIATION: (a) The "ornamental finishes" referred to include the (factory) painting of sprinklers. In the case of glass bulb pendent sprinklers the entire sprinkler (excluding the glass bulb) and its escutcheon plate are painted a uniform colour. This is contrary to Section A-3-16.9.2 which states in part "... Painting may invite the application of subsequent coatings, thus increasing the possibility of a malfunction of the sprinkler." A painter who is repainting a ceiling with these sprinklers present would be likely to assume that its O.K. to repaint the ceiling and sprinklers without protecting the sprinklers if they are already uniformly painted the same colour as the ceiling. (b) Factory painted sprinklers do not have an "ornamental" finish when the intended purpose of the painted finish is to have the sprinkler blend into the background of the painted ceiling (both being the same colour), so that the presence of these sprinklers is either not noticed or is hardly noticeable. This is the opposite of ornamentation whose intended purpose is to have the ornamental feature stand out.

COMMITTEE ACTION: Reject.

COMMITTEE COMMENT: The quantities specified are excessive.

13-115 - (Table 3-6.2(b), 3-7.2 Exception and 13-16.5.2(a) Exception): Accept

SUBMITTER: Rodney A. McPhee, Canadian Wood Council

RECOMMENDATION: (a) In both 3-7.2 and 3-16.5.2(a) Exception delete the words "See Chapter Six" and add to the remaining text in both cases:

"... installed in conformance with Chapter 6."

(b) In Table 3-6.2(b) heading change the word "less" to "more."

SUBSTANTIATION: Editorial mainly. In (b), the table is for pipe sizing where sprinklers are spaced over 12 ft apart, not less than 12 ft apart.

COMMITTEE ACTION: Accept.

13 - 116 - (Appendix A Figures): Reject

SUBMITTER: Jamie Blackstone, Grinnell Fire Protection Systems

RECOMMENDATION: For sprinkler spacing in irregular shaped enclosures and special conditions.

SUBSTANTIATION: A substantial amount of sprinklers are unnecessary for sufficient coverage when limited to "square" spacing. Circular spacing represents the actual protected area, the coverage is not in fact a square or rectangle, obviously, but rather a circle whose radius is the linear spacing required multiplied by 0.7.

COMMITTEE ACTION: Reject.

COMMITTEE COMMENT: The suggested guidance is not consistent with the discharge patterns of upright or pendent sprinklers which are affected by frame arms and piping.

13 - 117 - (4-1.1.1 Exceptions No. 1 and No. 4): Accept

SUBMITTER: Rodney A. McPhee, Canadian Wood Council

RECOMMENDATION: (a) Revise Exception No. 1 to read:

Exception No. 1: See 4-4.4, 4-4.4, and 4-4.4.4 for locations from which sprinklers may be omitted.

(b) In Exception No. 4 add "and 4-5.4" to the end of the wording.

SUBSTANTIATION: (a) Small washrooms with noncombustible fixtures are not required to be protected and should be referenced in Exception No. 1 for clarification.

(b) Editorial.

COMMITTEE ACTION: Accept.
NOTE: These figures are referenced in Proposal 13-116 (Log #40)

This is graphically illustrated in Figure A-3-5.1(b). With the O as the center, by rotating the square an infinite number of squares can be laid out, the corners of which will plot a circle whose radius is 0.7 times the listed spacing. The O will cover any of the squares and consequently any point within the confines of the circle.

\[ 15 \times 7 = 102" \text{ RADIUS} \]

So far this explanation has considered squares and circles. In practical applications, very few areas turn out to be exactly square, and circular areas are rare indeed. Designers deal generally with rectangles of odd dimensions and corners of rooms or areas formed by these intercepts, where spacing to one wall is less than one-half the spacing. To simplify the rest of this explanation consider the O with a listed spacing of 15 ft by 15 ft (4.55 m by 4.55 m). The principles derived will be equally applicable to other types.

Figure A-3-5.1(b)

15" C= A

Typical Rectangles

For SI Units: 1 ft = 0.305 m.

Figure A-3-5.1.1
13-118 - (4-1.1.3): Reject
SUBMITTER: W. E. Wilcox, FMRC
RECOMMENDATION: In the first sentence, change the term "protection areas" to "sprinkler spacings."
SUBSTANTIATION: This will clarify the true intent of 4-1.1.3 and clarify that 4-1.1.3 does not address design areas.
COMMITTEE ACTION: Reject.
COMMITTEE COMMENT: The Committee believes this revision would not clarify the section, and in addition the exceptions refer to areas, as do the listing of special sprinklers.

13-119 - (4-1.1.3 Exception No. 1): Reject
SUBMITTER: Thomas G. Daly, American Hotel and Hotel Assn.
RECOMMENDATION: Delete existing Exception No. 1 and renumber Exception No. 2 to read "Exception: . . . ."
SUBSTANTIATION: The addition of this section was not based on empirical testing, was contrary to the ability of listed sprinklers to provide coverage in excess of 400 sq ft and will further preclude technical advances in automatic sprinkler technology without substantial justification.
COMMITTEE ACTION: Reject.
COMMITTEE COMMENT: These two exceptions were installed because of concern for proliferation of unlimited pressure/area combinations with no guidance to the testing laboratories, and also concerns that existing test methods may not appropriately evaluate the resulting throw distances for other than equal-sized maximum areas of coverage.
This also would increase the response time as larger spacings are attempted - resulting in greater distances between sprinklers.

13-120 - (4-1.3.3): Accept
SUBMITTER: Rodney A. McPhee, Canadian Wood Council
RECOMMENDATION: Revise section to read:
4-1.3.3 Bar Joist Construction. The term bar joist construction refers to construction employing joists consisting of steel truss-shaped members, or wood bar joists which consist of wood top and bottom chord members with steel tube or bar webs. This definition includes noncombustible and combustible roof and floor decks supported on bar joists.
SUBSTANTIATION: Open wood bar joists are as open as open web type beams and open steel bar joists and as such do not present any more of a problem with banking up of heat between members. In view of this, sprinkler spacing below such construction should be as permitted for "smooth ceiling construction." Refer also to NFPA 72E, Section 2-4.1.4 Smooth Ceiling which states:
"Note: Open truss constructions are not considered to impede the flow or fire products unless the upper member in continuous contact with the ceiling projects below the ceiling more than 4 in. (100 mm)." This philosophy applies to spacing and location of heat detectors and should be applied to sprinklers (a type of heat detector).
COMMITTEE ACTION: Accept.

13-121 - (4-1.3.7): Accept in Principle
SUBMITTER: David J. Burkhardt, Fort Worth Fire Dept., TX
RECOMMENDATION: Revise as follows:
4-1.3.7 Wood Joist Construction. The term wood joist construction refers to wood members of rectangular cross section, which may vary from 2 to 4 in. (51 to 102 mm) nominal width and up to 14 in. (356 mm) nominal depth, spaced up to 3 ft (0.9 m) on centers, and spanning up to 40 ft (12 m) between supports, supporting a floor or roof deck. Wood members less than 4 in. (102 mm) nominal thickness spaced more than 3 ft (0.9 m) on centers are also considered as wood joist construction.
SUBSTANTIATION: By including wood trusses in the definition of wood joist construction the sprinkler deflector location (Section 4-3.5) will be below the trusses, which are unable to provide the separation property that solid wood joists can provide. Secondly, Exception No. 3 in 4-4.4 will allow major combustible concealed spaces if constructed of wood trusses.
COMMITTEE ACTION: Accept in Principle.
Revise submitted definition to read as follows:
4-1.3.7 Wood Joist Construction. The term wood joist construction refers to solid wood members of rectangular cross section, which may vary from 2 to 4 in. (51 to 102 mm) nominal width and up to 14 in. (356 mm) nominal depth, spaced up to 3 ft (0.9 m) on centers, and spanning up to 40 ft (12 m) between supports, supporting a floor or roof deck. Solid wood members less than 4 in. (102 mm) nominal thickness and up to 14 in. (356 mm) nominal depth, spaced more than 3 ft (0.9 m) on centers are also considered as wood joist construction.

COMMITTEE COMMENT: Clarification and also see Proposal 13-125 (Log #100).
Sprinkler Rules for Wood Joist Construction

<table>
<thead>
<tr>
<th>Open Wood Joists</th>
<th>Wood Joists</th>
<th>Open Wood Trusses</th>
<th>Wood Trusses</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Solid) Directly Attached</td>
<td>(Solid) w/Ceiling</td>
<td>(Solid) w/Ceiling</td>
<td>Directly Attached</td>
</tr>
<tr>
<td>Maximum Protection</td>
<td>Regular NFPA 13 spacings below smooth ceiling, Not required in concealed space</td>
<td>130 (See 4-2.2.1.2)</td>
<td>Regular NFPA 13 spacings below smooth ceiling, 168 sq. ft max. in concealed space. (See FI 76-17)</td>
</tr>
<tr>
<td>Area Per Sprinkler</td>
<td>1-6&quot; below bottom</td>
<td>Below ceiling only, Not required in concealed space</td>
<td>Required in concealed space if more than 6&quot; clear depth between ceiling and roof or floor above (See 4-4.4.1 Exc. 2)</td>
</tr>
<tr>
<td>Sprinkler Position</td>
<td>(See 4-3.5)</td>
<td>(See 4-3.5)</td>
<td></td>
</tr>
</tbody>
</table>

Sprinkler Rules for Open Wood Truss Construction

More Than 3 Feet on Center

<table>
<thead>
<tr>
<th>Open Wood Trusses</th>
<th>Wood Trusses w/Ceiling Directly Attached</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Protection</td>
<td>168 square feet (See 4-2.2.1.3 and FI 83-4)</td>
</tr>
<tr>
<td>Area Per Sprinkler</td>
<td>Regular NFPA 13 spacings below smooth ceiling. 168 square feet max. in concealed space. (See 4-2.2.1.3 and FI 83-4)</td>
</tr>
<tr>
<td>Sprinkler Position</td>
<td>Required in concealed space if more than 6&quot; clear depth between ceiling and roof or floor above. (See 4-4.4.1 Exc. 2)</td>
</tr>
</tbody>
</table>

Sprinkler Rules for Composite Wood Joist Construction

<table>
<thead>
<tr>
<th>Open Composite Wood Joists Up To 16&quot; Depth</th>
<th>Composite Wood Joists w/Ceiling Directly Attached Up To 16&quot; Depth</th>
<th>Composite Wood Joists With or Without Ceiling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Protection</td>
<td>Regular NFPA 13 spacings below smooth ceiling. Not required in concealed space if firestopped.</td>
<td>Not addressed by NFPA 13</td>
</tr>
<tr>
<td>Area Per Sprinkler</td>
<td>(See 4-2.2.1.2)</td>
<td>(See Sprinkler Technote No. 6-NOV/DEC 1983)</td>
</tr>
<tr>
<td>Sprinkler Position</td>
<td>Presumably 1-6&quot; below bottom - not addressed by NFPA 13 (See 4-3.5)</td>
<td>Below ceiling only if joist channels firestopped. (See 4-4.4.1 Exc [4])</td>
</tr>
<tr>
<td></td>
<td>(PER PROPOSAL)</td>
<td>Not addressed by NFPA 13 (See Sprinkler Technote No. 6-NOV/DEC 1983)</td>
</tr>
</tbody>
</table>

Note: This table is based on the 1985 edition of NFPA 13 and current formal interpretations. This is not the official position of the NFPA nor its Committee on Automatic Sprinklers and should not be relied upon as such.

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13-123 - (4-1.3.8 and 4-2.2.1.2): Reject

SUBMITTER: Russell P. Fleming, National Fire Sprinkler Association

RECOMMENDATION: Provide guidance for sprinkler spacing in deep composite joists and hanging in all composite joist construction.

SUBSTANTIATION: The standard does not provide spacing and positioning guidance for sprinklers in composite wood joist construction more than 16 in. in depth. This has led some to believe the rules for "other types of construction" in paragraph 4-2.2.1.3 apply for light hazard occupancies.

Also, this construction requires special consideration for hangers.

See article on preferred hanging methods.

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

COMMITTEE ACTION: Reject.

COMMITTEE COMMENT: There has been no additional research data nor specific proposals made to properly guide the Committee in developing requirements for such construction.

13-124 - (4-1.3.8): Accept

SUBMITTER: Rodney A. McPhee, Canadian Wood Council

RECOMMENDATION: Revise last sentence in 4-1.3.8 to read:

"Joist channels shall be fire-stopped to the full depth of the joists with material equivalent to the web construction so that individual channel areas do not exceed 300 sq ft (27.9 m²)."

SUBSTANTIATION: Clarification is needed to ensure that fire-stopping extends to the full depth of the joists along with the width of the channel. Also, it is the web material which is appropriate as a firestop therefore a bottom and top chord piece would not be needed as part of the firestop section.

COMMITTEE ACTION: Accept.

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COMMITTEE COMMENT: See Proposals 13-131 (Log #31) and 13-128 (Log #162). 

COMMITTEE ACTION: Accept in Principle.

Reference to bar joist construction is handled in the revision to that definition. See Proposal 13-120 (Log #159).

COMMITTEE ACTION: Accept in Principle.

Exception: Distance between branch lines is not regulated for hydraulically designed systems.

SUBSTANTIATION: The distance between branch lines is regulated to reduce friction losses on the mains between branch lines on pipe schedule systems. Also, where the heads are located directly on the branch line, it ensures that the adjacent sprinklers do not go beyond a spacing where the spray patterns are not reaching one another. In fact, once you exceed 12 ft between lines you need to boost up the pipe sizing for schedule systems for the reason of sprinklers not being able to reinforce the spray patterns of other sprinklers by having overlapping water spray patterns. In hydraulically designed systems, with the pressure losses on the mains being specifically determined, there is no need to limit the spacing of branch lines. The limit of 15 ft between sprinklers will still maintain sprinkler water spray patterns within the recommended limit.

COMMITTEE ACTION: Accept in Principle.

COMMITTEE COMMENT: See Proposal 13-131 (Log #31).

COMMITTEE COMMENT: Accept in Principle.

COMMITTEE ACTION: Accept in Principle.

Exception No. 2: For systems hydraulically designed for densities below .25 gpm/sq ft then sprinkler spacing may exceed 12 ft up to 15 ft. This is an exception to the rule so that designers are aware of this relaxation of spacing limits.

COMMITTEE ACTION: Accept in Principle.

Accept revised text of 4-2.1.4. In submitted Exception No. 1, delete the words "on adjacent branch lines."

Accept Exception No. 2.

COMMITTEE COMMENT: Clarification. See Proposal 13-131 (Log #31).

COMMITTEE ACTION: Accept in Principle.

COMMITTEE COMMENT: See Proposal 13-128 (Log #162).

COMMITTEE ACTION: Accept in Principle.

COMMITTEE ACTION: Accept in Principle.

COMMITTEE COMMENT: See Proposal 13-128 (Log #162).

Add a new Exception as follows:

Exception No. 2: For sprinkler systems hydraulically designed for densities below 0.25 gpm per sq ft (10.2 L/min/m²) a maximum distance of 15 ft (4.6 m) is permitted between sprinklers or between branch lines provided the sprinkler area coverage does not exceed 130 sq ft (12.1 m²).

SUBSTANTIATION: Exception No. 2 is new but its content has been taken from a Formal Interpretation. Exception No. 2 belongs in this section because it is an Important Exception and many sprinkler designers are unaware of the Formal Interpretation.
COMMITTEE ACTION: Accept in Principle.
COMMITTEE COMMENT: See Proposal 13-128 (Log #162).

13 - 131 - (4-2.1 through 4-2.1.5.1): Accept in Principle

SUBMITTER: Dennis Kirson, Sandia National Laboratories

RECOMMENDATION: Revise Articles 4-2.1 through 4-2.1.5.1 to read as follows:

4-2.1 Distance Between Sprinklers, on the Branch Lines and Between the Branch Lines.
4-2.1.1 For Light Hazard Occupancies, the distance between sprinklers, on branch lines and between branch lines, shall not exceed 15 ft (4.6 m).
4-2.1.2* For Ordinary Hazard Occupancies, the distance between sprinklers, on branch lines and between branch lines, shall not exceed 15 ft (4.6 m).
4-2.1.3 For Extra Hazard Occupancies, the distance between sprinklers, on branch lines and between branch lines, shall not exceed 12 ft (3.7 m).
4-2.1.4 In buildings used for high-piled storage (as defined in 4-1.3.9), the distance between sprinklers, on branch lines and between branch lines, shall not exceed 12 ft (3.7 m) except, in bays 25 ft (7.6 m) wide, a spacing of 12 ft 6 in. (3.8 m) between sprinklers is permitted.
4-2.1.5 Distance from Walls.
4-2.1.5.1 The distance from walls to sprinklers shall not exceed one-half of the allowable distance between sprinklers. For Exception relating to small rooms, refer to 4-4.20.

SUBSTANTIATION: I have always interpreted these articles to be concerned with the spacing of sprinklers and not the spacing of the branch piping.

On a recent renovation project, the sprinkler spacing remained unchanged, but one branch line (#2) needed to be moved due to HVAC interference with the piping; see Sketch A. The project mechanical engineer, however, maintained that Branch Line #3 also needed to be moved, because Branch #2 and Branch #3 were now 18 ft apart. I disagreed, and he referred me to Article 4-2.1.2, which I must admit does address the sprinkler piping and not the sprinklers themselves. I think it is obvious that those who drafted the current wording did not envision the problem of armovers.

I have consulted with several fire protection engineers who all concur with my interpretation. This proposal grammatically revises Articles 4-2.1 through 4-2.1.5.1 so that it is clear that the intent of NFPA is to limit the spacing of sprinklers and not the spacing of branch line piping they are connected to.

COMMITTEE ACTION: Accept in Principle.

Revise the submitted material to read as follows:

4-2.1 Distance Between Sprinklers, on the Branch Lines and Between the Branch Lines.
4-2.1.1 For Light Hazard Occupancies, the distance between sprinklers, either on branch lines or between branch lines, shall not exceed 15 ft (4.6 m).
4-2.1.2* For Ordinary Hazard Occupancies, the distance between sprinklers, either on branch lines or between branch lines, shall not exceed 15 ft (4.6 m).
4-2.1.3 For Extra Hazard Occupancies, the distance between sprinklers, either on branch lines or between branch lines, shall not exceed 12 ft (3.7 m).
4-2.1.4 In areas used for high-piled storage (as defined in 4-1.3.9), the distance between sprinklers, either on branch lines or between branch lines, shall not exceed 12 ft (3.7 m).

Exception: In areas 25 ft wide, a spacing of 12 ft 6 in. (3.8 m) between sprinklers is permitted.
4-2.1.5 Distance from Walls.
4-2.1.5.1 The distance from walls to sprinklers shall not exceed one-half of the allowable distance between sprinklers. For Exception relating to small rooms, refer to 4-4.20.

COMMITTEE COMMENT: Further clarification and see Proposal 13-128 (Log #162). It is not the intent to limit distance between branch lines.

BEFORE

SKETCH A

AFTER

SKETCH B
13-132 - (4-2.1.5.1): Accept in Principle  
SUBMITTER: Dennis Kirson, Sandra National Laboratories  
RECOMMENDATION: Revise Article 4-2.1.5.1 to read as follows:  

4-2.1.5.1 The distance from walls to sprinklers, in the direction along the branch, shall not exceed one-half of the design spacing of sprinklers on the branch. The distance from walls to sprinklers, in the direction perpendicular to the branches, shall not exceed one-half of the design spacing of sprinklers between branches. Refer to 4-4.20 for Exception relating to small rooms. Otherwise, neither distance shall exceed 7 ft 6 in.  

SUBSTANTIATION: The end sprinkler on a branch line may not be the closest sprinkler to the wall. The distance from a wall to a branch line is not really the issue. The proper concern is the distance from the wall to the sprinklers on the particular branch line. For the current wording presumes the sprinklers are installed directly in the tees on the branch line. It does not allow for armovers. [Refer to my Proposal 13-131 (Log #31).] 

I have found that sprinkler contractors and A/E firms almost universally interpret Article 4-2.1.5.1 to simply state that the distance any sprinkler may be installed from any wall is a maximum of 7 ft 6 in. The proposed wording will clarify this article's intent.  

COMMITTEE ACTION: Accept in Principle.  
COMMITTEE COMMENT: See Proposal 13-131 (Log #31).

13-131 - (4-2.1.5.2 and 4-2.1.5.3 (New)): Accept in Principle in Part  
SUBMITTER: Rodney A. McPhee, Canadian Wood Council  
RECOMMENDATION: (a) Add a new 4-2.1.5.2 worded as shown below; renumber existing 4-2.1.5.2 as 4-2.1.5.3.  

4-2.1.5.2 The protection area per sprinkler shall be determined as follows:  

1. Along the Branch Lines: Determine distance to next sprinkler upstream and downstream. Half of each distance and add them together. Call this "S." (In the case of an end sprinkler on a branch line take the total distance to the wall and add it to half the distance to the next sprinkler.)  

2. Between Branch Lines: Determine perpendicular distance to the sprinklers on the branch lines on each side of the branch line on which the subject sprinkler is positioned. Take half the distance between the sprinklers on these two branch lines and add them together. Call this "L." (In the case where the branch line is the last branch line and is next to a wall, take the distance to the wall and add it to half the distance to the sprinklers on the next branch line.)  

3. Protection area of the sprinkler = SxL.  

Exception: For rooms protected by a single sprinkler the protection area of the sprinkler is equal to the area of the room.  

(b) If (a) is not accepted the following proposal is submitted:  

Add a new 4-2.1.5.2 and renumber existing 4-2.1.5.2 accordingly. The wording of the new 4-2.1.5.2 would read:  

4-2.1.5.2 The protection area per sprinkler shall be determined as follows:  

1. Along Branch Lines: Determine distance to next sprinkler or to wall in case of end sprinkler on branch line upstream and downstream. Choose the larger of either twice the distance to the wall or distance to the next sprinkler. Call this "S."  

2. Between Branch Lines: Determine perpendicular distance to sprinklers on branch lines (or to wall in the case of the branch line) on each side of the branch line on which the subject sprinkler is positioned. Choose the larger of (1) the larger distance to the sprinklers on the next branch line, or (2) in the case of the last branch line, twice the distance to the wall. Call this "L."  

3. Protection area of the sprinkler = SxL.  

Exception: This does not apply to any sprinkler located more than 7.5 ft (2.3 m) from any single wall in a small room (See 4-4.20).  

SUBSTANTIATION: (a) Guidance is needed in the text of the standard on how to determine the protection area per sprinkler. This is necessary so that compliance with protection area limitations in 4-2.2 can be assessed. Presently there is no written rule as to how this is to be determined. The implied rule, which is based on an unwritten SxL rule can in some cases come up with a synthetic area which is greater than the actual area of the floor for which the sprinkler provides protection. This branch line rule is unjustified especially in the case where only a single sprinkler protects a room. (See Proposal on 7-4.3.1.2(a)).  

(b) Guidance of some sort is needed to be specifically written in the standard to indicate how to determine the protection area per sprinkler to permit assessment of compliance with protection area limits of 4-2.2. If it is not to be the actual floor area of the room or space where the sprinklers are located then it must be based on the actual or possibly synthetic area determined by assuming symmetrically spaced sprinklers in all cases. The Figure in the Appendix (Figures A-4-2.1.2(a) and (b) and A-4-2.2.1.2) provided some guidance but if either of the proposals submitted above were applied to these sprinkler layouts in the Appendix you'd come up with identical protection areas per sprinkler. No specific guidance is presently given for nonregularly spaced sprinkler layouts. As presently written in Chapter 7 the exception implies that the SxL rule is not applied to any sprinkler located in a small room defined in 4-4.20. The Sprinkler Handbook supports this by saying that the area per sprinkler for sprinklers located in small rooms is determined by dividing the area of the room by the number of sprinklers in the room. This is questionable especially for oddly shaped rooms and also if the occupancy is Light Hazard but without a smooth ceiling then SxL would apply (Small Room requires a smooth ceiling). Vice versa, with a smooth ceiling but occupied by Ordinary Hazard, SxL still applies. The occupancy of a room or the ceiling construction should not determine whether or not the SxL rule applies.  

COMMITTEE ACTION: Accept the submittal, however, in the submittal, delete "items (a) through (i)".  
COMMITTEE COMMENT: In the Committee's view (a) is rejected because part (b) offers simpler and clearer guidance, and the material as guidance should be in the appendix.

13-134 - (4-2.2.1.1 and Exception (New)): Accept in Principle  
SUBMITTER: John J. Walsh, United Assn.  
RECOMMENDATION: Revise paragraph to read:  

4-2.2.1.1 Under smooth ceiling, beam and girder, and bar joist construction (as defined in 4-1.3.1) the protection area per sprinkler shall not exceed 225 sq ft (20.9 m²).  

Exception: The protection area per sprinkler for pipe schedule systems shall not exceed 200 sq ft (18.6 m²).  

SUBSTANTIATION: The vast majority of currently installed systems are hydraulically designed. The standard should be modified to reflect that fact and to comply with the Style Manual.  

COMMITTEE ACTION: Accept in Principle.  
COMMITTEE COMMENT: Accept the submittal, however, in the submittal, delete "items (a) through (i)".  
COMMITTEE COMMENT: See Proposal 13-135 (Log #164).

13-135 - (4-2.2.1.1): Accept  
SUBMITTER: Rodney A. McPhee, Canadian Wood Council  
RECOMMENDATION: In the square brackets revise text to read:  

"(as defined in 4-1.3.1, 4-1.3.2 and 4-1.3.3)."  

SUBSTANTIATION: A single paragraph is needed to give specific reference to "items (a) through (i)" and thereby include ceilings as described in 4-1.3.1((j)) and (k) was rejected by the Committee in 1986. However, a proposal to delete items (j) and (k) and combine them with items

(Log #32)
(d) and (h) respectively was also rejected as the Committee felt that by having separate items then equivalencies of constructions could be more better determined and/or recognized. By not referencing items (j) and (k) in 4-2.2.1 it contradicts this intent of equivalencies for the various ceiling constructions defined in 4-1.3.1 when looking at spacing, location, and positioning of sprinklers.

COMMITTEE ACTION: Accept.

13 - 136 - (4-2.2.3 and Exception (New)): Accept

SUBMITTER: John J. Walsh, United Assn.

RECOMMENDATION: Revise paragraph to read:

4-2.2.3 Extra Hazard Occupancy. The protection area per sprinkler shall not exceed 100 sq ft (9.3 m²) for any type of building construction.

Exception: The protection area per sprinkler for pipe schedule systems shall not exceed 90 sq ft (8.4 m²).

SUBSTANTIATION: The vast majority of currently installed systems are hydraulically designed. The standard should be modified to reflect that fact and to comply with the Style Manual.

COMMITTEE ACTION: Accept.

13 - 137 - (4-2.2.3): Reject

SUBMITTER: L.G. Keeping, Canadian Automatic Sprinkler Assn.

RECOMMENDATION: Add the following after the words "hydraulically designed":

"Sprinkler spacing may exceed 100 sq ft (9.3 m²) but shall not exceed 130 sq ft (12.1 m²) for densities below 0.25 gpm per sq ft [10.2 (L/min)/m²]."

SUBSTANTIATION: To make the sprinkler spacing requirements for extra hazard consistent with those for high pile storage. The curve for Extra Hazard Group 1 occupancies is not quite as severe as the Class IV curve in NFPA 231-1987 For 20 ft high storage. The curve for Extra Hazard Group 2 is comparable to Curve F of Figure 6-11.1c in NFPA 231C-1986. The conclusion can thus be drawn that the respective combustible contents are roughly equivalent. Such similar fire loading should be allowed similar sprinkler spacing.

COMMITTEE ACTION: Reject.

COMMITTEE COMMENT: There has been no data base offered to support the extension of this allowance generally to all Extra-Hazard Occupancies.

13 - 138 - (4-2.2.4 Exceptions No. 1 and No. 2): Accept

SUBMITTER: Rodney A. McPhee, Canadian Wood Council

RECOMMENDATION: (a) Change the word "buildings" in Exception No. 1.

(b) The word "Indoor" should be dropped from the title of NFPA 231. In Exception No. 1.

(c) Place a bracket after "4-1.3.9" and remove the bracket after the word "standards."

(d) Delete curved bracket after m² in Exception No. 1.

(e) In Exception No. 1 change "spacing" to "protection areas."

SUBSTANTIATION: (a) To clarify that area of operation per sprinkler is limited by this section in the area of high pile only and not throughout the entire building; i.e. in offices used in conjunction with a warehouse operation.

(b), (c), and (d) - Editorial.

(e) 100 and 130 sq ft are limits of sprinkler protection areas, not spacings. (12 ft or 15 sq ft) and should be denoted as such.

COMMITTEE ACTION: Accept.

13 - 139 - (4-2.4.5): Accept

SUBMITTER: Rodney A. McPhee, Canadian Wood Council

RECOMMENDATION: Change the word "or" to "and."

SUBSTANTIATION: As presently written it implies that one or the other requirements needs to be complied with but not both for web members 1/2 in. or less in dimension.

COMMITTEE ACTION: Accept.

13 - 140 - (4-2.5.2 and Table 4-2.5.2): Accept in Principle

SUBMITTER: J.G. Barbeau, Insurers' Advisory Organization

RECOMMENDATION: Revise Section 4-2.5.2 to read as follows:

4-2.5.2 The clearance from sprinklers to privacy partitions, free-standing partitions, or room dividers shall be at sufficient distances as shown in Table 4-2.5.2 and Figure 4-2.5.2 to avoid obstruction to the sprinkler discharge pattern.

COMMITTEE COMMENT: See Proposal 13-141 (Log #93).

13 - 141 - (4-2.5.2 and Table 4-2.5.2): Accept in Principle

SUBMITTER: L.G. Keeping, Canadian Automatic Sprinkler Assn.

RECOMMENDATION: Revise Section 4-2.5.2 to read as follows:

Table 4-2.5.2 Horizontal and Minimum Vertical Distances for Sprinklers

<table>
<thead>
<tr>
<th>Horizontal Distance</th>
<th>Minimum Vertical Distance Below Deflector</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 in. or less</td>
<td>3 in.</td>
</tr>
<tr>
<td>more than 6 in. up to 4 in.</td>
<td>4 in.</td>
</tr>
<tr>
<td>more than 9 in. up to 12 in.</td>
<td>6 in.</td>
</tr>
<tr>
<td>more than 12 in. up to 15 in.</td>
<td>8 in.</td>
</tr>
<tr>
<td>more than 15 in. up to 18 in.</td>
<td>9 1/2 in.</td>
</tr>
<tr>
<td>more than 18 in. up to 24 in.</td>
<td>12 1/2 in.</td>
</tr>
<tr>
<td>more than 24 in. up to 30 in.</td>
<td>15 1/2 in.</td>
</tr>
<tr>
<td>more than 30 in.</td>
<td>18 in.</td>
</tr>
</tbody>
</table>

For SI units 1 in. = 25.4 mm.

SUBSTANTIATION: To more closely parallel the wording and format of Section 4-2.4.6 and Table 4-2.4.6 and thereby make it more readily apparent how the Table is to be used.

COMMITTEE ACTION: Accept in Principle.

Revise existing 4-2.5.2 to read:

Change "clearance" to "distances."

Insert table including the title as submitted.

COMMITTEE COMMENT: The Committee feels the change meets the submitter's intent.

13 - 142 - (Table 4-2.5.2): Reject

SUBMITTER: Don B. Grant, Dartmouth, N.S. Canada

RECOMMENDATION: Table 4-2.5.2:

Change last entry under Horizontal Distance column to: "36 in. to 7.5 ft."

(Log #93)

(Log #108)
13 - 143 - (4-4): Reject
RECOMMENDATION: Revise as follows:
4-4 In composite wood construction where the total pocket area formed by joists does not exceed 80 cu ft, a pendant style sprinkler may be installed in an upright position with deflectors located 1 to 4 in. below the bottom chord.

SUBSTANTIATION: When composite wood joist depth exceeds the maximum deflector distance as addressed in panel or wood joist construction (Appendix C - Summary of Spacing Rules) the rule now is to sprinkle every joist channel. Therefore each sprinkler head over discharges requiring an enormous water demand. We feel that if the area is limited to 80 cu ft (Ex: joists 24 in. deep x 16 in. o.c. x 30 ft bay) and the deflectors were located 1 to 4 in. below the bottom chord, the heads would operate. This would allow the system to be calculated to a realistic water demand and therefore saving the occupant a great deal of expense.
COMMITTEE ACTION: Reject.
COMMITTEE COMMENT: It is the Committee's opinion that pendant sprinklers in that position would not provide adequate protection to the floor area below. Substantiating test data was not submitted.

13 - 144 - (4-4.2): Reject
SUBMITTER: Rodney A. McPhee, Canadian Wood Council
RECOMMENDATION: Revise section to read:
4-4.2 Metal Roof Decks. When roof decks are metal with combustible adhesives or vapor seal the spacing, location, and the position of sprinklers shall be the same as that for combustible construction.

SUBSTANTIATION: Experience has shown the potential for fire spread on the underside of a metal deck having combustible adhesives or vapor seals. Sprinkler protection below such decks should be increased from the permitted for metal decks with approved adhesives and seals. Therefore reference is needed to not only position of sprinklers but also spacing and location.
COMMITTEE ACTION: Reject.
COMMITTEE COMMENT: It is the Committee's opinion that only the position of sprinklers is of concern under such metal roof situations. Data has not been presented to justify the added cost of revised spacing and location recommendation.

13 - 145 - (4-4.4.1 Exception No. 3): Reject
SUBMITTER: Jeffrey M. Shapiro, Ft. Worth, TX
RECOMMENDATION: Revise Exception No. 3 to read:
Exception No. 3: Spaces formed by ceilings attached directly to or within 6 in. (152 mm) of solid web joists having a nominal depth of 14 in. (356 mm) or less.

SUBSTANTIATION: This Exception was added to the standard because of the difficulty of installing sprinklers with a space having only a six inch clearance. This being the case, the Exception should apply only to joists with a solid web and not to a truss joist; however, the term "wood joist construction" is defined in Section 4-1.3.7 to include open wood truss construction. Clarification is necessary as to whether Exception 3 applies to open wood joist construction given that this type of construction allows substantially more working space which would make sprinkler installation feasible and permit much better water distribution in the void space.
COMMITTEE ACTION: Reject.
COMMITTEE COMMENT: The submitter has provided no supporting data to substantiate his position.

13 - 146 - (4-4.4.1 Exception No. 3 and Exception No. 4 (New) and A-4-4.1 (New)): Accept in Principle in Part
SUBMITTER: J.C. Barbeau, Insurers' Advisory Organization
RECOMMENDATION: Separate Exception No. 3 into two sections as follows:
Exception No. 3: Spaces formed by ceilings located within 6 in. (152 mm) of wood joist construction.
Exception No. 4: Spaces formed by ceilings attached directly to wood joists.

2. Renumber Exceptions 4 to 8 as 5 to 9 respectively.
3. Insert an asterisk after 4-4.4.1.
4. Add a new paragraph A-4-4.4.1 as follows:
A-4-4.1 Exceptions Nos. 1, 2 and 3 do not require sprinkler protection because it is not practical to install sprinklers in these spaces; tests have shown that even if these spaces are sprinklered the water distribution is severely obstructed and the spread of fire cannot be stopped. The presence of these unsprinklered combustible or partly combustible shallow spaces could constitute a serious deficiency if they extend over large areas. Consideration should therefore be given to elimination or reducing this deficiency by either filling these spaces with noncombustible insulation or using suitable fire stops at regular intervals or by other means acceptable to the Authority Having Jurisdiction.

SUBSTANTIATION: The existing Exception No. 3 deals with two conditions one of which is relatively safe (new Exception 4) and the other which could be a serious deficiency (new Exception 3).

2 and 3. Reasons for these editorial changes are obvious.
4. At present the impression is left that since these spaces need not be sprinklered, their presence does not constitute any unusual hazard. The explanatory material and recommendations outlined in the proposed new Section A-4-4.4.1 are intended to warn of the potential danger from the unchecked spread of fire through large shallow combustible spaces and to suggest some measures which can be taken to either eliminate or reduce the potential hazard.
COMMITTEE ACTION: Accept in Principle in Part.
COMMITTEE ACTION: Accept submitted A-4-4.4.1 to read:
A-4-4.1 Exception Nos. 1, 2 and 3 do not require sprinkler protection because it is not physically practical to install sprinklers in these spaces. To prevent the possibility of uncontrolled fire spread consideration should be given in these unsprinklered concealed space situations by using other means such as noncombustible or approved fire stops at regular intervals or other acceptable means. The Committee agrees that some cautionary guidance is appropriate, however, and has revised the submittal to meet this intent.

A-4-4.4.1 The Exception No. 3 recognizes the impracticality of providing sprinkler protection in such spaces. This new Exception No. 4 recognizes the impracticality of providing sprinkler protection in such spaces. However, tests have shown that a fire in such spaces will spread until it reaches a natural fire break. Sheathing attached to joists or some other means of firestopping should be considered.

COMMITTEE ACTION: Accept in Principle.
COMMITTEE COMMENT: See Proposal 13-146 (Log #67).

(Log #67)
13-148 - (4-4.4.1 Exception No. 8): Accept in Principle

Submitter: Matthew N. Scarbrough, Metro-Sarasota Fire Dept., FL

Recommendation: Revise as follows:

Exception No. 8: When the exposed surfaces have a Flame spread rating of 25 or less and the materials have been tested under standard conditions and are listed for use in concealed spaces, the materials shall be permitted to be used in the vicinity of exposed combustible materials with a Flame spread rating of 25 or less. The list shall be published by the National Fire Protection Association.

Committee Action: Accept in Principle.

Committee Comment: See Proposal 13-149 (Log #168).

13-149 - (4-4.4.1 Exception No. 8): Accept

Submitter: Rodney A. McPhee, Canadian Wood Council

Recommendation: Revise the exception to read in part as follows:

Exception No. 8: When the exposed surfaces have a Flame spread rating of 25 or less and the materials have been tested under standard conditions and are listed for use in concealed spaces, the materials shall be permitted to be used in the vicinity of exposed combustible materials with a Flame spread rating of 25 or less. The list shall be published by the National Fire Protection Association.

Committee Action: Accept.

Committee Comment: See Proposal 13-149 (Log #168).

13-150 - (4-4.4.1 Exception No. 8): Accept

Submitter: Russell P. Fleming, National Fire Sprinkler Association

Recommendation: Split Exception No. 8 into two separate exceptions.

Substantiation: The exception at present addresses two different situations. Separate exceptions may prove easier to interpret.

Committee Action: Accept.

Divide the exception at the word "or," and make the second exception, Exception No. 9.

Committee Comment: See Proposal 13-149 (Log #168).

13-151 - (4-4.4.1 Exception (New)): Reject

Submitter: J. DePrinipe, Good Shepherd Hospital

Recommendation: In this section of the Code, there are currently no provisions for fixed wardrobe lockers that serve essentially as furnishings within a designated space. Under the current Code, when such lockers are installed and anchored securely to prevent movement or provide security, a literal interpretation of the Code indicates that they would be necessary to provide for sprinklers in the locker. Therefore, it is believed that there should be an additional Exception to section 4-4.4.1 that as long as the wardrobe locker or other cabinetry for the intended use of the short term storage of clothing, textiles, or other related light-hazard materials does not exceed 24 sq. ft, and is located within a space that is properly protected, that additional sprinkler protection within the enclosed locker is not required. This would only apply in the case that the locker or cabinet is not used for the storage of flammable liquids, or other high-hazard materials. The proposed Code makes certain provisions in the case of hotels, but does not provide for health care facilities.

Substantiation: At this time, the hospital (Good Shepherd) is making revisions to an area of the building to allow for new Psychiatric services. Within this unit are to be installed the units described above. The State of Illinois is currently requiring the hospital to provide for sprinkler protection of the fixed wardrobe units within the sprinklered patient rooms. Using this criteria, it should seem that the issue of going back and sprinkling the entire complement of wardrobe units and/or other fixed cabinetry could become a reality. Cabinets, lockers and the like are secured for various reasons - safety, theft, etc., and without this new revision, it would mean that any fixed cabinet or locker would require sprinkler protection. The purpose of the Code is clear: it is meant to provide for the protection of all occupants, especially those within a hospital. The Code should not serve as a means or tool to unfairly burden a construction effort or the institution itself financially by imposing unreasonable interpretations for reasons of preference and partiality.

Committee Action: Reject.

Committee Comment: The Committee is not of the opinion that wardrobes, lockers, and similar furnishings with a maximum least dimension of 3 feet, an area less than 24 square feet and a volume not exceeding 150 cubic feet are concealed spaces in the context of this code.

13-152 - (4-4.4.5 (New)): Reject

Submitter: David J. Burkhart, Forth Worth Fire Dept., TX

Recommendation: Add new paragraph:

"For light hazard occupancies and buildings used for high-piled storage (as defined in 4-1.3.9) or for storage covered by other NFPA standards, the area per sprinkler shall be calculated on the distance measured along the slope. For ordinary hazard occupancies the area per sprinkler shall be calculated on the distances projected on the floor, but in no case shall the spacing on the roof be greater than that for light hazard occupancies in accordance with the provisions outlined in 4-2.2.1.1, 4-2.2.1.2 and 4-2.2.1.3. For extra hazard occupancies and buildings used for high-piled storage, storage covered by other NFPA standards, the area per sprinkler shall be calculated on the distances projected on the floor, but in no case shall the spacing on the roof be greater than that for ordinary hazard occupancies in accordance with provisions outlined in 4-2.2.2."

Substantiation: To bring the spacing requirements of this section into compliance with the provisions of Section 7-4.3.1.2 and to parallel provisions of Section 3-2.3.3 of NFPA 409-1985.

Committee Action: Reject.

Committee Comment: The Committee does not feel the revision adequately/correctly guides the user in the application of spacing under pitched roofs.
COMMITTEE COMMENT: The Committee wishes to note that which begins: "These sprinklers shall be added to . . .
remains.

SUBSTANTIATION: The present wording in the text is vague in its intent in using the words "may require." If sprays are obstructed by the structural member, be it of combustible or noncombustible construction, consideration should be given to providing additional protection. Neither the stock located below this narrow pocket or the wall adjacent thereto (assuming the pocket is along a wall) will be adequately protected by an obstructed system. Present wording also does not clearly define "narrow pocket."

COMMITTEE ACTION: Accept in Principle.

In accordance with item B. in existing 4-4.7, delete "In accordance with Table 4-2.4.6." Place the remaining text as Appendix A Item for paragraph 4-2.4.6.

COMMITTEE COMMENT: The Committee feels this approach should satisfy the intent of the submitter, and the placement of the section as A-4-2.4.6 is appropriate.

13 - 155 - (4-4.8.1.2): Reject

SUBMITTER: Dennis M. Terbrook, Lenexa, KS

RECOMMENDATION: Add to existing section "Sprinklers are not required in trapped sections of noncombustible shafts."

SUBSTANTIATION: It appears to me this is what the section is trying to say without coming out and saying it, and is an attempt to clarify a problem not addressed. Also, in the index under shafts, vertical, reference is made to sections 4-4.8.1, A-4-4.8.1.12. I believe this should be moved to 4-4.8.1.12.

COMMITTEE ACTION: Reject.

COMMITTEE COMMENT: The index reference error will be corrected by NFPA staff. The Committee calls the submitter's attention to paragraph 4-4.8.1.3 and in addition the formal Interpretation which asks is it the intention of 4-4.8.1.3 to require protection at the bottom of a noncombustible elevator shaft, not having direct access? The answer is yes.

13 - 155 - (4-4.8.2.3): Accept

SUBMITTER: Rodney A. McPhee, Canadian Wood Council

RECOMMENDATION: Revise the sentence within the text which begins: "These sprinklers shall be added to . . ."

"The water supply for these sprinklers shall be added to the water supply required for the area of operation in hydraulically designed systems or to the water supply required as determined in accordance with Table 2-2.1(a). Supplies shall be balanced to the higher pressure demand in each case."

SUBSTANTIATION: Clarification is needed as to the method of determining total water supply demand for buildings/floor areas where sprinklers are provided to protect a floor opening. Also, the reference to water supplies for pipe schedule designs clarifies that such designs are permitted for buildings or floor areas containing such openings. With the present text referring to adding sprinklers from the water main to the design area it implies that pipe schedule designs for the floor areas adjacent the openings are not permitted.

If pipe schedule designs are in fact permitted then the following should be added at the end of the first paragraph in 4-4.8.2.3.

"The portion of the sprinkler system protecting the floor area adjacent the opening shall be hydraulically designed."

COMMITTEE ACTION: Accept.

COMMITTEE COMMENT: The Committee wishes to note that the sentence "Sprinklers . . . 7/16 in. . . . orifice remains.

13 - 157 - (4-4.8.2.3 Exception): Reject

SUBMITTER: Rodney A. McPhee, Quispamsis, N.B., Canada

RECOMMENDATION: Add another sentence at the end of the sentence to read: "Draft stops, however, will be required to be provided."

SUBSTANTIATION: Protection in this section (4-4.8.2.3) includes both draft stops and closely spaced sprinklers as indicated in first sentence. Revisions as noted in this comment are required to clarify intent and also to correspond to reference in A-4-4.8.2.4 at the top of the stair shaft, conforms to the intent of Article 4-4.8.1.1. It is further understood that the intent of the sprinkler head required at the lowest landing is to take care of any improper storage beneath the stairs. However, to omit sprinkler heads at all other landings, in noncombustible stair shafts, appears inconsistent with other NFPA 13 articles which require sprinklers beneath obstructions (i.e., stair landings) to sprinkler discharge which exceed 4 ft in width.

COMMITTEE ACTION: Accept.

COMMITTEE COMMENT: No technical substantiation to justify the added cost of these additional sprinklers has been provided.

13 - 159 - (A-4-4.10 and Figure A-4-4.10): Reject

SUBMITTER: Dennis Kirson, Sandia National Laboratories

RECOMMENDATION: Revise Article 4-4.10 to read as follows:

"A-4-4.10 Small loading docks, covered platforms, ducts, or similar small unheated areas may be protected by 45° dry pendant or dry horizontal sidewall sprinklers extending through the wall to wet sprinkler piping in an adjacent heated area as shown in Figure A-4-4.10.

Sprinklers shall be spaced in accordance with their listing."

Revise Figure A-4-4.10 in accordance with Submittal 13-197 on page 127 of the Fall 1986 TCD. Change the title of the figure to read: "45° Dry Pendant or Dry Horizontal Sidewall Sprinklers for Protection of Covered Platforms, Shipping Docks, and Similar Areas."

SUBSTANTIATION: This proposal is essentially a resubmittal of Submittal 13-197, by Rodney A. McPhee, on page 127 of the Fall 1986 TCD. It appears to me that Mr. McPhee's proposal was two-fold. First, to add the dry pendant sprinkler manufactured by Viking; and, second, to move this material from the Appendix to the body of the standard. I believe the Committee rejected Mr. McPhee's proposal on the issue of its location within NFPA 13, and I concur with the Committee Action that the Appendix is its proper location. My proposal leaves this material in the Appendix, but adds the dry horizontal sidewall sprinkler to the 45° dry pendant sprinkler.

I have also deleted, from both the article and figure, the 7 ft 6 in. limitation in the width of the protected area. Both dry sprinklers are listed for widths exceeding 7 ft 6 in.

The 45° dry pendant is listed for a maximum width of 10 ft and a spacing of 100 sq ft. The dry horizontal is listed for spacing in accordance with

SUBMITTER: J.G. Barbeau, Insurers' Advisory Organization

RECOMMENDATION: (a) Reword Exception No. 1 as follows: Exception No. 1: Sprinklers may be omitted in alternate aisles, on each level, when sprinklers are installed in those aisles. A certain margin of safety will be maintained by installing sprinklers in two different aisles. But if piping is to be hydraulically designed the two most hydraulically remote sprinklers shall be hydraulically designed the two most hydraulically remote sprinklers shall be hydraulically designed (See 4-4.17.4) and allow water distribution to adjacent aisles.

Exception No. 2: Line 2, replace "more than 18 in. (457 mm)" with "18 in. (457 mm) or more." The new wording of Exception No. 1 states that "sprinklers may be omitted in alternate levels." Sprinklers are in fact installed at every level but omitted only in alternate aisles. The required installation pattern is accurately described in the wording.

(b) This change should be made to be consistent with Section 4-2.5.1.

COMMITTEE ACTION: Accept in Principle.

SUBMITTER: Mike McNeel, Gaylord Industries, Inc.

RECOMMENDATION: This test information indicates the appropriateness of the current requirements. There have been no additional tests to support the effectiveness of an arrangement of standard sprinklers as submitted. In addition, old style sprinklers are readily available.

COMMITTEE ACTION: Reject.

SUBMITTER: Mike McNeel, Gaylord Industries, Inc.

RECOMMENDATION: This test information indicates the appropriateness of the current requirements. There have been no additional tests to support the effectiveness of an arrangement of standard sprinklers as submitted. In addition, old style sprinklers are readily available.

COMMITTEE ACTION: Reject.
The reason to delete paragraph .13 is that mesh filters can not pass the test requirements of U.L. Standard 1046 and are thereby not recognized by NFPA 96. 4-1.2.1.2 as an acceptable grease removal device. The acceptable baffle filter is designed in such a manner that liquids cannot drain or fall through them. Since the provisions in 4-4.18.13 no longer apply to an acceptable method of commercial kitchen ventilation, we suggest the paragraph be deleted.

Further substantiation against shielding is the health and sanitation concern. The shield collects grease and lint by virtue of impingment and harbors them for bacterial growth. As the shield becomes saturated, the grease begins to drip onto the cooking equipment below contaminating that surface. Shielding also disrupts the critical air flow patterns which enable the ventilator to properly capture and extract the grease laden vapors and keep them within the area where proper cleaning and fire protection is provided and required.

COMMITTEE ACTION: Accept.
13 - 166 - (4-4.20.3 (New)): Accept in Principle
SUBMITTER: T.G. Daly/H. Moore, Hilton Hotels Corp.
RECOMMENDATION: Add new section to read: 4-4.20.3. In hotel guest rooms, sprinkler installation may be omitted in closets not over 24 sq ft (2.2 m) in size.
SUBSTANTIATION: Storage within closets in transient occupancies such as hotel guestrooms does not present a substantial load.
COMMITTEE COMMENT: Committee feels this is guidance appropriate for the appendix and putting the wording in as the second sentence.

13 - 167 - (4-5.1): Reject
SUBMITTER: E. J. O'Donoghue, Industrial Risk Insurers
RECOMMENDATION: Change 92 in. to read 24 in.
SUBSTANTIATION: The purpose of this comment is to allow consideration of recent tests involving 8 in. and 10 in. lintels wherein the lintel did not appear to prevent operation of sprinklers on the side distal to the fire.
COMMITTEE ACTION: Reject.
COMMITTEE COMMENT: The tests referred to addressed residential sprinklers. In addition, the effectiveness of the 8 in. lintel is still under study.

13 - 168 - (Figure 4-5.2.1): Accept in Principle
SUBMITTER: Jerry D. Watts, Grainger Consulting
RECOMMENDATION: Change existing 100’6” dimension to 102’-2”.
SUBSTANTIATION: Dimension of 11’2” multiplied by equal number of sprinklers (9) = 100’6” + two spaces of (approx.) 6” on either side of heads nearest walls: add 1’-0” approx. width of walls: Add 4” ea. (x2) outside dimension should show 102’-2”.
COMMITTEE ACTION: Accept in Principle.
COMMITTEE COMMENT: Detail the drawing more clearly to show the dimensions to be within the walls.
COMMITTEE COMMENT: Editorial. The intent is that the dimensions are approximate.

13 - 169 - (4-5.2): Accept in Principle
SUBMITTER: Rodney A. McPhee, Canadian Wood Council
RECOMMENDATION: Add new paragraph 4-5.2 to read.
4-5.2 To determine the protection area per sprinkler the distance between sprinklers on the same wall shall be s while the distance to the opposite wall will be l in the formula SxL = Area of sprinkler operation. Exception: Where sprinklers are provided on two opposite sides of the room or area, 1 shall be taken as half the distance between the two walls.
SUBSTANTIATION: Guidance is needed in Chapter 4 to specify how to determine the area of floor protected by an individual sprinkler. Without this there is no means of checking whether or not the coverage limits in 4-5.3 and 4-5.4 have been exceeded.
COMMITTEE ACTION: Accept in Principle.
COMMITTEE COMMENT: Committee feels this is guidance appropriate for the appendix.

13 - 170 - (Figure 4-5.2.1, 4-5.2.2): Accept
SUBMITTER: Rodney A. McPhee, Canadian Wood Council
RECOMMENDATION: A. In the wording under Figure 4-5.2.1 delete the words “with Light Hazard Occupancy.” B. Make 4-5.2.2 an Exception to 4-5.2.
SUBSTANTIATION: Protection of a room containing an Ordinary Hazard occupancy by installing sidewall sprinklers on branch lines on opposite walls is not permitted. Protecting such a room in a manner (branch lines on two walls) is only permitted for Light Hazard occupancies. In view of this, reference to an occupancy classification in the figure is unnecessary and misleading. Making 4-5.2.2 an Exception to 4-5.2.1 clarifies this intent further.
COMMITTEE ACTION: Accept.

13 - 171 - (4-5.3.2 Exception and 4-5.4.2 Exception): Accept in Principle
SUBMITTER: Rodney A. McPhee, Canadian Wood Council
RECOMMENDATION: Revise both exceptions to read: Exception: Noncombustible smooth ceiling spacing is permitted beneath a noncombustible smooth ceiling located beneath any sprinklered combustible concealed space or any combustible concealed space permitted to be unsprinklered as indicated in 4-4.4.1.
SUBSTANTIATION: As presently written, spacing of sprinklers may be in accordance with noncombustible smooth ceiling if the ceiling is attached to the underside of a sprinklered combustible concealed space. However, by 4-4.4.1 Exceptions Nos. 3 and 4, these spaces would not be required to be sprinkler protected. In view of this the wording should be revised to permit noncombustible ceiling spacing beneath such concealed spaces permitted to be unsprinklered as well as beneath any sprinklered concealed space.
COMMITTEE ACTION: Accept in Principle.
COMMITTEE COMMENT: Clarification and the revised wording should meet the submitter’s intent.

13 - 172 - (4-5.5 thru 4-5.5.2 (New)): Accept in Principle
SUBMITTER: UL/FM/NFSA Standards Review Committee, National Fire Sprinkler Association/UL/FM
RECOMMENDATION: Revise both exceptions to read: 4-5.5.2 where soffits are used for the installation of sidewall sprinklers, they shall be limited to six in. in width.
Exception No. 1: Wider soffits are permitted if the sprinkler is specially listed for such use.
Exception No. 2: Wider soffits are permitted if additional sprinkler protection is provided for the area below the soffit.
SUBSTANTIATION: The UL/FM/NFSA Standards Review Committee has reviewed test data from a number of manufacturers dealing with the ability of sidewall sprinklers to protect the area below the soffit on which they are mounted. Based on this review, the Committee suggests that the width of soffits be limited to a practical minimum (6 inches) unless the sprinklers are specially listed for their ability to project water spray into the backwall area below the soffit.
COMMITTEE ACTION: Accept in Principle.
COMMITTEE COMMENT: Should meet the submitter’s intent. The Committee suggests that the substantiation refers only to spacing data and does not include any fire test data.
COMMITTEE COMMENT: Scale on sediment can originate can collect in drop piping.

COMMITTEE ACTION: Reject.

SUBMITTER: Rodney A. McPhee, Canadian Automatic Sprinkler Council.

RECOMMENDATION: Make the following editorial changes:

(a) In 4-2.2.1.2 change the "or" to "and" directly after "(. . . in 4-1.3.7)."

(f) In the Index under "Stages, Theater" change reference from 4-4.2.1 to 4-4.21.

(g) In Table 3-15.4.9 add the words "or joists" after the word "beam" in two places.

(h) In 4-5.3.2 change reference to Figure 4-5.1.2 to Figure 4-5.2.1.

(i) In Figure A-4-2.1.2(a) add "L" on the left side dimension line.

SUBSTANTIATION: The provision of check valves does not guarantee delivery of water to remote areas of the system in a reasonable time.

COMMITTEE ACTION: Reject.

COMMITTEE COMMENT: The provision of check valves does not guarantee delivery of water to remote areas of the system.

SUBMITTER: Don B. Grant, Dartmouth, N.S., Canada.

RECOMMENDATION: Delete the Exception.

COMMITTEE ACTION: Accept in Part.

COMMITTEE COMMENT: The Committee feels insufficient supporting data has been submitted to warrant this change.

RECOMMENDATION: Make the Following editorial changes:

(a) In 5-6.1.4.1 change "higher" to "high."

(b) In Figure A-5-6.1.10(a) change "m" sign to "x" sign in "2 1/2 x 2 1/2 = 4 in. Diameter.

(c) In 5-2.3.1 Exception delete the words "for nongridded systems."

(d) In Index add "Exhausters - See Quick Opening Devices."

COMMITTEE COMMENT: The maximum system capacity may exceed 750 gal (2839 L) provided branches of the system are subdivided by check valves so that no system branch shall have a capacity exceeding 600 gal (2227 L) nor shall a system branch plus common pipe exceed 750 gal (2839 L). A hole 1/8 inch (3.2 mm) in diameter shall be drilled in the clapper of each check valve to permit equalization of air pressure among the various parts of the system. An approved indicating drain valve, connected by a bypass around each check valve, shall be proved as a means of draining the system. All check valves shall be located in heated enclosures to prevent the formation of ice. Check valves shall not be installed in any piping where they may interfere with the hydraulic characteristics of the system.

SUBSTANTIATION: The Committee feels insufficient supporting data has been submitted to warrant this change.

COMMITTEE ACTION: Reject.

COMMITTEE COMMENT: The Committee feels insufficient supporting data has been submitted to warrant this change.

SUBMITTER: B.J. Lukes, Canadian Automatic Sprinkler Assoc.

RECOMMENDATION: Delete the Exception.

COMMITTEE ACTION: Reject.

COMMITTEE COMMENT: The Committee feels insufficient supporting data has been submitted to warrant this change.

SUBMITTER: Walter J. Swingle, Glen Ellyn, IL.

RECOMMENDATION: Delete second paragraph in Appendix paragraph A-5.2.1 and add following new paragraph under Section 5-2:

"Dry pipe sprinkler systems shall be provided with curtain boards between systems extending minimum of 30 in.; below ceiling."

SUBSTANTIATION: This was a previous requirement under Article 1133, 1969 issue and was improperly deleted by the convention.

COMMITTEE ACTION: Reject.

COMMITTEE COMMENT: The Committee feels insufficient supporting data has been submitted to warrant this change.

COMMITTEE ACTION: Accept in Part.

COMMITTEE COMMENT: The Committee intends.
which service such systems. NFPA 13A contains guidance
maintained at or below 40°F (4°C), it is important
within the valve room.

COMMITTEE COMMENT: This section refers to supply pipe
paragraph which reads:

SUBSTANTIATION: Editorial generally. In (a) change is
made to clarify that sprinklers of "Extra High" or
higher temperature classification are not permitted.
In (c), nongridded are now not permitted, therefore
this reference is redundant. For (d), Exhaustors were
inadvertently deleted from the index in this edition
of the standard.

COMMITTEE ACTION: Accept in Part.
Accept and (d). Reject items (a) and (c).

COMMITTEE COMMENT: Items (a) and (c) are not
editorial, whereas "higher" is the intended meaning,
and "nongridded" is needed for correct meaning for this
section.

13-180 - (5-2.4.1): Reject
SUBMITTER: Don B. Grant, N.S., Canada
RECOMMENDATION: Change present wording to:
5-2.4.1 Dry pipe valves shall be provided with a
listed quick opening device when system trip test time
(time from opening system test connection fully to time
of tripping the system) exceeds 1 min.

SUBSTANTIATION: Test results indicate the 1-min. time
for water delivery to test connection is unrealistically severe and not often achieved with
larger volume systems. Completely eliminating acceptance of systems over 750 gal. and providing a
more realistic test time should result in less reliance on unreliable QOD's to provide acceptable protection.
Water delivery time after trip point is not improved by provision of a QUD. Let's remove it from the equation.

COMMITTEE ACTION: Reject.

COMMITTEE COMMENT: Insufficient data submitted to
support this change.

13 - 181 - (5-2.4.1 Exception (New)): Accept
SUBMITTER: Nicholas Hilosky, Adelphia Automatic
Sprinkler Co.
RECOMMENDATION: Add Exception to read:
Exception: A quick-opening device shall not be
required if the requirements of paragraph 5-2.3.1.
Exception can be met without such a device.

SUBSTANTIATION: There is no reason to increase the
cost, complexity, and maintenance problems of an
installation if the limitations of the Exception to
Section 5-2.3.1 can be met without a quick-opening
device.

COMMITTEE ACTION: Accept.

13-182 - (5-2.5.2): Reject
SUBMITTER: Thomas C. Brown, Fairfax, VA
RECOMMENDATION: Delete the words "and supply pipe."

SUBSTANTIATION: This situation would be covered by the
proposed new paragraph 3-10.1.3.

COMMITTEE ACTION: Reject.

COMMITTEE COMMENT: This section refers to supply pipe
within the valve room.

13-183 - (A-3-10.1.1 or A-5-2.6): Accept
SUBMITTER: John A. Antola, American Insurance Services
Group
RECOMMENDATION: Add a new A-3-10.1.1 (with appropriate
text asterisk), or revise A-5-2.6, by adding a
paragraph which reads:
"Because it is not practical to allow water to flow
into sprinkler piping in spaces which may be constantly
subject to freezing or where temperatures must be
maintained at or below 40°F (4°C), it is important
that means be provided at the time of system
installation to conduct trip tests on dry-pipe valves
which service such systems. NFPA 13A contains guidance
in this matter."

SUBSTANTIATION: NFPA 13 currently covers the
arrangement of a dry-pipe sprinkler system with piping
in a freezer or similar space subject to freezing.
However, the standard does not address the difficulty of
trip testing under such circumstances. It is
recognized that it is not practical to fill the system
with water, but it is also essential that the valve
operation be checked periodically. This proposal, in
conjunction with a proposal for NFPA 13A intended to
call attention to this problem and suggest
reasonable alternatives. Since NFPA 13 is the
installation standard and provision for appropriate
piping to enable trip testing at the
time of installation, we believe some statement must be
included in NFPA 13 (albeit in the Appendix).
Acceptance will be contingent on action on the NFPA 13A
proposal.

COMMITTEE ACTION: Accept.

COMMITTEE COMMENT: Add the paragraph to A-5-2.6.

13 - 184 - (5-2.7.9 (New)): Reject
SUBMITTER: Dennis Kirson, Sandia National Laboratories
RECOMMENDATION: Add a new paragraph 5-2.7.9,
substantially as follows:
5-2.7.9 Air or nitrogen pressure shall be supervised
to provide two separate and distinctive signals. One
signal shall indicate that the required pressure has
been exceeded or increased beyond acceptable limits,
and the other indicating restoration of the pressure to
its normal value.

SUBSTANTIATION: There appears to me to be a lack of
coordination between NFPA No. 13, Standard for the
Installation of Sprinkler Systems, and the NFPA
standards for protective signaling systems, NFPA 71,
72A, 72C, and 72D, and lack of clarity concerning
requirements for preaction sprinkler systems. The
signaling system standards [Article 3-4.3.3b (NFPA 71)];
Article 3-5.4.3 (NFPA 72A); Article 3-5.4.4 (NFPA 72C);
and Article 3-6.4.3 (NFPA 72D)] require that
supervision of air or nitrogen pressure in dry pipe
sprinkler systems indicate both high and low pressure
conditions. This is not spelled out anywhere in NFPA
13 and, in fact, the entire subject of supervision of
sprinkler systems in NFPA 13 appears extremely vague.
Approved high/low pressure supervision switches are
available. However, sprinkler system equipment
manufacturers, suppliers, and installers are not
generally familiar with the NFPA signaling system
standards, and as a result, I find that sprinkler
contractors only supply low pressure supervisory
switches.

COMMITTEE ACTION: Reject.

COMMITTEE COMMENT: Mandatory supervision is not
considered necessary for all applications.

13-185 - (5-3.1 and 5-3.2): Reject
SUBMITTER: Rodney A. McPhee, Canadian Wood Council
RECOMMENDATION: A. In definition for Preaction
Systems add the words "or manual release" after the
brackets in the second sentence.
B. In definition for Deluge System add the words
"manually released or" before the word "opened."
C. 5-3.2 Revise second sentence to read:
"The water supply is controlled by an automatic valve
operated by means of fire detection devices or a
manual release, both of which are independent of the
sprinklers and of each other.

SUBSTANTIATION: Manual release of such valves is
mentioned in 5-3.2 Description and should be
appropriately referenced in the Definitions also.
Revision to 5-3.2 is editorial to clarify intent that
manual release operates the system as does the
detection devices but both are independent of each
other as well as the operation of any sprinkler

COMMITTEE ACTION: Reject.

COMMITTEE COMMENT: These sections are not intended to
describe all features of preaction or deluge systems.
SUBMITTER: John O. Jensen, Idaho Falls, ID

RECOMMENDATION: Add new paragraph as follows:

"For systems having a capacity in excess of 40 gallons of antifreeze solution or where local authorities have mandated the use of reduced pressure backflow prevention devices to isolate the antifreeze portion of the system, a means shall be provided to compensate for the expansion of solution by using a small pressure relief valve (175 psig maximum release) or a small air bladder expansion tank with capacity to absorb the excess pressure."  

SUBSTANTIATION: Local water officials are increasingly requiring that reduced pressure backflow prevention devices be installed on antifreeze portions of fire sprinkler systems. This case seems to exist even where the antifreeze has been provided for potable water systems. There is a reluctance by the water officials to believe that future antifreeze solutions will still be of the potable types. In marginal and remote water supplies, in order not to adversely affect the sprinkler system hydraulics for the remote area, the backflow prevention device is only being installed on the antifreeze portion of the system, rather than at the city or main sprinkler connection. In these situations, the 1/32 in. valve does not allow the antifreeze portion of the system to relieve the excess pressure from summer heating. This proposal provides information that is needed to engineer these types of situations.

COMMITTEE ACTION: Accept in Principle.

Add a new paragraph to read:

"If a hole in the clapper of the check valve is not present, a means shall be provided to compensate for the expansion of the antifreeze solution such as the installation of a pressure relief valve (175 psig maximum relief) or an expansion chamber."

COMMITTEE COMMENT: The revision expresses the Committee's intent and should satisfy the submitter's intent.

1-Richardson & Oleszkiewicz - Fire Technology

2-Haselden et al - Fire Technology.
Table 5.3.3(a) Densities of Aqueous Ethylene Glycol Solution (percent by weight)

Densities of Aqueous Ethylene Glycol Solutions (percent by weight)

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Density, Grams per ml

-40 -30 -20 -10 0 10 20 30 40 50 60 70 80
1.9500
1.9400
1.9300
1.9200
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1.9000
1.8900
1.8800
1.8700
1.8600
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1.8400
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1.8000
1.7900
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1.7600
1.7500
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1.2900
1.2800
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1.2600
1.2500
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1.1900
1.1800
1.1700
1.1600
1.1500
1.1400
1.1300
1.1200
1.1100
1.1000
1.0900
1.0800
1.0700
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0.0400
0.0300
0.0200
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-40 -20 0 20 40 60 80 100 120 140 160 180

Temperature, Degrees Fahrenheit

-40 -30 -20 -10 0 10 20 30 40 50 60 70 80
9.5
9.4
9.3
9.2
9.1
9.0
8.9
8.8
8.7
8.6
8.5
8.4
8.3

Pounds per Gallon

FREEZING CURVE

FREEZING CURVE

FREEZING CURVE

FREEZING CURVE

FREEZING CURVE

FREEZING CURVE
Table 5-5.3.3(b) Densities of Aqueous Propylene Glycol Solutions (percent by weight)

— Densities of Aqueous Propylene Glycol Solutions (percent by weight)

Degrees Centigrade

Temperature, Degrees Fahrenheit
13-191 - (6-1.1.1 and Exception (New)): Accept

SUBMITTER: Technical Committee on Automatic Sprinklers

RECOMMENDATION: Revise text as follows:

6-1.1.1 Sprinklers installed for protection against exposure fires shall be supplied from a standard water supply as outlined in Chapter 2.

Exception: When approved, other supplies such as manual valves or pumps, or fire department connections may be used.

SUBSTANTIATION: The present wording is confusing in that it is not clear whether manual valves and pumps are acceptable as primary water supplies as equivalent to Chapter 2 or only when they are approved. The proposed wording separates automatic water supplies as being the required level and nonautomatic supplies being permissible only when approved.

COMMITTEE ACTION: Accept.

13-192 - (6-1.2.1 and Exception (New) and B-6.2.3): Accept

SUBMITTER: Technical Committee on Automatic Sprinklers

RECOMMENDATION: 1. Revise text as follows:

6-1.2.1 Each system of outside sprinklers shall have an independent control valve. When more than one system is required, the division between systems shall be vertical and not horizontal.

Exception: When over 6 lines are installed, the systems shall be divided horizontally with independent risers.

2. Delete B-6.2.3.

SUBSTANTIATION: To comply with the Style Manual this has been put in the appropriate format necessitating moving Appendix text to the body of the standard and changing "should" to "shall."

COMMITTEE ACTION: Accept.

13-193 - (6-1.2.3): Accept

SUBMITTER: Technical Committee on Automatic Sprinklers

RECOMMENDATION: Revise text as follows:

6-1.2.3 Sprinklers may be of the open or closed type. Closed sprinklers in areas subject to freezing shall be on dry pipe systems conforming to Section 5-2 or antifreeze systems conforming to Section 5-5.

SUBSTANTIATION: To clarify that the types of systems needed for closed sprinklers are those specified in Chapter 5. The requirements in Chapter 5 provide all the necessary details, including the need to involve public health authorities when dealing with antifreeze systems.

COMMITTEE ACTION: Accept.

13-194 - (6-2.1.1): Accept

SUBMITTER: Technical Committee on Automatic Sprinklers

RECOMMENDATION: In the first line, change "approved" to "listed."

SUBSTANTIATION: Automatic sprinkler system control valves are required by Chapter 3 to be listed to ensure that minimum standards are met. This standard is needed for control valves for exposure sprinkler systems.

COMMITTEE ACTION: Accept.

13-195 - (6-2.4): Accept

SUBMITTER: Technical Committee on Automatic Sprinklers

RECOMMENDATION: Revise text as follows:

6-2.4 An approved pressure gage conforming to 2-9.2.2 shall be installed immediately below the control valve of each system.

SUBSTANTIATION: Presently there is no standard for the type of pressure gage used for exposure protection systems. This reference provides such guidance making the requirements the same as for other sprinkler systems.

COMMITTEE ACTION: Accept.

13-196 - (7-1.2): Accept in Part

SUBMITTER: J.G. Barbeau, Insurers' Advisory Organization

RECOMMENDATION: Line 7, after "riser" insert "and total hose allowance."

SUBSTANTIATION: The total inside and outside hose allowance used in a hydraulically designed system should be included here because both sprinkler demand and hose demand should be taken into consideration when evaluating the existing water supply.

COMMITTEE ACTION: Accept in Part.

13-197 - (7-1.2): Accept in Principle

SUBMITTER: Rodney A. McPhee, Canadian Wood Council

RECOMMENDATION: Add the words "for sprinklers and hoses" after the word "riser" inside the brackets.

SUBSTANTIATION: Information on minimum flow demand in gallons per minute for sprinklers and hoses (inside and outside) along with residual pressure is critical information. This will permit direct comparisons, by an inspector or an engineer considering building alterations, of the available water supply (flow test results and/or 2 in. drain results) to the system demand.

COMMITTEE ACTION: Accept in Principle.

COMMITTEE COMMENT: See Proposal 13-196 (Log #70).

13-198 - (8-7-1.2): Accept in Principle

SUBMITTER: L.G. Keeping, Canadian Automatic Sprinkler Assn.

RECOMMENDATION: Change the second sentence to read:

"It is desirable to specify densities rounded upward to the nearest 0.005 gpm/sq ft."

SUBSTANTIATION: Editorial, to properly express the number of significant figures and units. Rounding the densities to 0.05 as the present wording recommends would create the same densities for different design areas on the curves of Figure 2-2.1(b). As an example of this, two density/design area combinations permissible for ordinary hazard group 2 occupancies are 0.19 gpm/sq ft for 1500 sq ft and 0.16 gpm/sq ft for 3000 sq ft. Rounding these densities upward to 0.05 would create a density of 0.20 gpm/sq ft for both.

COMMITTEE ACTION: Accept in Principle.

Change the second sentence to read:

"It is desirable to specify densities rounded upward to the nearest 0.01 gpm/sq ft."

COMMITTEE COMMENT: Precision of calculations and since test data doesn't justify any closer tolerances.

13-199 - (7-3.3.0 and A-7-3.3.0): Accept in Principle

SUBMITTER: Rick Lander/Nicholas Hlasky/Ken Isman, National Fire Sprinkler Association

RECOMMENDATION: Delete paragraph 7-3.3.0.

DElEte paragraph A-7-3.3.0.

SUBSTANTIATION: All flow splits and quantities are determined by the hydraulic programs, and shown in the printouts, and in addition the velocities are also shown, so no information is added by the sketch that is not already available from the printout.

The requirement for Figure A-7-3.3.0 should be eliminated.

COMMITTEE ACTION: Accept in Principle.

Paragraph 7-3.3.0: Change "sketch" to "diagram."

COMMITTEE COMMENT: This permits computer enhanced calculations as a diagram of flow and direction. A sketch is not necessary.
It is not necessary to duplicate in graph form. Some programs can provide the required graphic summary.

COMMITTEE ACTION: Accept in Principle.

COMMITTEE COMMENT: The revision should meet the committee's intent. Computer programs can provide the required graphic summary.

7-4.3.1.1 Where the design area is based on the ordinary hazard group, the designer shall verify that all other smaller rooms have adequate water supply.

SUBSTANTIATION: Assurance that all rooms have adequate water is needed. For example, if the chosen largest room is on the first floor, you must assure that a room half the size but located six stories higher will have adequate water pressure. Paragraph 2-2.1.2.8 or 7-4.3.1.1 Exception No. 3 do not address this issue.

COMMITTEE ACTION: Accept in Principle.

COMMITTEE COMMENT: The revision should meet the submitter's intent, but more fully expresses the committee's intent.

7-4.3.1.2 Exception: When hydraulic calculations are made with a computer program which includes, as part of its printout, a graphic summary of water information, the calculation shall be based on the rectangular area which is the hydraulically most demanding.

SUBSTANTIATION: When the computer program provides a printout of the water supply information, demand, required pressure, available pressure, etc., there is no reason to duplicate in graph form. Some programs can print a schematic water supply curve, and for general use, there is no reason for the curve to be on semi-log graph paper.

COMMITTEE ACTION: Reject.

COMMITTEE COMMENT: Existing paragraph meets the Committee intent. Computer programs can provide the required graphic summary.

COMMITTEE COMMENT: (a) In 7-4.3.1.2(a) delete everything after the first sentence. This would include items 1, 2, 3, and the Exception. Also, delete Figure A-7-4.3.1.2(a) from the Appendix.

(b) If the proposal in (a) is rejected then the following proposal is submitted:

(1) In 7-4.3.1.2(a), item 2 revise wording to read: 7-4.3.1.2(a) 2. Between Branch Lines. Determine the perpendicular distance to sprinklers on branch lines (or to wall in the case of the last branch line) on each side of the branch line on which the subject sprinkler is positioned. Choose the larger of (1) the larger distance to the sprinklers on the next branch line, or (2) in the case of the last branch line, twice the distance to the wall. Call this "L."

(ii) Add to 7-4.3.1.2(a) Item 3 the following: The individual "design areas" for each sprinkler shall be added together to determine the overall total design area. This total design area need not exceed that required by application of 2-2.1.2, Figure 2-2.1(b), or the application of any other NFPA standard specifying minimum/maximum design areas.

(iii) Throughout Table 2-2.1.2 and Figure 2-2.1(b) change any reference to "area of sprinkler operation" to "design area".

(iv) Throughout Chapter 7 change reference to "area of application" or "area of water application" to "design area."

(2) In 7-4.3.1.1 add the word "design" before the word "area" in the first sentence.

SUBSTANTIATION: (a) Chapter 2 refers to "minimum water supplies to be determined by calculation" or other NFPA standard specifying minimum/maximum design areas.

(b) Throughout 2-2.1.2 including Table 2-2.1.2(b) and Figure 2-2.1(b) change any reference to "area of sprinkler operation" to "design area."

(c) Throughout Chapter 7 change reference to "area of application" or "area of water application" to "design area."

With this philosophy it was agreed that such designs would end up requiring a minimum water supply of at least that determined by multiplying the density over the minimum design area, e.g., 10 gpm/sq ft x 1500 sq ft for Ordinary Hazard Group 1 and so on. Due to pressure balancing at heads an average of 10-20 percent was normal.

The general rule in determining area per sprinkler for hydraulically designed systems had been, up to the introduction of SxL requirements in Chapter 7, to look at the layout of the sprinklers and to determine individual sprinkler protection areas by dividing the floor area up evenly between sprinkler heads and multiplying this probable area of sprinkler operation by the density over an "area of operation" (floor area). This has been generally felt to mean that the floor area in question or "design area" becomes totally involved in a fire and every sprinkler within that area will have operated and will be flowing. This probable area of fire involvement, specified not only in NFPA 13 but also in other NFPA standards such as 231 and 231C, is based on fire tests and experience. (Note that NFPA 13 does exclude calculating water supplies for sprinklers in small closets (Section 7-4.3.1.6) located in this "area of operation")

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With this philosophy it was agreed that such designs would end up requiring a minimum water supply of at least that determined by multiplying the density over the minimum design area, e.g., 10 gpm/sq ft x 1500 sq ft for Ordinary Hazard Group 1 and so on. Due to pressure balancing at heads an average of 10-20 percent was normal.
A more extreme case is where a sprinkler protects a single room. With a room sized 9 x 9 ft and a sprinkler located 5 ft off one wall and 6.5 ft off and another the SxL rule requires the water supply from the sprinkler to be calculated based on a “synthetic” area of operation of 130 sq ft while the room is only 81 sq ft in area. The sprinkler having a .54 “K” factor and a .21 density required, starting pressure would be 25.6 psi compared to 9.9 psi if the SxL rule is not applied and the actual floor area of the room used as an area of operation.

Most if not all standard sprinklers are listed on the basis of a minimum operating pressure of 7 psi. The standard permits sprinklers operating at 7 psi (required by 7-4.3.2) to be spaced to protect up to 130 sq ft for Ordinary Hazard occupancies and 225 sq ft for Light Hazard occupancies so long as they are located within 7.5 ft of all walls. In the case where a sprinkler is installed in a room 9 x 9 ft. It shouldn’t matter where the sprinkler is located so long as it is within 7.5 ft of all walls. At the same time, the density requirements for that room do not change with the location of the sprinkler. The standard should not require 27 gpm simply because the sprinkler is 5 ft off one wall and 6.5 ft off another. The standard may want to continue however to limit the sprinkler location so to not exceed the protection area limits noted in Chapter 4.

In this case for example, Chapter 4 would not permit the sprinkler to be located 6 ft off two walls as the SxL wuld equal 144 sq ft which exceeds the 130 sq ft limit. (See Proposal on 4-2.1.5). This principal, as discussed above, should apply as well to sprinklers located in open floor areas next to walls, partitions, or obstructions at ceiling level.

In other words, the area of operation for an individual sprinkler should not be based on a “synthetic” or nonexistent floor area but instead should be based on the actual area of the floor upon which the sprinkler will be discharging water.

(b) As stated earlier, the intent of the standard for hydraulically designed sprinkler systems was, and as far as I know still is, to require a minimum density over an “area of operation.” This area of operation was presumed to be the total area expected to be involved in a fire; and accordingly a minimum design density was required based on this expected area of involvement.

With the inclusion of the SxL rule in 7-4.3.1.2(a) in 1983 the system designer suddenly had two “areas” to deal with: one, the “area of operation” referred to in Chapter 2 and the other, a “design area” for individual sprinklers over both of which you were required to calculate a minimum density. However, if you take the area calculated for each head based on SxL (which could be actual floor area or a “synthetic” area depending upon symmetry of spacing) your total of the individual design area could add up to an area greater than the actual area of the floor protected by these same sprinklers. As a result, what started out as a minimum density over a minimum area of operation, i.e. .21/1500, ended up as a minimum density over a larger synthetic area of operation or design area, i.e. .21/15000.

It has never been the intent of the standard to require this extra 500 sq ft to be calculated. Therefore, in order to still meet the intent of the standard of a minimum density over a minimum “area of operation” or “design area” as specified in Figure 2-2.1(b) and also apply the SxL rule, you must be allowed to add up the individual totals for the sprinklers calculated using SxL.

The following examples show several cases where there can be very major differences in the two concepts where small open faced booths are involved. These differences worthy of attention where open floor layouts are involved. In the proposal the words “area of operation” or “area of application” are changed to “design area” to more closely describe what is being calculated. Where SxL synthetic areas are used we are not talking about an actual “operating” or “application” area. The changes in 7-4.3.1.2(a), Item 2 are made to clarify intent that perpendicular distance is measured to the next sprinkler(s) and not the line itself.

Example A: Light Hazard

The SxL rule results in each sprinkler in the booths having a design area of 180 sq ft (72x14 = 1260), .3 x 1500 = 450 sq ft. Dividing 1680 sq ft by 166 you get 9 heads. The actual area of the floor covered by these 9 heads is 792 sq ft (8x11=88 x 9 = 792) resulting in a difference of 720 sq ft if you took an actual floor area of 1500 sq ft.

Example B: Ordinary Hazard

The SxL rule results in each sprinkler having a design area of 120 sq ft (6.5 x 2 = 130). Dividing 1500 sq ft by 130 you get 12 heads. The actual area covered by these 12 heads is 900 sq ft (7.5 x 10 = 75 x 12 = 900) resulting in a difference of 600 sq ft if you took an actual floor area.

Example C: Light Hazard

Selecting a design area outside the booths on lines AC, AD, and AE you come up with a synthetic area of 1,630 sq ft (4 x 129 + 4 x 139 + 4 x139) while the actual operating area 1,422 sq ft (4 x 103 + 4 x 127.4 + 4 x 127.4). If you dropped 1 head you'd have a synthetic area of 1,490 sq ft, an actual area of 1,305 sq ft.

Example D: Light Hazard

Selecting a design area outside the booth on lines AA, AB, and AC you'd come up with a synthetic area of 1,533 sq ft (4 x 156 + 4 x 130 + 3 x 129.5) while your actual operating area is 1,432 sq ft (4 x 143 + 4 x 123.5 + 3 x 122.5). The following examples show several cases where there can be very major differences in the two concepts where small open faced booths are involved. These differences worthy of attention where open floor layouts are involved. In the proposal the words “area of operation” or “area of application” are changed to “design area” to more closely describe what is being calculated. Where SxL synthetic areas are used we are not talking about an actual “operating” or “application” area. The changes in 7-4.3.1.2(a), Item 2 are made to clarify intent that perpendicular distance is measured to the next sprinkler(s) and not the line itself.

Example A: Light Hazard (see Figures following)

The SxL rule results in each sprinkler in the booths having a design area of 168 sq ft (7x2=14, 6x2=12, 1x68). Dividing 1,500 sq ft by 168 you get 9 heads. The actual area of the floor covered by these 9 heads is 792 sq ft (8x11=88 x 9 = 792) resulting in a difference of 720 sq ft if you took an actual floor area of 1500 sq ft.

Example B: Ordinary Hazard

The SxL rule results in each sprinkler having a design area of 130 sq ft (6.5 x 2 = 130). Dividing 1,500 sq ft by 130 you get 12 heads. The actual area covered by these 12 heads is 900 sq ft (7.5 x 10 = 75 x 12 = 900) resulting in a difference of 600 sq ft if you took an actual floor area.

Example C: Light Hazard

Selecting a design area outside the booths on lines AC, AD, and AE you come up with a synthetic area of 1,630 sq ft (4 x 129 + 4 x 139 + 4 x139) while the actual operating area 1,422 sq ft (4 x 103 + 4 x 127.4 + 4 x 127.4). If you dropped 1 head you'd have a synthetic area of 1,490 sq ft, an actual area of 1,305 sq ft.

Example D: Light Hazard

Selecting a design area outside the booth on lines AA, AB, and AC you'd come up with a synthetic area of 1,533 sq ft (4 x 156 + 4 x 130 + 3 x 129.5) while your actual operating area is 1,432 sq ft (4 x 143 + 4 x 123.5 + 3 x 122.5). The following examples show several cases where there can be very major differences in the two concepts where small open faced booths are involved. These differences worthy of attention where open floor layouts are involved. In the proposal the words “area of operation” or “area of application” are changed to “design area” to more closely describe what is being calculated. Where SxL synthetic areas are used we are not talking about an actual “operating” or “application” area. The changes in 7-4.3.1.2(a), Item 2 are made to clarify intent that perpendicular distance is measured to the next sprinkler(s) and not the line itself.

Example A: Light Hazard

The SxL rule results in each sprinkler in the booths having a design area of 168 sq ft (7x2=14, 6x2=12, 1x68). Dividing 1,500 sq ft by 168 you get 9 heads. The actual area of the floor covered by these 9 heads is 792 sq ft (8x11=88 x 9 = 792) resulting in a difference of 720 sq ft if you took an actual floor area of 1500 sq ft.

Example B: Ordinary Hazard

The SxL rule results in each sprinkler having a design area of 130 sq ft (6.5 x 2 = 130). Dividing 1,500 sq ft by 130 you get 12 heads. The actual area covered by these 12 heads is 900 sq ft (7.5 x 10 = 75 x 12 = 900) resulting in a difference of 600 sq ft if you took an actual floor area.

Example C: Light Hazard

Selecting a design area outside the booths on lines AC, AD, and AE you come up with a synthetic area of 1,630 sq ft (4 x 129 + 4 x 139 + 4 x139) while the actual operating area 1,422 sq ft (4 x 103 + 4 x 127.4 + 4 x 127.4). If you dropped 1 head you'd have a synthetic area of 1,490 sq ft, an actual area of 1,305 sq ft.
COMMITTEE ACTION: Accept in Principle.

RECOMMENDATION: Add new Appendix section as follows:
A-7-4.3.1.5 Using different orifice sizes to balance a system is sometimes done where additives are used, as in foam-water sprinkler systems, so as to make sure those additives are distributed evenly throughout an area. However, this balancing introduces difficulties when restoring a system to service after operation since it is not always clear which sprinklers go where. The use of sprinklers with different orifice sizes in situations where different protection areas are needed is not considered balancing. An example would be a hotel room which could be protected with different sprinklers in closet, foyer, and room areas.

SUBSTANTIATION: Appendix guidance is necessary to clarify the intent of the prohibition against hydraulic balancing of systems.

COMMITTEE ACTION: Accept in Principle.

Add new Appendix A-7-4.3.1.5:
"The use of sprinklers with differing orifice size in situations where different protection areas are needed is not considered balancing. An example would be a room which could be protected with sprinklers having differing orifice size in closet, foyer and room areas. However, this procedure introduces difficulties when restoring a system to service after operation since it is not always clear which sprinklers go where.

COMMITTEE COMMENT: The revised wording should meet the intent of the submitter and provide the necessary guidance.

LOG #184
13-206-(7-4.3.1.6): Reject
SUBMITTER: Rodney A. McPhee, Canadian Wood Council
RECOMMENDATION: Add the following to 7-4.3.1.6 after the word "application":
"when the sprinklers within such compartments are small orifice type (less than 1/2 in. (12.7 mm))."

SUBSTANTIATION: Not needing to calculate the water supply to these heads in the hydraulic calculations for the design area was based on the assumption that those heads would be of small orifice type and thus if operating in a fire would not be flowing a significant amount of water. Present day designs however utilize, on a consistent basis, 1/2 in. or 1/4 in. orifice sprinklers throughout the building including these small rooms. This is found even though the designer is permitted by 3-10.5 and 7-4.3.1.5 to use sprinklers with smaller orifices for these rooms. In view of this the exclusion of the water demand should only apply where small orifice sprinklers are used.

COMMITTEE ACTION: Reject.
COMMITTEE COMMENT: Existing wording meets the Committee intent.

LOG #185
13-207-(7-4.3.1.6)(a) and (b) (New): Accept in Principle
SUBMITTER: Rodney A. McPhee, Canadian Wood Council
RECOMMENDATION: (a) Make existing text of 7-4.3.1.6 part (a) including the Exception
(b) Add a new (b) section to 7-4.3.1.6 reading:
"(b) Water supply for sprinklers located below permanent obstructions such as ducts, wide tables, etc. need not be added to the design calculation for ceiling sprinklers.

SUBSTANTIATION: The Committee, by their comments on a previous proposal for the 1987 edition of NFPA 13, indicated that water supply for sprinklers located below permanent obstructions need not be included in hydraulic calculations where sprinklers above the obstruction have been included in the calculations. This should be specified in the standard to clarify differences in requirements for sprinklers located beneath temporary obstructions (see 7-4.3.1.2(c)) and those as related above.

COMMITTEE ACTION: Accept in Principle.

Make new 7-4.3.1.7:
Water supply for sprinklers located below permanent obstructions such as wide ducts, tables, etc. may be omitted from hydraulic ceiling sprinkler calculations within the area of application. Sprinklers below permanent obstructions shall, however, be capable of discharging minimum densities in accordance with Table 2-2.1(b) when the discharge from these sprinklers supplements discharge from ceiling sprinklers in the design area.

COMMITTEE COMMENT: Clarification of the Committee's intent.

LOG #186
13-208-(7-4.4.2, 7-4.4.2 Exception (New) and Figure A-7-4.4.2): Accept in Principle in Part
SUBMITTER: Rodney A. McPhee, Canadian Wood Council
RECOMMENDATION: A. In the third sentence beginning with "Adjoining corridors" add the word "adjoining" after "considered" so that the sentence reads:
"Adjoining corridors may be considered adjoining compartments for purposes of these calculations."
B. Add Exception to read:
Exception: See 7-4.3.1 Exception No. 1 for criteria to follow for design areas in corridors except that calculations need not include sprinklers inside unprotected openings.
C. In Figure A-7-4.4.2(b) add one more sprinkler to the designated design area.

SUBSTANTIATION: The sprinklers installed in these adjoining corridors will be standard sprinklers with ordinary response links. Design criteria for sprinklers in corridors in specified in 7-4.3.1. Exception No. 1 and must be followed in all corridor designs. Residential sprinklers are not listed for use in corridors.

COMMITTEE ACTION: Accept in Principle in Part.
In item A, revise the submitted third sentence to read:
"Adjoining corridors, if used in the calculations, shall be considered adjoining compartments solely for the purposes of these calculations."
Reject items B and C.

COMMITTEE COMMENT: The Committee believes that the four sprinkler design is appropriate for residential areas.

LOG #134
13-209-(Chapter 7): Accept
SUBMITTER: Technical Committee on Automatic Sprinklers
RECOMMENDATION: Give consideration to mandating a data interchange system for computer hydraulic programs.
SUBSTANTIATION: A data interchange system for sprinkler hydraulics programs would make plan review much easier. The proposal from Crowley Design Group presents one approach which could be used.

COMMITTEE ACTION: Accept.
COMMITTEE COMMENT: Consideration was given. Specific wording was not proposed.

LOG #25
13-210-(Chapter 8): Accept
SUBMITTER: Technical Committee on Automatic Sprinklers
RECOMMENDATION: Revise Chapter 8 to appear as follows:
Chapter 8 Large-Drop and Early Suppression Fast Response (ESFR) Sprinklers
8-1 General.
8-1.1 Applications. This chapter provides requirements for the installation of large-drop and early suppression fast response (ESFR) sprinklers. Listed sprinklers other than large-drop and ESFR sprinklers are not covered by this chapter.
8-2 Large Drop Sprinklers.
8-2.1 Definition - Large Drop Sprinkler (Old 8-1.2).
8-2.2 Applicability (Old 8-1.3).
8-2.2.1 (Old 8-1.3.1).
8-2.2.2 (Old 8-1.3.2).
8-2.2.3 Installation (Old 8-2).
8-2.3.1 Operating Pressure (Old 8-2.1).
shall be designed such that the minimum operating pressure is not less than 50 psi (3.4 bar).

Sprinkler systems shall be sized by hydraulic calculation to supply the most hydraulically remote twelve sprinklers, flowing four sprinklers on three branch lines.

Temperature Rating. Sprinkler temperature ratings shall be nominal 165°F (74°C).

Exception: Sprinklers of Intermediate and high temperature ratings shall be installed in specific locations as required by 3-16.6.3.

The area of coverage shall be limited to a minimum of 80 ft² (7.4 m²) and a maximum of 100 ft² (9.3 m²).

The distance between branch lines and between sprinklers on the branch lines shall be limited to not more than 12 ft (3.7 m) nor less than 8 ft (2.4 m).

Clear Space Below Sprinklers. At least 36 in. (914 mm) shall be maintained between sprinkler deflectors and the top of storage.

Distances Below Ceiling. Sprinklers shall be positioned so that deflectors are a maximum 14 in. (356 mm) and a minimum 6 in. (152 mm) below the ceiling.

Location of Sprinklers in Beam and Girder and Panel Construction. (See NFPA 24, Standard for Installation of Private Fire Service Mains and Their Appurtenances) shall be cleaned and serviced at least annually and after any work has been performed on fire protection water supply.

Visual and/or flushing investigations shall be conducted of all systems for Foreign material at intervals not exceeding five years.

Obstruction to Distribution. The maximum distance of deflector above the bottom of beams shall be limited to the values specified in Chapter 4.

Obstruction in Piping. Under beam and girder construction and under panel construction, the branch lines may run across the beams, but sprinklers shall be located in the bays and not under the beams.

The maximum distance of deflector above the bottom of beams shall be limited to the values specified in Table 8-3.3.10.2.

When sprinkler deflectors are located above the bottom of beams, girders, ducts, fluorescent lighting fixtures, or other obstructions located at the ceiling, the sprinklers shall be positioned so that the maximum distance from the bottom of the obstruction to the deflector does not exceed the value specified in Chapter 4.

Table 8-3.3.10.2 Position of Sprinklers in Relation to Obstructions Located Entirely Below the Sprinklers

<table>
<thead>
<tr>
<th>Distance of Deflector Above Bottom of Obstruction</th>
<th>Minimum Distance from the Bottom of the Obstruction to the Side of the Obstruction, ft (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 6 in. (152 mm)</td>
<td>1 1/2</td>
</tr>
<tr>
<td>6 in. (152 mm) to less than 12 in. (305 mm)</td>
<td>3</td>
</tr>
<tr>
<td>12 in. (305 mm) to less than 18 in. (457 mm)</td>
<td>4</td>
</tr>
<tr>
<td>18 in. (457 mm) to less than 24 in. (610 mm)</td>
<td>5</td>
</tr>
<tr>
<td>24 in. (610 mm) to less than 30 in. (660 mm)</td>
<td>6</td>
</tr>
</tbody>
</table>

8-3.3.4.1 Pipe shall be sized by hydraulic calculation to supply the most hydraulically remote twelve sprinklers, flowing four sprinklers on three branch lines.

8-3.3.4.2 Sprinkler systems shall be designed such that the minimum operating pressure is not less than 50 psi (3.4 bar).

8-3.3.4.3 System Design.
COMMITTEE COMMENT: Large drop sprinklers with fast response thermal sensing elements are currently listed as special sprinkler (4-1.1.3) and are therefore outside the scope of Chapter 8.

COMMITTEE ACTION: Accept.

SUBMITTER: W. E. Wilcox, FMRC

RECOMMENDATION: Revise as follows:
8-2.10.2.3 The number of automatic sprinklers to be calculated shall be determined by the appropriate standards (i.e., NFPA 231, 231C, etc.). The maximum number of operating sprinklers calculated per branch line shall be as follows:
15 sprinklers - 4 sprinklers per branch line
20 sprinklers - 5 sprinklers per branch line
25 sprinklers - 6 sprinklers per branch line
30 sprinklers - 6 sprinklers per branch line

The requirements of 7-4.3.1 do not apply to this type of sprinkler.

SUBSTANTIATION: The requirements of 7-4.3.1 do not apply to this sprinkler. Guidance is needed. Depending on the area of coverage, per sprinkler, demand areas for 15 sprinklers can range from 1,200 square feet to 1,950 square feet. Using the procedures in 7-4.3.1 and the distance between sprinklers, the number of calculated sprinklers required per branch line can vary between 4 and 7. See table following. This does not follow the original test data, nor is it the intent to vary the design requirements based on spacing of sprinklers along branch lines.

Table A-8-3.4.1 Protectible Occupancies

<table>
<thead>
<tr>
<th>Type of Storage</th>
<th>Commodity</th>
<th>Maximum Height</th>
<th>Maximum Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single, double- and multiple-row and portable rack storage (no open-top containers or solid shelves), and baled or polyurethane (not polystyrene) foam-in-place packaging</td>
<td>Cartoned unexpanded</td>
<td>IV commodities. Cartoned</td>
<td>25</td>
</tr>
<tr>
<td>(Encapsulated or nonencapsulated)</td>
<td>polyurethane (not polystyrene) foam-in-place packaging</td>
<td>Cartoned</td>
<td>25</td>
</tr>
<tr>
<td>Roll paper on end, open/standard/closed array, banded or unbanded</td>
<td>Heavyweight paper</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>Roll paper on end, open/standard/closed array, banded or unbanded</td>
<td>Mediumweight paper</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>Aerosol Storage</td>
<td>To be determined</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

LOG #119

13- 211 - (8-1.3.2): Reject

SUBMITTER: W. E. Wilcox, FMRC

RECOMMENDATION: Revise as follows:
8-2.10.2.3 The number of automatic sprinklers to be calculated shall be determined by the appropriate standards (i.e., NFPA 231, 231C, etc.). The maximum number of operating sprinklers calculated per branch line shall be as follows:
15 sprinklers - 4 sprinklers per branch line
20 sprinklers - 5 sprinklers per branch line
25 sprinklers - 6 sprinklers per branch line
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The requirements of 7-4.3.1 do not apply to this type of sprinkler.

SUBSTANTIATION: The requirements of 7-4.3.1 do not apply to this sprinkler. Guidance is needed. Depending on the area of coverage, per sprinkler, demand areas for 15 sprinklers can range from 1,200 square feet to 1,950 square feet. Using the procedures in 7-4.3.1 and the distance between sprinklers, the number of calculated sprinklers required per branch line can vary between 4 and 7. See table following. This does not follow the original test data, nor is it the intent to vary the design requirements based on spacing of sprinklers along branch lines.
Distance Between Sprinklers

<table>
<thead>
<tr>
<th>Distance</th>
<th>8 feet</th>
<th>10 feet</th>
<th>12 feet</th>
<th>8 feet</th>
<th>10 feet</th>
<th>12 feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>13 Sprinklers</td>
<td>1,200</td>
<td>1,500</td>
<td>1,950</td>
<td>1,200</td>
<td>1,500</td>
<td>1,950</td>
</tr>
<tr>
<td>20 Sprinklers</td>
<td>1,400</td>
<td>2,000</td>
<td>2,600</td>
<td>1,400</td>
<td>2,000</td>
<td>2,600</td>
</tr>
<tr>
<td>25 Sprinklers</td>
<td>2,000</td>
<td>2,500</td>
<td>3,250</td>
<td>2,000</td>
<td>2,500</td>
<td>3,250</td>
</tr>
<tr>
<td>30 Sprinklers</td>
<td>2,400</td>
<td>3,000</td>
<td>3,900</td>
<td>2,400</td>
<td>3,000</td>
<td>3,900</td>
</tr>
</tbody>
</table>

COMMITTEE ACTION: Reject.
COMMITTEE COMMENT: Committee still continues to feel the area of operation should be a rectangle most closely approximating a square and still supports the 1.2 rule.

COMMITTEE ACTION: Accept.
COMMITTEE COMMENT: Modify under "Light Hazard" to read: "225 sq ft smooth ceiling and beam girder construction. (200 sq ft if pipe schedule system)"
SUBSTANTIATION: The vast majority of currently installed systems are hydraulically designed. The standard should be modified to reflect that fact.
COMMITTEE ACTION: Accept.

COMMITTEE ACTION: Accept in Principle.
COMMITTEE COMMENT: See Proposal 13-216 (Log #71).

13 - 216 - (10-1.2): Accept
SUBMITTER: Thomas G. Daly, American Hotel and Motel Assn.
RECOMMENDATION: Add the following standards to the list which have special design criteria for sprinkler systems:
NFPA 40-1982, Cellulose Nitrate Motion Picture Film
NFPA 48-1982, Storage Handling and Processing of Magnesium
NFPA 423-1983, Construction and Protection of Aircraft Engine Test Facilities
NFPA 307-1985, Construction and Fire Protection of Marine Terminals
SUBSTANTIATION: The above cited standards have special design criteria which differ from NFPA 13. The current list does not reflect these standards.
COMMITTEE ACTION: Accept in Principle.

COMMITTEE COMMENT: See Proposal 13-216 (Log #71).

13 - 217 - (Appendix C): Accept
SUBMITTER: John J. Walsh, United Assn.
RECOMMENDATION: Modify under "Light Hazard" to read: "225 sq ft smooth ceiling and beam girder construction. (200 sq ft if pipe schedule system)"
SUBSTANTIATION: The vast majority of currently installed systems are hydraulically designed. The standard should be modified to reflect that fact.
COMMITTEE ACTION: Accept.

13 - 218 - (XX): Reject
SUBMITTER: Robert R. Laroche, Ministere des Affaires municipales Gouvernement du Quebec, Chauveau Quebec, Quebec
RECOMMENDATION: Add the following standards to the list:
NFPA 40-1982, Cellulose Nitrate Motion Picture Film
NFPA 48-1982, Storage Handling and Processing of Magnesium
NFPA 423-1983, Construction and Protection of Aircraft Engine Test Facilities
COMMITTEE ACTION: Accept.
COMMITTEE COMMENT: See Proposal 13-216 (Log #71).
This standard does not apply:
(a) to buildings of 1 or 2 apartments covered by the NFPA 13 Standard; or
(b) to dry pipe sprinkler systems.

1-2 Am. The present standard was established in order to ensure a reasonable degree of protection for persons or property by setting out for automatic sprinkler systems basic requirements concerning established engineering principles, test results and experience carried out on the site of fires. This standard establishes the specifications for automatic sprinkler systems for small buildings only when the installation of a system in accordance with the NFPA 13 standard is not required by the National Building Code for a new building.

Although the water supply required for automatic sprinkler systems for small buildings is less than that required for systems designed in accordance with the NFPA 13 Standard, automatic water sprinkler systems for small buildings have a fire hose connection for systems designed in accordance with the NFPA 13 standard.

1-3 Definitions. The expressions underlined are defined in Part I of the National Building Code. The other expressions used in this standard have the same meaning as in standard NFPA 13.

1-4 Design and Installation. An automatic sprinkler system is a fire prevention system whose design and installation require considerable knowledge and experience.

1-5 Maintenance. The systems designed in accordance with this standard shall be maintained as is required to ensure their effectiveness. The owner is responsible for the condition of the equipment and must therefore ensure that it is kept in good working order.

1-5.1 The contractor-installer shall provide the owner with a copy of the brochure entitled: Inspection, Testing and Maintenance of Sprinkler Systems (NFPA 13A).

1-6 Reference works. The reference works referred to in this standard are as follows:

NFPA 13-1985, Standard for the Installation of Sprinkler Systems;
NFPA 13D-1984, Installation of Sprinkler Systems for One and Two-Family Dwellings and Mobile Homes;

Chapter 2 System Components

2-1 Pipes, supports, tubes and fittings.

2-1.1 The pipes, supports and methods of suspension, connection and assembly methods used in installing systems shall be consistent with standard NFPA 13. Exception: The diameter of pipes shall be established by hydraulic calculation as specified in Chapter 3 but shall not be less than the minimum diameter specified in standard NFPA 13.

2-1.2 No brazing or welding with tin using an open flame is permitted in the building that one wishes to protect.

2-2 Automatic extinguishers.

2-2.1 Automatic extinguishers used in systems designed in accordance to this standard shall be consistent with section 3.16 of standard NFPA 13. However, in dwellings and sleeping rooms not forming part of a dwelling, residential sprinkler systems must be used.

2-2.2 Automatic sprinkler systems shall have a rated operational temperature of the 71°C (160°F). The other operating temperature shall be consistent with standard NFPA 13.

2-3 Valves and accessories. Valves, check valves and other accessories such as flow detectors shall be consistent with standard NFPA 13.

Chapter 3 Hydraulic Calculations

3-1 Design area. The system shall be designed so that the water supply provides the required flow for the simultaneous operation of automatic sprinklers protecting the area of 37.2 m² (400 sq ft) as it is the most demanding hydraulically with the minimum design density specified as 3.2.1 or 3.2.2.

3-2 Design density.

3-2.1 For low-risk operations, the minimum design density coverage shall be 6.1 L/min/m² (0.15 gal US/min/sq ft).

3-2.2 For normal-risk operations of Groups I and II, the minimum design density shall be 8.1 L/min/m² (0.2 gal US/min/sq ft).

3-3 Water consumption for domestic needs.

3-3.1 A Flow of 100 L/min (26.3 gal US/min) shall be added in the hydraulic calculations at the connection point of the domestic water system.

3-3.2 The flow mentioned in 3-3.1 is not suitable where usual domestic consumption such as bathrooms, toilets and residential kitchens are concerned. Any other equipment or activities require higher levels of water, they shall be determined and added to the calculations.

The flow allocated to domestic consumption shall be determined in accordance with Table 3-3.2.

Table 3-3.2 Diameter of water service line of domestic system calculated in accordance with the Quebec Plumbing Code

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Flow allocated to domestic consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 mm (1 in.)</td>
<td>100 L/min (26.3 gal US/min)</td>
</tr>
<tr>
<td>30 mm (1 1/4 in.)</td>
<td>200 L/min (52.6 gal US/min)</td>
</tr>
<tr>
<td>40 mm (1 1/2 in.)</td>
<td>300 L/min (78.9 gal US/min)</td>
</tr>
<tr>
<td>50 mm (2 in.)</td>
<td>400 L/min (144.7 gal US/min)</td>
</tr>
</tbody>
</table>

3-4 Methods of calculations.

3-4.1 The hydraulic calculations shall follow the method set out by standard NFPA 13.

Exception: For grid systems, the design area shall include all the automatic sprinkler systems located on the distribution pipes which are the furthest from the riser up to the number of automatic sprinkler heads required.

3-4.2 When residential automatic sprinkler heads are used, this part of the system shall be designed in accordance with article 7-4.4 of standard NFPA 13.

Chapter 4 Spacing and Placement of Automatic Sprinkler Heads

4-1 Spacing and placement of automatic sprinkler heads.

Except as provided in 4.2, the regulations of Chapter 4 of Standard NFPA 13 shall be followed.

4-2 Area protected and distance between automatic sprinkler heads.

Except for residential automatic sprinkler heads, the maximum horizontal distance between automatic sprinkler heads shall be 12 ft (3.7 m) [6 ft (1.8 m) maximum from walls or partitions], and the maximum area protected by any automatic sprinkler head shall be 100 ft² (9.3 m²).

Exception: Small rooms with an area not exceeding 120 sq ft (11.2 m²) may be protected by a single automatic sprinkler head placed at least 6 ft (1.8 m) from any wall.

Chapter 5 Water Supply

5-1 The automatic sprinkler systems shall be connected to an acceptable water supply source in accordance with standard NFPA 13.

5-2 The minimum rated diameter of the water service line shall be 40 mm (1 1/2 in.) for a copper pipe and 50 mm (2 in.) for a steel pipe.

5-3 Larger water service lines may be required in order to respond to requirements of hydraulic calculations.

5-4 Subject to the approval of municipal authorities, the water meter shall be located on the domestic water system.
Chapter 6: Main Elements of System

6-1 Automatic sprinkler systems shall comprise the following elements:
- an indicating valve;
- two check valves forming a back-flow prevention device;
- a firefighter fitting equipped with a check valve and an automatic drainage valve;
- a manometer;
- a flow detector equipped with a delayed action device; and
- a drainage valve.

These elements shall be assembled as shown in Illustration 6-1.

6-2 The drainage valve shall be at least 25 mm (1 in.) and shall run into a safe area.

6-3 The flow detector shall be able to operate an alarm device installed on the most frequent outside wall. A sign describing the function of the alarm shall be installed near the alarm.

6-4 A test valve for the inspector shall be installed as required in standard NFPA 13 and shall run into a safe area.

ILLUSTRATION 6-1

\[\text{Flow detector} \rightarrow \text{To the automatic sprinkler needs} \]
\[\text{Drainage valve} \]
\[\text{Manometer} \]
\[\text{Valve} \rightarrow \text{To domestic water system} \]
\[\text{Indicating valve} \]
\[\text{Check valves} \]
\[\text{Firefighter connection} \]
\[\text{Valve} \rightarrow \text{Flow detector} \rightarrow \text{Check valves} \rightarrow \text{Valve} \rightarrow \text{Flow detector} \]
\[\text{Flow detector} \rightarrow \text{To the automatic sprinkler needs} \]

Chapter 7: Tests

7-1 Water supply tests shall be carried out in accordance with standard NFPA 13.

7-2 Hydraulic tests of each system shall be consistent with standard NFPA 13.

SUBSTANTIATION: The need for a modification to NFPA 13 which would allow automatic sprinkler system protection in small buildings at a more economical cost.

Fire Protection for Small Buildings
In the Province of Quebec

The committee formed by the Conseil St-Laurent of the Association des Ingenieurs en securite incendie (AISI) to set forth standards for automatic sprinkler systems for small buildings comprised the following:

Standing members:
- Jean-Pierre Bonneville
- Antoine Tabet, P. Eng.
- Gaetan Frenette

Associate members:
- Andre Gonneville, P. Eng.
- Benoit Charbonneau, P. Eng.
- Jean Drouin, P. Eng.
- Denis Claude, P. Eng.
- Andre Blain, P. Eng.
- Ken Villiot, P. Eng.
- Mike Abacarius
- Nat Buczynski

June 18, 1986

The National Fire Protection Association is aware of the high costs related to the NFPA 13 standard and recently set up the National Fire Protection Research Foundation. An extensive research program is in progress in order to make major amendments to the NFPA 13 standard.

The National Fire Protection Association is aware of the high costs related to the NFPA 13 standard and recently set up the National Fire Protection Research Foundation. An extensive research program is in progress in order to make major amendments to the NFPA 13 standard.

Meanwhile, however, the D.G.P.I. is committed to act immediately. Therefore, it has mandated the Conseil Saint-Laurent of the Association des Ingenieurs en securite incendie to develop standards for automatic sprinkler systems for small buildings. The Conseil Saint-Laurent set up a technical committee that began its work in March 1985. This work continued until the summer of 1986.

The technical committee obviously does not have the resources of the National Fire Protection Research Foundation. It based its decisions mainly on its knowledge, judgment and experience of its members and on the written documentation available. The resulting standard should meet the objectives set by D.G.P.I. Neither the committee members nor the A.I.S.I. can assume responsibility for the pertinence and application of this standard. The evaluation, promotion and application of this standard will be the responsibility of the D.G.P.I.

Because of the major technological developments that will result from the work of the N.F.P.R.F., the technical committee deems it essential that the contents of the proposed standard be revised as soon as the results of this work are published. The modifications concern mainly the hydraulic calculations and sprinkler head spacing. We can expect greater efficiency and an additional reduction in costs.

It is now incumbent on the D.G.P.I. to act through the Ministere des affaires municipales.

The intention to take immediate action should yield concrete results in the near future.

2. EFFECTIVENESS OF AUTOMATIC SPRINKLER SYSTEMS

a) The value of an automatic sprinkler system in preventing fires is acknowledged by fire fighters. This system operates automatically without human intervention. It ensures protection of occupants and buildings. All fire prevention publications praise automatic sprinkler systems. In most cases, it takes four or fewer sprinkler heads to extinguish a fire or contain it while awaiting the arrival of the fire fighters.
The terms “reliability” and “satisfactory performance” are very subjective. In terms of saving lives, a satisfactory performance is presumably achieved if there is no loss of life other than the person directly involved in starting the fire. The absence of other injuries is negligible. Buildings equipped with automatic sprinkler systems indicates that these systems are highly reliable. A Swedish study of fire reports in 17 countries reveals one loss of life in 10 years in 200,000 to 550,000 Fires in buildings protected by automatic sprinkler systems over a one hundred year period.

b) Automatic sprinkler systems are undoubtedly effective in ensuring the health and safety of fire fighters. When fire fighters arrive on the scene of a fire, they are exposed to the dangers of smoke poisoning, broken bones caused by collapsing structures. In buildings protected by automatic sprinkler systems, the fog produced by this system decreases the density of toxic gases in the air and maintains the temperature of structural elements below levels susceptible to cause damage to the structure.

c) The National Research Council of Canada published a report (NRCC 23495) on the performance of automatic sprinkler systems:


These statistics include almost all the fires in Australia and New Zealand from 1886 to 1968. In these two countries, the fire alarm triggering an automatic sprinkler system is transmitted directly to the fire department. The fire statistics are national. These statistics reveal that automatic sprinkler systems performed satisfactorily in 99.75 percent of the 5,734 fires reported.


A total of 5,709 fires were reported in buildings with automatic sprinkler systems and these systems performed satisfactorily in 96.5 percent of the cases.

d) Automatic sprinkler systems have a reliability of over 95 percent and it has been proven that, with a minimum of maintenance, reliability increases to 99 percent.

3. AUTOMATIC SPRINKLER SYSTEMS IN QUEBEC

a) An analysis of fire intervention reports for 1984 reveals the effectiveness of automatic sprinkler systems in Quebec.

b) If we select from a total of 8,774 fire reports, those in buildings whose ground-floor space is less than 10,000 sq ft and exclude buildings with one or two dwellings, we are left with 1,276 fires resulting in material losses of $29,717,560, i.e., an average material loss of $23,290 per fire.

c) In analyzing these fires, if we compare the loss in relation to the value of the building and its contents, we find that the presence of automatic sprinkler systems makes a considerable difference:

- with automatic sprinkler systems: 1.6%
- without automatic sprinkler systems: 7.8%

d) Therefore, the extent of material loss caused by fires is nearly five times higher when there is no automatic sprinkler system than when there is an automatic sprinkler system.

4. INCENTIVES

To encourage property owners, whether private individuals or organizations, to install automatic sprinkler systems, we plan to take the following action:

a) Promote the advantages of this equipment

The first step is to make property owners and municipalities aware of the advantages of installing automatic sprinkler systems. These advantages are described in annex A.

b) Reduce insurance premiums

A reduction in insurance premiums will decrease the annual expenses of property owners. This factor is explained in annex B.

c) Reduce installation costs

A reduction in the cost of automatic sprinkler systems, equipment and labour decreases capital outlay for installation and, therefore, is an incentive to install automatic sprinkler systems. This cost reduction would be achieved by:

installation of a common water service pipe for automatic sprinklers and the domestic water system (see annex D);
- adoption of a specific standard for small buildings for which the National Building Code has apparently not required the installation of automatic water sprinkler systems.

This cost reduction is illustrated in annex C. d) Create financial incentives

Financial incentives can take various forms. They can be either a lump sum, a decrease in property tax valuation or a combination of both (loan guarantee or financial assistance).

The municipalities should subsidize installation of automatic sprinkler systems by not taxing, if possible, the value of such equipment, since property owners who protect their properties against fire reduce the insurance rates for the community. The various levels of government could encourage the installation of automatic sprinkler systems by fiscal or other incentives such as:

- Reduction in costs of connecting the automatic sprinkler system to the municipal water system.

This incentive has already been applied successfully by some municipalities.

- Reduction of construction requirements.

The concept for installing automatic sprinkler systems in small buildings is based on existing statistics which show that a high percentage of fires, i.e., 70 percent to 90 percent, require only four or fewer sprinkler heads. This is according to the automatic sprinkler systems specified in the present standard indicate that in existing structures this system generates savings of 15 percent to 30 percent in relation to the NFPA 13 standard.

The recommended standard would make it possible to achieve an effectiveness that is substantially greater than these figures since it would cover only properties exposed to low or normal risk and would not authorize compressed air systems, which are less reliable.

NFPA statistics indicate that 43 percent of firms that have had a fire do not resume their activities, and that an additional 28 percent of such firms will close in the next three years for a total failure rate of 71 percent. With a system designed in accordance with this standard, the failure rate would be reduced to less than 15 percent.

A system designed in accordance with this standard is not recommended for new buildings in which an automatic sprinkler system is required by the National Building Code. The protection offered by a system designed in accordance with the NFPA 13 standard is considered superior and the savings achieved by using this standard in the case of new buildings do not exceed 15 percent, because underground piping of an appropriate diameter can be installed immediately.

It is recognized that the automatic sprinkler system for small buildings concept accepts a lower success rate than that obtained with a system designed in accordance with the NFPA 13 standard. However, it is expected that the use of automatic sprinkler systems in small buildings can substantially increase the safety of occupants and diminish fire-related losses by several million dollars, because such systems can be purchased by persons who would consider existing fire protection systems too expensive. Automatic sprinkler systems for small buildings offer a balanced compromise between the cost of installation and the control of the fire.

The recommended standard is set out at annex E of this document. The committee’s reasons for drawing up this standard are outlined in the annex. The numbers correspond with those used in the text of the standard.

1.1b) and c)

The area of height limits were selected in order to cover buildings for which the NBC does not require sprinkler systems in accordance with the NFPA 13 standard.
In view of the lowering of requirements, the recommended standard applies only to low or normal risk occupancies of groups I and II, i.e., areas that do not present fireloads that might exceed the available water supply.

The ceiling height was limited to 5 m because the operational delay of an automatic sprinkler system is proportional to the distance between the sprinkler head and the fire. An increase in the operational delay would result in the fire becoming more intense and diminish the chances of controlling it with automatic sprinkler systems.

Single or double-occupancy buildings are covered by the NFPA 13D standard which has a lower water supply requirement.

The operational delay of a dry-pipe sprinkler, the internal corrosion affecting the performance of the system and the necessity of providing a compressor and a compressed-air valve preclude achievement of effectiveness and reduced cost objectives.

Hydraulic calculations make it possible to reduce the diameter of the piping and obtain maximum use of available water supplies.

The design area is based on the operation of the four sprinkler heads which are the most hydraulically demanding.

The recommended design density are greater than the NFPA 13 standard. It is obvious that a system designed in accordance with the NFPA 13 standard for a certain density, when an average of 15 sprinkler heads are in operation, will provide a greater density than when only four sprinkler heads are in operation.

Since reduced water supply is required under the recommended standard and common water service pipes (domestic water system and automatic sprinkler system) are preferred in order to reduce installation costs, it is important to take domestic water consumption into account when making hydraulic calculations.

The maximum area protected is limited to 9.3 m² (100 ft²) per sprinkler head in order to permit rapid activation during a fire.

The water meter should be located on the domestic water connection so that the performance of the automatic sprinkler system will not be penalized. It is not necessary to measure the quantity of water used by an automatic sprinkler system in case of fire.

The delayed action device on the flow detector is important to avoid false alarms during normal fluctuations of the water pressure in the municipal water system. We recommend installation of the automatic sprinkler system control valve upstream from the point at which the domestic water system is connected in order to determine when the system is closed.

To promote installation of automatic sprinkler systems in the province of Quebec, we recommend:

1. that the present standard be recognized by provincial and municipal authorities;
2. that the Ministere des affaires municipales encourage municipal authorities to:
   - recognize this standard;
   - accept common water service pipes, as justified at annex D;
3. that the Ministere du travail accept this standard in compensation for certain instruction in safety regulations in existing buildings;
4. that insurers recognize this standard when establishing insurance rates;
5. that the direction generale de l'évaluation foncière of the Ministere des affaires municipales not include the value of automatic sprinkler systems when valuating the property for tax purposes (Municipal Tax Act).

The installation of automatic sprinkler systems has been statistically proven not only to reduce the risks of fatalities and serious burns during fires but also to benefit property owners, municipalities and the provincial government.

Automatic sprinkler systems enable property owners to:

a) adequately protect their properties;
b) reduce risks of business interruptions that generally involve loss of clientele and contracts;
c) reduce insurance costs (see annex B);
d) improve the insurability of buildings;
e) enhance the rental values of the buildings;
f) ensure a greater flexibility in the use of the building, particularly during conversion or changes in its use;
g) compensate for certain built-in protection provided for by the regulations (fire resistance of corridors, etc.).

For municipalities, an increase in the number of buildings protected by automatic sprinkler systems will:

a) maintain taxable real estate and business income;
b) reduce risks of a conflagration following a fire;
c) conserve old buildings. They can be more easily put to other uses even if they do not comply with current construction standards. A building constructed of combustible material protected by an automatic sprinkler system could be considered fireproof;
d) maintain or even improve the equipment and labour while keeping the same level of safety;
e) reduce the costs of municipal water systems if automatic sprinkler systems were widely used;
f) maintain or even improve the municipality's insurance rating without investing in equipment;
g) reduce risks to the health and safety of fire fighters.

The installation of automatic sprinkler systems in small buildings also offers the following advantages to the provincial government:

a) conservation of existing jobs and creation of new jobs in the construction industry;
b) preservation of existing buildings;
c) protection of buildings belonging to or subsidized by the government;
d) protection of the residents of these buildings, e.g., senior citizens.

Although none of these advantages in itself would compensate for the cost of establishing automatic sprinkler systems—especially since many of these advantages are difficult to quantify—it is advantageous to install automatic sprinkler systems because of the social benefits.

The fire insurance rates for the province of Quebec with those of other provinces, we note that Quebec has the highest insurance rates of Canada. This is the inevitable consequence of the high level of material losses.

Further, the insurers have always made a major allowance in calculating fire insurance rates for establishments that are suitably protected by a good automatic sprinkler system. Since fire insurance rates are higher in Quebec, we can hope that the cost of purchasing automatic sprinkler systems will be offset by a reduction in fire insurance rates.

The introduction of automatic sprinkler systems cannot be justified solely by the insurance savings because such savings are rarely enough to completely cover the costs of installing automatic sprinkler systems. However, every possible incentive should be used to promote fire protection. In this vein, lower insurance rates can be an important factor.

Lower fire insurance rates will be an especially attractive incentive for establishments with high insurance rates. The main characteristics of these establishments are as follows:

- combustible construction;
- use for high-risk activities (examples: restaurant or workshop rather than residence or office);

ANNEX A

ADVANTAGES OF AUTOMATIC SPRINKLER SYSTEMS IN SMALL BUILDINGS

The benefits of installing automatic sprinkler systems are as follows:

1. encourage municipal authorities to:

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   b) reduce risks of a conflagration following a fire;
   c) conserve old buildings. They can be more easily put to other uses even if they do not comply with current construction standards. A building constructed of combustible material protected by an automatic sprinkler system could be considered fireproof;
   d) maintain or even improve the equipment and labour while keeping the same level of safety;
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Lower fire insurance rates will be an especially attractive incentive for establishments with high insurance rates. The main characteristics of these establishments are as follows:

- combustible construction;
- use for high-risk activities (examples: restaurant or workshop rather than residence or office);
- a less favourable municipal fire insurance rating from the Service d'inspection des assureurs incendie (4 to 10);
- contents are insured for a large amount.

Another important aspect to consider is that installation of automatic sprinkler systems will lower not only building insurance but also insurance rates for contents. Insurance rates for contents are almost always higher than those for buildings.

Resident-owners pay the highest insurance rates, because they must insure both their building and its contents. It is they who will benefit the most from a lowering of insurance rates because of the installation of automatic sprinkler systems.

However, a reduction in insurance rates will not be a strong incentive for tenants of large buildings because total insurance payments are divided among the many tenants concerned and each would assume only part of the total fire insurance premium.

It should not be forgotten that people are increasingly falling to insure their property for its full value. This phenomenon became more pronounced since the imposition of a 9 percent tax on insurance premiums. By having less insurance, one pays proportionally less and the potential savings resulting from the installation of an automatic sprinkler system are less significant.

Finally, the table below illustrates typical fire insurance rates. The premium is calculated by multiplying the rate by the amount of insurance. These rates are not always followed by insurance companies. During period of intense competition, the rates drop and insurance savings for installing fire protection equipment will be minimal.

Description of typical cases
1. Houses
   a) Rooming house located at Montreal and Quebec City
      2 storeys with basement
      3000 sq ft per storey
      brick and wood
      50 years old
      pipes can be seen in the existing construction
   b) 14-unit apartment building located in Sherbrooke
      3 storeys with 4 apartments each
      50 percent basement
      50 percent apartments
      garage
      5000 sq ft per storey
      pipes hidden (except in garage)
      new building
      brick and wood

2. Restaurant on the main-floor and storage area in the basement located at Montreal and Quebec City
   4 apartments on the two upper floors
   3000 sq ft per storey
   brick and wood
   pipes hidden (25 year-old building under renovation)

3. Garage in St-Jérôme
   1 storey, 5000 sq ft without a basement
   fire-proof construction (masonry walls)
   pipes visible
   new building

4. Three (3) businesses on the ground-floor offices on the second floor at St.-Leonard
   10,000 sq ft
   brick on wood, no basement, 10 years old
   pipes hidden in existing building

Examples of fire insurance rates ($100 of insurance)

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<td>#3 Garages</td>
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</tr>
<tr>
<td>#4 Businesses</td>
<td>.80</td>
<td>.48</td>
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<td>.24</td>
</tr>
<tr>
<td>#4 Businesses</td>
<td>.50</td>
<td>.40</td>
</tr>
</tbody>
</table>

How insurance premiums are calculated:
Consider a $100,000 garage containing $50,000 of merchandise.

The annual premium without an automatic sprinkler system =

\[ (0.30 \times 100,000) + (0.60 \times 50,000) = 1,000 \]

The annual premium with an automatic sprinkler system =

\[ (0.20 \times 100,000) + (0.60 \times 50,000) = 600 \]

Savings with automatic sprinkler systems = $400 a year.

If we add the savings for operational losses (assuming a gross income of $200,000 a year), we have an additional saving of $120, i.e., a total of $520.

ANNEX C

STUDY OF INSTALLATION COSTS

A study of the costs of installation of automatic sprinkler systems in accordance with the present standards compared with installations made in accordance with the NFPA 13 standard reveals substantial savings in the order of 15 percent to 30 percent. By adopting this standard it will be possible to install an automatic extinguisher system for as little as $56 to $65 a square foot in most small buildings. These costs do not include the costs for installing underground pipes. In municipalities that permit common water service pipes for automatic sprinkler systems and domestic systems, the additional cost will be minimal.

The diameter of the pipes used is 1 1/2 in. or 2 in. They will be made of copper and must withstand a residual pressure of 50 lbs/sq ft.

WATER SERVICE PIPE

Regardless of the number of sprinkler heads in an automatic sprinkler system, the cost of a water service pipe is relatively invariable. Therefore, the smaller the building, the greater the proportion of the costs of the water service pipe connection in the total cost of the system. These costs comprise excavation, equipment, filling, paving and labour.

Since the reduction in the cost of a system can encourage installation in a greater number of buildings, the committee studied the possibility of reducing street connection costs. Two solutions were identified:

1. Reduction in the diameter of the water service pipe

ANNEX D

WATER SERVICE PIPE

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Since the reduction in the cost of a system can encourage installation in a greater number of buildings, the committee studied the possibility of reducing street connection costs. Two solutions were identified:

1. Reduction in the diameter of the water service pipe

Examples of fire insurance rates ($100 of insurance)
Traditionally, insurance companies have specified water service pipes at least 6 inches in diameter. The NFPA 13 standard, Installation of Sprinkler Systems, however, authorizes water service pipes less than 4 inches if the material is resistant to corrosion (copper, plastic, coated steel, etc.) and if a hydraulic calculation shows that a smaller diameter can provide an adequate water supply.

A new installation standard with reduced hydraulic material requiring a corrosive resistant water service pipe would make it possible to reduce the diameter of the pipe. This would result in a saving of material and labor.

2. Common water service pipe for automatic sprinkler system and domestic water supply system

If a common water service pipe is used for the automatic sprinkler system and the domestic water system, all the costs of installing a distinct pipe can be avoided for a slight increase in the price of materials and labor.

A common water service pipe may have a diameter greater than that required for a single domestic water service pipe, because it must accommodate the demand of two networks simultaneously as determined by hydraulic calculations. However, regardless of the criteria determined by the new standard and the available water source, the diameter of an existing water service pipe could, in some cases, be sufficient.

An obstacle to installing common water service pipes was identified in most municipalities. These municipalities based on the National Building Code, require a separate water service pipe as soon as a system has eight or more sprinkler heads. Since the committee felt that the Code was not very clear on this point, it obtained an interpretation from the Associated Committee on the NBC.

This interpretation confirms that the NBC does not require separate water service pipes for systems of 8 or more sprinkler heads; it simply requires that these systems be distinct from the domestic system starting at the point where the water service pipe enters the building.

Further, the Associated Committee on the NBC stated that this article applies only for buildings for which automatic sprinkler systems are required by the Code; this is not the case for the buildings to which the proposed standard would apply.

Stated in the Recommendation is a standard for the installation of automatic sprinkler systems for small buildings set forth by the "Association des Ingenieurs en securite incendie (AISI)* conseil St-Laurent on a mandate given by the "Direction generale de la Prevention des incendies" of the "Ministre des Affaires municipales* Quebec Government."

COMMITTEE ACTION: Reject.

COMMITTEE COMMENT: While the committee appreciates the intent to provide low cost sprinkler protection for small buildings, the proposal includes specific recommendations for water application densities and spacing intended to limit the number of sprinklers operating but with no technical substantiation.

The National Fire Protection Research Foundation currently has the subject of appropriate application densities under study as part of the OGS Research Project. Until the research is completed, systems can continue to be installed economically in conformance with the existing standard. Since NFPA 13 contains no minimum size for water service connections, it is possible to provide protection for some small compartmented buildings with water connections smaller than those specified in the proposed (paragraphs 2-2.1.2.8 and 2-3.2).

The standard cannot take the position that two identical occupancies can have differing levels of sprinkler protection based on whether the system is legally mandated. The proposal is not of sufficient detail to be adopted as a separate NFPA standard.


SUBMITTER: Harry Shaw, Operation Life Safety

RECOMMENDATION: Develop new standard or add new text as follows:

4A-45.001 Scope. This rule chapter establishes minimum requirements for the design and installation of automatic sprinkler systems for the protection of light hazard occupancies not otherwise required to be sprinklered by law. These minimum requirements shall be met by any installation of an automatic sprinkler system not otherwise required once the decision to sprinkle the occupancy is taken. The local authority having jurisdiction shall determine any construction or fire protection alternatives to be allowed for the installation of a sprinkler system in conformity with this rule chapter.

4A-45.002 Purpose. The purpose of this rule chapter is to reduce the loss of life and property from fire in the State of Florida by providing standards for an affordable fire sprinkler system to encourage the use of this level of fire protection. Nothing in this rule chapter is intended to restrict new technologies, alternate arrangements or alternate materials so long as the level of safety required by the rule chapter is met.

4A-45.003 Definitions.

(1) "Approved" means acceptable to the "authority having jurisdiction".

(2) "Authority Having Jurisdiction" means the organization, office or individual responsible for approving equipment, an installation or a procedure.

(3) "Listed" refers to equipment or materials included in a list published by an organization acceptable to the "authority having jurisdiction" and concerned with product evaluation, provided that the organization maintains periodic inspection of production of listed equipment or materials and states on its listing either that the equipment or material meets appropriate standards or has been tested and found suitable for a use in a specified manner.

(4) "Sprinkler System" for fire protection purposes, means an integrated system of underground and overhead piping designed in accordance with generally accepted fire protection engineering standards.

(5) "Standard" means a document containing mandatory requirements, using the word "shall" to indicate requirements.

4A-45.004 Maintenance.

(1) A sprinkler system installed pursuant to the provisions of this rule chapter shall be properly maintained for efficient service. The owner is responsible for the condition of the sprinkler system and shall use due diligence in keeping the system in good operating condition.

(2) The installing contractor shall provide the owner with:

(a) Instruction charts describing the operation and proper maintenance of sprinkler devices and
(b) A copy of NFPA 13A, Care and Maintenance of Sprinkler Systems, published by the National Fire Protection Association, Battery March Park, Quincy, Massachusetts 02269, and adopted pursuant to Rule 4A-3.012, Florida Administrative Code.

4A-45.005 Classification of Sprinkler Systems. This rule chapter covers wet pipe automatic sprinkler systems. Special purpose systems employing departures from the requirements of this rule chapter, such as special water supplies and reduced pipe sizing, shall be installed in accordance with their listing.

4A-45.006 Classification of Occupancies.

(1) Occupancy classifications for this rule chapter relate to sprinkler installations and their water supplies only. They are not intended to be a general classification of occupancy hazards.

(2) Light Hazard Occupancies are those occupancies or portions of other occupancies where the quantity and/or combustibility of contents is low and fires with relatively low rates of heat release are expected. They include occupancies having conditions similar to those generally found in churches: clubs: eaves and/or combustible construction with no combustibles underneath; educational facilities; hospitals; institutional facilities; libraries, except

Log #14
Large stack rooms; museums; nursing or convalescent homes; offices, including data processing rooms; residential restaurant seating areas; theaters and auditoriums, excluding stages and prosceniums; and unused attics.

1. Only new sprinklers shall be employed in the installation of sprinkler systems.
2. When a sprinkler system is installed, only approved materials and devices shall be used.
3. Sprinkler systems shall be designed for a maximum working pressure of 175 psi (12.1 bars), except that higher design pressures may be used when all system components are rated for pressures higher than 175 psi (12.1 bars). Interior system components subject to pressure shall be designed for a working pressure not less than 175 psi (12.1 bars).


1. Working plans shall be submitted for approval to the authority having jurisdiction before any equipment subject to pressure shall be designed for a working pressure not less than 175 psi (12.1 bars).
2. Working plans shall be drawn to an indicated scale, on sheets of uniform size, with plan of each floor, made so that they can be easily duplicated, and shall show all the following data:
   (a) Name of owner and occupant
   (b) Site plan, include location and street address
   (c) Point of compass
   (d) Ceiling construction
   (e) Full height cross section
   (f) Location of fire walls
   (g) Location of partitions
   (h) Occupancy of each area or room
   (i) Location and size of concealed spaces and closets
   (j) Any questionable small enclosures in which no sprinklers are to be installed.
   (k) Size of city main in street, pressure and whether dead-end or circulating and, if dead-end, direction and distance to nearest circulated main, city main test results
   (l) Other sources of water supply, with pressure or elevation
   (m) Make, type and nominal orifice size of sprinkler
   (n) Temperature rating and location of high temperature sprinklers
   (o) Total area protected by each system on each floor
   (p) Number of sprinklers on each riser per floor
   (q) Kind and location of alarm bells
   (r) Pipe type and schedule of wall thickness
   (s) Nominal pipe size and cutting lengths of pipe
   (t) Location and size of riser nipples
   (u) Type of fittings and joints and location of all welds and bends
   (v) Type and locations of hangers and sleeves
   (w) All control valves, check valves, drain pipes and test pipes.
   (x) Underground pipe size, length, location, weight, material, point of connection to city main; the type of valves, meters and valve pits, and the depth that top of the pipe is laid below grade
   (y) Provision for flushing
   (z) When the equipment is to be installed as an addition to an existing system or portion of the system being tested.
   (aa) Type of fittings and joints and location of all welds and bends
   (bb) Name and address of contractor

4A-45.009 Approval of Sprinkler Systems.

1. The installer shall perform all required acceptance tests, complete the Contractor's Material and Test Certificate(s), and forward the certificate(s) to the authority having jurisdiction.
2. When the authority having jurisdiction desires to be present during the conduct of acceptance tests, the installer shall give advance notification of the time and date the testing will be performed.

4A-45.010 Acceptance Tests.

1. Flushing of Underground Connections.
   (a) Underground mains and lead-in connections shall be flushed at a flow rate not less than the hydraulically calculated water demand rate of the system.
   (b) Provision shall be made for the disposal of water issuing from test outlets to avoid property damage.

   (a) All new systems including yard piping shall be hydrostatically tested at not less than 200 psi (13.8 bars) pressure for 2 hours, or at 50 psi (3.4 bars) in excess of the maximum pressure, when the maximum pressure to be maintained in the system is in excess of 150 psi (10.3 bars). The test pressure shall be read from a gauge located at the low elevation point of the individual system or portion of the system being tested.
   (b) Fire Department Connection. Piping between the check valve in the fire department inlet pipe and the outside connection shall be tested in the same manner as the balance of the system.
   (c) Corrosive Chemicals. Brine or other corrosive chemicals shall not be used unless approved by the authority having jurisdiction.

3. Tests of Drainage Facilities. Tests of drainage facilities shall be made while the control valve is wide open. The main drain valve shall be opened and shall remain open until the system pressure stabilizers. The contractor's Material and Test Certificate shall be completed for each installation. The contractor shall use Form 4A-45 CMT. Copies are available from the State Fire Marshal, Suite 541, Larson Building, Tallahassee, Florida 32301 and may be reproduced. Form 4A-45 CMT is hereby adopted and incorporated by reference.

4A-45.011 Water Supplies.

1. Every automatic sprinkler system shall have at least one automatic water supply.
2. Water supply requirements shall be in accordance with the provisions of Rule 4A-45.012.


4A-45.012 Connections to Water Works Systems.

1. Acceptability.
   (a) A connection to a reliable water works system shall be an acceptable water supply source. The volume and pressure of a public water supply shall be determined from water flow test data.
   (b) Meters are not recommended for use on sprinkler systems. However, where required by other authorities, they shall be of approved type.

2. Capacity. The connection and arrangement of underground supply piping shall be capable of supplying the calculated demand.

3. Fire Department Connections.

4A-45.013 Fire Department Connections.

1. A fire department connection shall be provided, except when permission of the authority having jurisdiction has been obtained for its omission.
2. A fire department connection shall be included at any time that a pump is required to provide necessary pressures.

4. For these sprinkler systems the size of the fire department connection should be sufficient to supply the calculated water demand.

4A-45.014 Arrangement of Water Supply Connections.

1. Connection Between Underground and Aboveground Piping. The connection between the system piping and underground piping shall be made with a suitable transition piece and shall be properly strapped or fastened by approved devices. The transition piece shall be protected against possible damage from corrosive agents, solvent attack, or mechanical damage.
2. Connection Passing Through or Under Foundation Walls.

   (a) A pressure gauge shall be installed on the riser or feed main at or near each test pipe, with a connection no smaller than 1/2 inch. This gauge connection shall be equipped with a shutoff valve and with provision for draining.
   (b) The required pressure gauges shall be of approved type and shall have a maximum limit not less than twice the normal working pressure at the point where installed. They shall be installed to permit removal, and shall be located where they will not be subject to freezing.
4A-45.015 System Components

(1) Piping
(a) Piping Specifications.
1. Pipe or tube used in sprinkler systems shall be in accordance with subparagraphs 2. through 6., below. Pipe and tube used in sprinkler systems shall be designed to withstand a working pressure of not less than 175 psi (12.1 bars).
2. When welded and seamless steel pipe is used and joined by welding as referenced in subsection (12)(b), below, or by roll grooved pipe and couplings as referenced in subsection (12)(c), below, the minimum nominal wall thickness for pressures up to 300 psi (20.7 bars) shall be in accordance with Schedule 10 for sizes up to 5 inches; 0.134 inches (3.40 mm) for 6 inches; and 0.188 inches (4.78 mm) for 8- and 10-inches pipe; or as modified in subparagraph 5., below, or as defined in subparagraph 6., below.
3. When steel pipe is used and joined by threaded fittings referenced in subsection (12)(a), below, or by couplings used with pipe having cut grooves, the minimum wall thickness shall be in accordance with Schedule 30 (in sizes 8 inches and larger) or Schedule 40 (in sizes less than 8 inches) pipe for pressures up to 300 psi (20.7 bars).
4. Copper tube as specified in the standards used in sprinkler systems, shall have a wall thickness of Type K, L or M.
5. Other types of pipe or tube may be used, provided, the level of safety required by this rule chapter is not lowered as determined by the authority having jurisdiction.
6. Whenever the word "pipe" is used in this rule chapter, it shall also be understood to mean tube.

(b) System Riser. Bending of steel pipe (Schedule 40) and copper tube (Type K & L) may be accomplished when bends are made in conformance with good installation practices and show no kinks, ripples, distortions, reduction in diameter, or any noticeable deviations from round. The minimum radius of a bend shall be 6 pipe diameters for pipe sizes 2 inches and smaller, 8 pipe diameters for pipe sizes 2 1/2 inches and larger.

(c) "Branch Lines" are lines of pipe, from the point of attachment to the cross main (or similar connection) to the end sprinkler, in which the sprinklers are placed.

(d) "Feed Mains" are the mains supplying risers or cross mains.

(e) "Cross Mains" are pipes directly supplying the lines in which the sprinklers are placed.

(3) Area Protection. The minimum floor area to be protected by sprinklers supplied on each system riser on any one floor shall be 52,000 sq. ft.

(4) Return Bends. When piping on wet systems is concealed, with sprinklers installed in pendant position below a ceiling, return bends shall be used when the water supply to the sprinkler system is from a raw water source, millpond, or from open top reservoirs. Return bends shall be connected to the tops of lines in order to avoid accumulation of sediment in the drop nipples. In new systems the return bend pipe and fittings shall be 1 inch in size. In revamping existing systems, where necessary to retain sprinklers in the concealed space, 1/2 inch or 3/4 inch drop nipples inserted in the existing sprinkler fittings may be used with 1 inch pipe and fittings for the other portions of the return bend. When the water supply is potable, return bends are not required on wet systems.

(5) System Test Pipes.
(a) A test pipe not less than 1 inch in diameter terminating in a smooth bore corrosion resistant orifice giving a flow equivalent to one sprinkler should be provided for each system. The test connection valve should be readily accessible. The discharge should be to the outside, to a drain connection capable of accepting full flow under system pressure or to another location where water damage will not result.

(b) In multi-story buildings where waterflow alarm devices are provided at each riser on each floor or where more than one alarm device is provided in one sprinkler system, a test pipe shall be provided for testing each alarm device.

(6) Protection of Piping.
(a) Protection of Piping Against Freezing.
1. When portions of systems subject to freezing and temperatures cannot be reliably maintained at or above 40 degrees F. (4 degrees C), sprinklers shall be installed to protect from freezing.
2. When supply pipes, risers, system risers or feed mains pass through open areas, cold rooms, passageways or other areas exposed to freezing, the pipe shall be protected against freezing by insulating coverings, frostproof casings or other reliable means capable of maintaining a minimum 40 degrees F. (4 degrees C).
(b) Protection of Piping Against Corrosion.
1. Steel pipe in overhead feed mains running from one building to another, when exposed to the weather, shall be galvanized, or otherwise protected against corrosion.
2. When steel pipe is used underground as a connection from a system to sprinklers in a detached building, the pipe shall be protected against corrosion before being buried.
3. Brine or other corrosive chemicals shall not be used unless approved by the authority having jurisdiction.

(7) Drainage.
(a) Pitching of Piping for Drainage.

1. All sprinkler pipe and fittings shall be so installed that the system may be drained in order to perform repair or maintenance.
2. When the capacity of isolated trapped sections of pipe is more than 5 gallons (19 liters) an auxiliary drain shall be installed. The auxiliary drain shall consist of a valve not smaller than 3/4 inch size and plug. However, auxiliary drains are not required where piping can be drained by the removal of one head.
(b) Discharge of Drain Valves.
1. Direct interconnections shall not be made between sewers and sprinkler drain systems supplied by public water. The drain discharge shall be in conformity with any applicable health or water department regulations.
2. When drain pipes are buried underground, approved corrosive-resistant pipe shall be used.
3. Drain pipes shall not terminate in blind spaces under the building.
4. Drain pipes when exposed shall be fitted with a turned down elbow.
5. Drain pipes shall be arranged so that no part of the sprinkler system is exposed to freezing conditions.

(8) Joining of Pipe and Fittings.
1. All threaded fittings and pipe shall have threads cut to ANSI/ASMA Standard B 1.20.1, which is hereby adopted and incorporated herein by reference. Care shall be taken that the pipe does not extend into the fitting sufficiently to reduce the waterway.
2. Steel pipe with threads less than Schedule 30 (in sizes 8 inches and larger) or Schedule 40 (in sizes less than 8 inches) shall not be joined by threaded fittings, unless a threaded assembly has been investigated for suitability in automatic sprinkler installations and listed for this service.
3. Joint compound or tape shall be applied to the threads of the pipe and not in the fitting.

(b) Welded Piping.
1. Welding methods which comply with all of the requirements of ANSI D100.0, Level AR-3, Qualification of Welding Procedures and Welders for Piping and Tubing, which is hereby adopted and incorporated herein by reference, are acceptable means of joining fire protection piping.
2. Welding sections of sprinkler piping in place inside the building shall not be permitted. Sections of branchlines, cross mains or risers may be shop welded. However, welding sections of sprinkler piping in place inside new buildings under construction may be permitted but only when the construction is noncombustible and no combustible contents are present and when the welding process is performed in accordance with NFPA 51B, Standard For Fire Prevention in Use of Cutting and Welding Processes, as adopted pursuant to Rule 4A-3.012, Florida Administrative Code.
3. Welding procedures, welder and welding machine operators shall be qualified as required by subparagraph 11, below.

4. Welding fittings and welded formations manufactured, fabricated, or joined in conformance with a qualified welding procedure as set forth herein are an acceptable product under this rule provided that materials and wall thickness are compatible with other rules within this rule chapter.

5. No welding shall be performed if there is any indication of cracking, hot cracking, or incomplete fusion in the weld area. The pipe product shall be tested for strength,

6. a. Holes in piping shall be cut to full inside diameter of fitting or shaped, contoured nipple.
   b. Discs shall be retrieved.
   c. Openings in piping shall be smooth.
   d. All slag and other welding residue shall be removed.
   e. Fittings or shaped, contoured nipples of any length shall not penetrate beyond the internal diameter of the piping.

7. When reducing a pipe size in the run of a main, cross main, or branch, a suitable reducing fitting designed for that purpose shall be used.

8. Torch cutting and welding shall not be permitted as a means of modifying or repairing sprinkler systems.

9. When welding is planned, the contractor shall specify the section to be shop welded on drawings and the type of fittings or formations to be used.

10. Sections of shop welded piping shall be joined by means of flanged or flexible gasketed joints or other approved fittings. An exception may be made if the installer complies with subparagraph 2. under this paragraph (b).

11. Qualifications.
   a. A welding procedure shall be prepared and qualified before any welding is done. Qualification of the welding procedure to be used and the performance of welders and welding operators is required and shall comply with the requirements of American Welding Society Standard AWS D10.9, Level AR-3.
   b. Each contractor or fabricator shall be responsible for all welding installed by him. Each contractor or fabricator shall have an established written quality assurance procedure related to control of the requirements of subparagraph 6. of this chapter, available to the authority having jurisdiction.
   c. Each contractor or fabrciator shall be responsible for qualifying any welding procedure that he intends to have used by personnel of his organization.
   d. Each contractor or fabricator shall be responsible for qualifying all of the welders and welding machine operators employed by him in compliance with the requirements of ANSI D10.9, Level AR-3.

12. Qualifications Records. The contractor or fabricator shall maintain certified records, which are available to the authority having jurisdiction, of the procedures used and the welders or welding machine operators employed by him. Records shall show the date and the results of procedure and performance qualifications.

(c) Groove Joining Methods. Pipe joined with mechanical grooved couplings shall be joined by a listed combination of couplings, gaskets and grooves. When grooves are cut or rolled on the pipe they shall be dimensionally compatible with the coupling. However, steel pipe with wall thicknesses less than Schedule 30 (in sizes 8 inches and larger) or Schedule 40 (in sizes less than 8 inches) shall not be joined by couplings with pipe having cut grooves.

(d) Brazed and Soldered Joints. Joints for the connection of copper tubing shall be brazed. However, solder joints may be permitted for wet-pipe systems in light hazard occupancies where the temperature classification of the installed sprinklers is ordinary or intermediate.

(e) Other Types. Other types of joints shall be made or installed in accordance with the requirements of the listings for this service.

(f) End Treatment. After cutting, pipe ends shall be burrs and fins removed. When using listed fittings, the pipe and its end treatment shall be in accordance with the manufacturer's installation instruction and the listing.

(g) Fittings.
   (a) Fittings used in sprinkler systems shall be of the materials listed in the Table in subparagraph 2. or in accordance with the provisions of subparagraph 3., below. The chemical properties, physical properties and dimensions of the material shall be at least equivalent to the standards cited in the table. Fittings used in sprinkler systems shall be designed to withstand the working pressures involved, but not less than 175 psi (12.1 bars) saturated steam pressure.

2. Table of Fittings.

<table>
<thead>
<tr>
<th>Fittings</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cast Iron</td>
<td>ANSI B16.4</td>
</tr>
<tr>
<td>Cast Iron Threaded Fittings</td>
<td>ANSI B16.25</td>
</tr>
<tr>
<td>Cast Iron Pipe Flanges and Flanged Fittings</td>
<td>ANSI B16.1</td>
</tr>
<tr>
<td>Malleable Iron</td>
<td>ANSI B16.3</td>
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<tr>
<td>Malleable Iron Threaded Fittings</td>
<td>ANSI B16.9</td>
</tr>
<tr>
<td>Steel</td>
<td></td>
</tr>
<tr>
<td>Factory-made Wrought Steel Butt weld Fittings</td>
<td>ANSI B16.11</td>
</tr>
<tr>
<td>Butt welding Ends for Pipe, Valves, and Flanges</td>
<td>ANSI B16.5</td>
</tr>
<tr>
<td>Spec. For Piping Fittings of Wrought Carbon Steel and Alloy Steel</td>
<td>ANSI B16.2</td>
</tr>
<tr>
<td>Steel Pipe Flanges and Flanged Fittings</td>
<td>ANSI B16.5</td>
</tr>
<tr>
<td>Forged Steel Fittings, Socket Welded, and Threaded</td>
<td>ANSI B16.11</td>
</tr>
<tr>
<td>Copper</td>
<td></td>
</tr>
<tr>
<td>Wrought Copper and Bronze Solder-Joint Pressure Fittings</td>
<td>ANSI B16.18</td>
</tr>
<tr>
<td>Cast Bronze-Solder-Joint Pressure Fittings</td>
<td>ANSI B16.18</td>
</tr>
</tbody>
</table>

All of the standards listed in this subparagraph are adopted and incorporated herein by reference.

3. Other types of fittings may be used, with the approval of the authority having jurisdiction, provided that the level of safety prescribed by this rule chapter is not lowered. Note that welded fittings or fittings approved specifically for use in sprinkler systems shall be used on pipe larger than 2 inches. Couplings and fittings when standard fittings of the required size are not available.
(10) Valves.
(a) Types of Valves to be Used.
1. All valves on connections to water supplies and in supply pipes to sprinklers shall be listed indicating valves, unless a nonindicating valve, such as an underground gate valve with approved roadway box complete with T-wrench, is accepted by the authority having jurisdiction.

Such valves shall not close in less than 5 seconds when operated at maximum possible speed from the fully open position. This is to avoid damage to piping by water hammer.

The following may not incorporate indicating devices as part of the valve, but the valve assembly described shall qualify as an indicating valve.

Steel
Factory-made Wrought Steel
Buttweld Fittings ..................................... ANSI B16.9
Buttwelding Ends for Pipe, Valves, Flanges and Fittings ........ ANSI B16.25
Spec. for Piping Fittings of Wrought Carbon Steel and Alloy Steel For Moderate and Elevated Temperatures . .... ASTM A234
Steel Pipe Flanges and Flanged Fittings . ANSI B16.5
Forged Steel Fittings, Socket Welded and Threaded ............. ANSI B16.11
Copper
Wrought Copper and Bronze Solder-Joint Pressure Fittings ..... ANSI B16.18

All of the standards listed in this subparagraph are adopted and incorporated herein by reference.

3. Other types of fittings may be used, with the approval of the authority having jurisdiction, provided that the level of safety prescribed by this rule chapter is not lowered. Note that welded fittings or formations may be permitted if they conform to the requirements of subsection (8)(b) of this rule. Note also that when unique characteristics of a fitting, such as a tendency to rotate, require support in addition to that required in subsection (11), below, restraint shall be provided in accordance with its listing.

4. Fittings used in sprinkler systems shall be extra heavy patterns where pressures exceed 175 psi (12.1 bars).

a. However, standard weight pattern cast-iron fittings in 2 inch size and smaller may be used where pressures do not exceed 300 psi (20.7 bars); or
b. Standard weight pattern malleable iron fittings 6 inch size and smaller may be used where pressures do not exceed 300 psi (20.7 bars); or
c. Fittings may be used for system pressures up to the limits specified in listings by a testing laboratory.

5. Where water pressures are 175 to 300 psi (12.1 to 20.7 bars), the ANSI standards permit the use of standard wall pipe and extra heavy valves. Until pressure ratings for valves are standardized, the manufacturer’s ratings shall be observed.

6. When risers are 3 inches in size or larger, a flanged joint or mechanical coupling shall be used at the riser at each floor.

b. Couplings and Unions. Screwed unions shall not be used on pipe larger than 2 inches. Couplings and unions of other than screwed type shall be of types approved specifically for use in sprinkler systems.

Unions, screwed or mechanical couplings, or flanges may be used to facilitate installation.

(c) Reducers and Bushings. A one-piece reducing fitting shall be used wherever a change is made in the size of the pipe. However, hexagonal or face bushings may be used in reducing the size of openings of fittings when standard fittings of the required size are not available.

(10) Valves.
(a) Types of Valves to be Used.

1. All valves on connections to water supplies and in supply pipes to sprinklers shall be listed indicating valves, unless a nonindicating valve, such as an underground gate valve with approved roadway box complete with T-wrench, is accepted by the authority having jurisdiction.

Such valves shall not close in less than 5 seconds when operated at maximum possible speed from the fully open position. This is to avoid damage to piping by water hammer.

The following may not incorporate indicating devices as part of the valve, but the valve assembly described shall qualify as an indicating valve:

a. An underground gate valve of listed type equipped with a listed indicator so located as to control all sources of water supply except fire department connections.

b. A listed water control valve assembly which is normally open and requires constant energy application to close and keep closed.

c. A listed water control valve assembly which has a reliable position indication connected to a remote supervisory station.

2. Drain valves and test valves shall be of listed type of 175 psi (12.1 bars) cold water (125 psi (8.6 bars) saturated steam) pressure rating.

3. Check valves shall be listed and shall be installed in a vertical or horizontal position in accordance with their listing.

(b) Valves Controlling Sprinkler Systems.

1. Each system shall be provided with a listed indicating valve so located as to control all sources of water supply except fire department connections.

2. At least one listed indicating valve shall be installed in each source of water supply except fire department connections.

3. Valves controlling sprinkler systems, except underground gate valves with roadway boxes, shall be supervised open by a system controlled by each valve shall be provided.

4. When a single wet-pipe sprinkler system is equipped with a fire department connection the alarm valve is considered a check valve and an additional check valve shall not be required.

5. In a city connection serving as one source of supply, the city valve in the connection may serve as one of the required valves. A listed indicating valve or an indicator post valve shall be installed on the system side of the check valve. However, when a wet-pipe sprinkler system is equipped with an (alarm) check valve, a gate valve is not required on the system side of the (alarm) check valve.

6. When there is more than one check valve, a gate valve is considered a check valve and an additional check valve shall not be required.

7. When a fire department connection is used, a check valve shall be installed in each connection. However, when cushion tanks are used with automatic fire pumps, no check valve is required in the cushion tank connection.

8. A check valve shall be installed in each water supply connection if there is a fire department connection on the system.

9. When a single wet-pipe sprinkler system is equipped with a fire department connection the alarm valve is considered a check valve and an additional check valve shall not be required.

10. In a city connection serving as one source of supply, the city valve in the connection may serve as one of the required valves. A listed indicating valve or an indicator post valve shall be installed on the system side of the check valve.

(c) Identification of Valves.

1. Identification of Valves. When there is more than one control valve, permanently marked identification signs indicating the portion of the system controlled by each valve shall be provided. Embossed plastic tape, penecil, ink, crayon, etc., shall not be considered permanent markings. The sign shall be secured with noncorrosive wire, chain or other means.

(ii) Hangers.

(a) General. Type of hangers and installation methods shall be in accordance with the requirements of this subsection.

1. The components of hanger assemblies which directly attach to the pipe or to the building structure shall be listed.

a. Mild steel hangers formed from rods need not be listed.

b. Hangers and installation methods certified by a registered professional engineer for the following need not be listed:

i. Designed to support five times the weight of the water-filled pipe plus 250 lb (115 kg) at each point of piping support.

ii. These points of support are enough to support the sprinkler system.

ii. Ferrous materials are used for hanger components. Detailed calculations shall be submitted, when required by the reviewing authority, showing stressing developed both in hangers and piping and safety factors allowed.

2. Sprinkler piping or hangers shall not be used to support non-system components.
3. Sprinkler piping shall be substantially supported from the building structure with means that will support an added load of the water-filled pipe plus a minimum of 250 lb. (114 kg) applied at the point of hanging.

4. Sprinkler piping shall be supported independently of the ceiling. However, loggle hangers shall be used only for the support of pipe 1 1/2 inch or smaller in size under ceilings of hollow tile or metal lath and Plaster and not less than 3/8 inch (9.5 mm) thick. Any other sizes or shapes giving equal or greater section modulus will be acceptable. The transverse member shall be secured to prevent slippage.

5. When sprinkler piping is installed below ductwork, piping shall be substantially supported from the building structure or from the steel angles supporting the ductwork provided the angles conform to Table 3-15.1.7, in NFPA 13, Installation of Sprinkler Systems, as adopted in Rule 4A-3.012, Florida Administrative Code.

6. For trapeze hangers, the minimum size of steel angle or Schedule 40 pipe span between purlins or joists shall be as shown in Table 3-15.1.7, in NFPA 13, all angles to be used with longer leg vertical. Any other sizes or shapes giving equal or greater section modulus will be acceptable. The transverse member shall be secured to prevent slippage.

7. The size of hanger rods and fasteners required to support the steel angle iron or pipe indicated in Table 3-15.1.7 in NFPA 13, shall comply with paragraph (d), below.

8. Eye rods and ring hangers shall be secured with necessary lock washers to prevent lateral motion at the point of support.

9. Holes through concrete beams may also be considered as a substitute for hangers for the support of pipes.

10. Maximum Distance Between Hangers. With steel pipe or copper tube, the maximum distance between hangers shall not exceed 12 ft (3.7 m) for 1- and 1 1/2 inch sizes nor 15 ft (4.6 m) for sizes 1 1/2 inches and larger.

11. When sprinkler piping is installed in storage racks as defined in NFPA 231C, Standard For Rack Storage of Materials, as adopted pursuant to Rule 4A-3.012, Florida Administrative Code, the piping shall be substantially supported from the storage rack structure or building in accordance with all applicable provisions of this subsection (h).

(h) Hangers in Concrete.
1. Listed inserts set in concrete may be installed for the support of hangers. Wood plugs shall not be used.
2. Listed expansion shields for supporting pipes under concrete construction may be used in a horizontal position in the sides of beams. In concrete having gravel or crushed stone aggregate, expansion shields may be used in the vertical position to support pipes 4 inches or less in diameter.
3. Expansion shields shall not be used in ceilings of gypsum or similar soft material. Inside concrete, expansion shields shall not be used except on branch lines where they shall alternate with through bolts or hangers attached to beams.
4. When expansion shields are used in the vertical position, the holes shall be drilled to provide uniform contact with the shield over its entire circumference. Depth of the hole shall not be less than specified for the type of shield used.
5. Holes for expansion shields in the side of concrete beams shall be above the center line of the beam or above the bottom reinforcement steel rods.

(c) Powder Driven Studs and Welding Studs.
1. Powder driven studs, welding studs, and the tools used for installing these devices shall be listed by a testing laboratory and installed within the limits of pipe size, installation position, and construction material into which they are installed as expressed in individual listings or approvals. However, loggle hangers shall be used only for the support of pipe 1 1/2 inch or smaller pipe, 1000 lb (454 kg) for 2 1/2-, 3-, or 3 1/2-inch pipe, and 1200 lb (545 kg) for 4- or 5-inch pipe.
2. When increased couplings are used, they shall be attached directly to the powder driven stud or welding stud.
3. Welded studs or other hanger parts shall not be attached by welding to steel less than US Standard, 12 gauge.
4. Rods and "U" hooks.
5. Hanger rod sizes shall be the same as that approved for use with the hanger assembly. However, rods of smaller diameter may be used when the hanger assembly has been tested and listed by a testing laboratory and installed within the limits expressed in individual listings or approvals. For rolled threads, the rod shall not be less than the root diameter of the thread.
6. "U" hooks. The size of the rod material of "U" hooks shall be not less than 5/16 inch (7.9 mm).
7. The size of the rod material for eye rods shall not be less than 3/8 inch (9.5 mm) for "U" hooks.
8. Screws. For ceiling flanges and "U" hooks, screw dimensions shall be not less than: wood screw No. 18 X 1 1/2 inch for screw flanges and drive screw No. 16 X 2 inch for "U" hooks.
9. The size bolt or lag (coach) screw used with an eye rod or flange on the side of the beam shall not be less than 3/8 inch (9.5 mm) X 2 1/2 inch (64 mm). However, when the thickness of beams or joists does not permit the use of screws 2 1/2 inch (64 mm), screws 2 inch (51 mm) may be permitted with hangers spaced not over 10 ft (3 m) apart.
10. Drive screws shall be used only in horizontal position as in the side of a beam. Wood screws shall not be driven. Nails are not acceptable for fastening hangers.
11. Screws in the side of a timber or joist shall be not less than 2 1/2 inches (64 mm) from the lower edge when supporting branch lines, and not less than 3 inches (76 mm) when supporting main lines. This shall not apply to 2-inch (51 mm) or thicker nailing strips resting on top of steel beams.
12. The minimum thickness of plank and the minimum width of lower face of beams or joists in which lag screws are used shall be plank thickness 3 inch (76 mm) up to 2 inch; 4 inch for all other, face width 2 inch (51 mm).

(e) Location of Hangers on Branch Lines. This paragraph applies to the support of steel pipe or copper tube.
1. On branch lines, there shall be not less than one hanger for each length of pipe. However, hangers may be located as provided in subparagraphs 2. through 6., below.
2. The distance between the hanger and centerline of upright sprinkler shall be no less than 3 inches (76 mm).
3. The unsupported length between the end sprinkler and the last hanger shall be not more than 36 inches (914 mm) for 1-inch pipe, or 48 inches (1219 mm) for 1 1/2 inch pipe. Where these limits are not met, the pipe shall be extended beyond the end sprinkler and supported by an additional hanger.
4. When sprinklers are less than 6 ft (1.8 m) apart, hangers may be spaced up to, but not exceeding, 12 ft (3.7 m).
5. Starter lengths less than 6 ft (1.8 m) do not require a hanger, except on the end line of a side-feed system, or where an intermediate cross main hanger has been omitted.
6. Hangers are not required on 1-inch arms not over 12 inches long for copper tube, nor 24 inches (610 mm) long for steel pipe from branch lines or cross mains.

(f) Location of Hangers on Cross Mains. This paragraph applies to the support of steel pipe. Intermediate hangers shall not be omitted for copper tube.
1. On cross mains, there shall be at least one hanger between each two branch lines.
2. However, in bays having two branch lines, the intermediate hanger may be omitted provided that a hanger attached to a purlin is installed on each branch line located as near to the cross main as the location of the purlin permits. Remaining branch line hangers shall be installed in accordance with paragraph (e); or
b. In bays having more than one branch line, either side or centerfeed, one (only) intermediate hanger may be omitted provided that a hanger attached to a purlin is installed on each branch line located as near to the cross main as the location of the purlin permits. Remaining branch line hangers shall be installed in accordance with paragraph (e).
2. At the end of the cross main, intermediate trapeze hangers shall be installed unless the cross main is extended to the next framing member with an ordinary hanger installed at this point, in which event an intermediate hanger may be installed in accordance with sub-subparagraphs a. and b. or paragraph (f). above.

(g) Support of Risers.
1. Risers shall be supported by attachments directly to the riser or by hangers located on the horizontal connections close to the riser.
2. In multi-story buildings, riser supports shall be provided at the lowest level, at each alternate level above, and above and below offsets, and at the top of the riser. Supports above the lowest level shall also restrain the pipe to prevent movement by an upward thrust when flexible fittings are used. Where risers are supported from the ground, the ground support constitutes the first level of riser support. Where risers are offset or do not rise from the ground, the first ceiling level above the offset constitutes the first level of riser support.
3. Sprinkler and tank risers in vertical spaces, or in buildings with ceilings over 25 ft (7.6 m) high, shall have at least done support for each riser pipe section.
4. Clamps supporting pipe by means of set screws shall not be used.

(12) Sprinklers.
(a) Use of Sprinklers.
1. Only listed quick response sprinklers shall be used and shall be installed in accordance with their listing. However, when construction features or other special situations require unusual water distribution, listed sprinklers may be installed in other positions than anticipated by their listing to achieve specific results.
2. Sprinklers shall not be altered in any respect or have any type of ornamentation or coating applied after shipment from the place of manufacture.
3. Sprinklers shall not be used for system working pressures exceeding 175 psi (12.1 bars). However, higher design pressures may be used when sprinklers are listed for those pressures.
4. Old style sprinklers shall not be used in a new installation.
5. Sidewall sprinklers for this rule chapter shall be installed in accordance with their listing.
6. Extended coverage sidewall sprinklers shall be installed only in accordance with their listing.
7. When nonmetallic ceiling plates (escutcheons) are used, they shall be listed.

(b) Corrosion-resistant, Wax Coated or Similar Sprinklers.
1. Listed corrosion-resistant or special coated sprinklers shall be installed in locations where chemicals, moisture or other corrosive vapors exist sufficient to cause corrosion of such devices.
2. Care shall be taken in the handling and installation of wax coated or similar sprinklers to avoid damaging the coating.
3. Corrosion-resistant coating shall be applied only by the manufacturer of the sprinkler. However, any damage to the protective coating occurring at the time of installation shall be repaired at once using only the coating of the manufacturer of the sprinkler in the approved manner so that none of the sprinkler will be exposed after installation has been completed.

(c) Sprinkler Discharge Characteristics and Identification. For light hazard occupancies not requiring as much water as is discharged by a nominal 1/2 inch (12.7 mm) orifice sprinkler, sprinklers having a smaller orifice may be used so long as an approved strainer is provided in the riser from the main which supplies sprinklers having orifices smaller than 3/8 inch (9.5 mm).

(13) Temperature Ratings, Classifications and Color Coding.
1. Automatic sprinklers shall have their frame arms colored in accordance with the color code designated in NFPA 13. Those sprinklers shall be manufactured in accordance with NFPA 13-A-3.6.1 with the following exceptions:
   a. Exception No. 1: The color identification for coated sprinklers may be a dot on the top of the deflector, the color of the coating material or colored frame arms.
   b. Exception No. 2: Color identification is not required for plated sprinklers, flush or recessed or concealed sprinklers or similar decorative types.


2. Ordinary temperature rated sprinklers shall be used throughout buildings. However, where maximum ceiling temperatures exceed 100 degrees C (212 degrees F), sprinklers with higher temperature ratings shall be used.

The following practices shall be observed when installing high temperature sprinklers, unless maximum expected temperature sprinklers are used throughout.

(a) Sprinklers near unit heaters. Where steam pressure is not more than 15 psi (1.1 bar), sprinklers in the heater zone shall be high and sprinklers in the danger zone shall be intermediate temperature classification.
(b) Sprinklers located within 12 inches (305 mm) to one side or 30 inches (762 mm) above an uncovered steam main, heating coil or radiator shall be intermediate temperature classification.
(c) Sprinklers within 7 ft (2.1 m) of a low pressure blow-off valve which discharges free in a large room shall be high temperature classification.
(d) Sprinklers under glass or plastic skylights exposed to the direct rays of the sun shall be intermediate temperature classification.
(e) Sprinklers in an unventilated concealed space under an uninsulated roof, or in an unventilated attic shall be of intermediate temperature classification.
(f) Sprinklers in unventilated show windows having high-powered electric lights near the ceiling shall be intermediate temperature classification.
(g) In case of change of occupancy involving temperature change, the sprinklers shall be changed accordingly.

(e) Stock of Spare Sprinklers. There shall be maintained on the premises a supply of spare sprinklers (never less than two of each type) so that any sprinklers that have operated or been damaged in any way may promptly be replaced. These sprinklers shall correspond as to types and temperature rating with the sprinklers in the property. The sprinklers shall be kept in a cabinet located where the temperature to which they are subjected will at no time exceed 100 degrees F (38 degrees C). A special sprinkler wrench shall also be provided and kept in the cabinet, to be used in the removal and installation of sprinklers.

(f) Guards and Shields. Sprinklers which are so located as to be subject to mechanical injury (in either the upright or the pendent position) shall be protected with approved guards.

(g) Painting and Ornamental Finishes.
1. When the sprinkler piping is given any kind of coating, such as whitewash or paint, care shall be exercised to see that no automatic sprinklers are coated.
2. Sprinklers shall not be painted and any sprinklers which have been painted shall be replaced with new, listed sprinklers of the same characteristics. However, factory applied coatings to sprinkler frames for identifying sprinklers of different temperature ratings in accordance with subsection (12)(d), above, shall be permitted.
3. Ornamental finishes shall not be applied to sprinklers by anyone other than the sprinkler manufacturer and only sprinklers listed with such finishes shall be used.

(i) Sprinkler Alarms.
(a) Definition. A local alarm unit is an assembly of apparatus approved for the service and so constructed and installed that any flow of water from a sprinkler system equal to or greater than that from a single automatic sprinkler of the smallest orifice size installed on the system will result in an audible alarm on the premises within 3 minutes after the flow begins.
(b) Where Required. Local waterflow alarms shall be provided on all sprinkler systems covered by this rule chapter. Note that local station, auxiliary station, or proprietary protective signaling system are a highly desirable supplement to local alarms, especially from a safety to life standpoint.
(c) Water Flow Devices. The alarm apparatus for a wet-pipe system shall consist of
listed alarm check valve or other approved waterflow
detecting device with the necessary attachments
required to give an alarm.

(d) Attachments -- General.
1. An alarm unit shall include a listed mechanical
alarm, horn or siren, or an approved weatherproof
electric gong, bell, horn or siren.

2. Outdoor mechanical or electrically operated bells
shall be of weatherproof and guarded type.

3. On each alarm check valve used under conditions
of variable water pressure, a retarding device shall be
installed. Valves shall be provided in the connections
to retarding chambers, to permit repair or removal
without shutting off sprinklers. These valves shall be
so arranged that they may be locked or sealed in the open
position.

4. A control valve shall be installed in connection with
pressure-type contactor or water-motor-operated
alarm devices. Nonretarding valves shall be of the type
which will clearly indicate whether they are open or
closed and be so constructed that they may be locked
or sealed in the open position. The control valve for the
retarding chamber or alarm check valves of wet-pipe
systems may be accepted as complying with this
subparagraph.

(e) Attachments -- Mechanically Operated. For all
types of sprinkler systems employing
water-motor-operated alarms, an approved 3/4 inch
strainer shall be installed at the alarm outlet of the
waterflow detecting device except that when a retarding
chamber is used in connection with an alarm valve, the
strainer shall be located at the outlet of the
retarding chamber unless the retarding chamber is
provided with an approved integral strainer in its
outlet. Water-motor-operated devices shall be
protected from the weather and shall be properly
provided with an approved integral strainer in its
connection to retarding chambers, to permit repair or
removal without shutting off sprinklers. These valves shall be
so arranged that they may be locked or sealed in the open
position.

3. On each alarm check valve used under conditions
of variable water pressure, a retarding device shall be
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so arranged that they may be locked or sealed in the open
position. The control valve for the
retarding chamber or alarm check valves of wet-pipe
systems may be accepted as complying with this
subparagraph.
I/2 ft (2.3 m) apart and framed into girders qualify for panel construction provided the 300 sq ft (27 sq m) area limitation is met.

(e) "Standard Mill Construction" refers to heavy timber construction as defined in NFPA 220, Standard on Types of Building Construction, as adopted pursuant to Rule 4A-3.012, Florida Administrative Code.

(f) "Semi-Mill Construction" refers to a modified standard mill construction where greater column spacing is used and beams rest on girders.

(g) "Wood Joist Construction" refers to wood boards or planks spaced less beams spaced 6 ft (0.9 m) on centers. Wooden beams less than 4 inches (102 mm) nominal thickness spaced more than 3 ft (0.9 m) on centers are also considered wood joist construction.

(3) Sprinkler Staggering and Location of Sprinklers. (See also subsections (4) and (5), below.)

(a) Distance Between the Branch Lines and Between Sprinklers in the Branch Lines.

1. The distance between branch lines and between sprinklers on the branch lines shall not exceed 15 ft (4.6 m).

2. Distance from Walls. The distance from the wall to the end sprinklers on the branch lines shall not exceed one-half of the allowable distance between sprinklers on the branch lines. The distance from the wall to the end branch lines shall not exceed one-half the allowable distance between the branch lines.

(b) Protection Area Limitations For Light Hazard Occupancies.

1. Under smooth ceiling construction and under beam and girders construction as defined in subsections (2)(a) and (b), above, the protection area per sprinkler shall not exceed 0.25 sq ft (0.023 sq m).

2. Under open wood joist construction (as defined in subsection (2)(g) the protection area per sprinkler shall not exceed 100 sq ft (9.2 sq m).

3. For other types of construction the protection area per sprinkler shall not exceed 0.18 sq ft (1.56 sq m).

(c) Location of Sprinklers and Branch Lines with Respect to Structural Members. Sprinklers may be located under beams, in bays, or a combination of both, but the locations must meet the provisions outlined in paragraph (d) and subsection (6), below.

(d) Clearance Between Sprinklers and Structural Members.

1. Trusses. Sprinklers shall be at least 2 ft (0.6 m) laterally from truss members (web or chord) more than 4 inches (102 mm) wide, and at least 1 ft (0.3 m) laterally from truss members 4 inches (102 mm) or less in width. When sprinkler lines run above or through trusses, the sprinklers may be located on center lines of truss, provided chord members are not more than 8 inches (203 mm) wide, and the deflector is at least 6 inches (152 mm) above the chords. When sprinklers are located laterally beside chord members, clearances between the chord members and the sprinkler deflectors shall be in accordance with paragraph 6., below.

2. Girders. When sprinkler lines are located perpendicular to and above girders, sprinklers shall be at least 3 ft (0.9 m) (225 mm) above girders except that they may be located directly above girders with the top flange not more than 8 inches (203 mm) wide, in which case the deflectors shall be at least 6 inches (152 mm) above the top of the girder.

3. When sprinkler deflectors are in accordance with the table in this subparagraph, the girders may be disregarded in the spacing of branch lines.

Position of Deflector When Located Above Bottom of Beam

<table>
<thead>
<tr>
<th>Distance from Sprinkler to Side of Beam</th>
<th>Maximum Allowable Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 1 ft</td>
<td>0 in.</td>
</tr>
<tr>
<td>1 ft to less than 2 ft</td>
<td>1 in.</td>
</tr>
<tr>
<td>2 ft to less than 2 ft 6 in.</td>
<td>2 in.</td>
</tr>
<tr>
<td>2 ft 6 in. to less than 3 ft</td>
<td>3 in.</td>
</tr>
<tr>
<td>3 ft to less than 3 ft 6 in.</td>
<td>4 in.</td>
</tr>
<tr>
<td>3 ft 6 in. to less than 4 ft</td>
<td>5 in.</td>
</tr>
<tr>
<td>4 ft to less than 4 ft 6 in.</td>
<td>6 in.</td>
</tr>
<tr>
<td>4 ft 6 in. to less than 5 ft</td>
<td>7 in.</td>
</tr>
<tr>
<td>5 ft to less than 5 ft 6 in.</td>
<td>8 in.</td>
</tr>
<tr>
<td>5 ft 6 in. to less than 6 ft</td>
<td>9 in.</td>
</tr>
</tbody>
</table>

4. Open Web-Type Steel Beams. When branch lines are run across and through openings of open web-type steel beams, sprinklers may be spaced bay and beam provided:

a. The distance between sprinklers and between branch lines conforms to the requirements of subsection (3)(a), above.

b. Sprinklers in the beam openings are located within 1 in. (25 mm) horizontally of the opening center line.

c. The branch line is located within 1 in. (25 mm) horizontally of the opening center line, and

d. Sprinklers on alternate lines are staggered.

5. Bar Joists. When the distance between web members of open bar joists which do not exceed 1/2 inches (13 mm) or at least 6 inches (152 mm) laterally from web members which do not exceed 1 inch (25 mm). When the dimensions of the web member exceed 1 inch (25 mm), the installation must comply with paragraph 1., above.

6. Beams. Deflectors of sprinklers in bays shall be set at sufficient distances from the beams to avoid obstruction to the sprinkler discharge pattern. Otherwise the spacing of sprinkler on opposite sides of the beams shall be measured from the beam and the distance shall not exceed one-half of the allowable distance between sprinklers.

7. Positions of Deflectors. Deflectors of sprinklers shall be parallel to ceilings, roofs, or the incline of stairs, but when installed in the peak of a pitched roof they shall be horizontal. Low-pitched roofs having slopes greater than 1 inch per ft (203 mm/m) may be considered as level in the application of this rule and sprinklers may be installed with deflectors horizontal.

(e) Clear Space Below Sprinklers. A minimum of 1/2 inches (127 mm) clearance shall be maintained between top of storage and ceiling sprinkler deflectors.

(f) Position of Sprinklers. Sprinklers shall be installed in accordance with their listing and confirmation no. 220, Standard on Types of Building Construction, as adopted pursuant to Rule 4A-3.012, Florida Administrative Code.

(g) "Wood Joist Construction" refers to wood boards or planks spaced 6 ft (0.9 m) on centers. Sprinklers shall be provided where there is 6 inches (152 mm) or more clearance between the inside or near edges of the studs or joists which form the opposite sides of the space; the distance from the first sprinkler to the wall, however, need not be less than specified in subparagraph 2. In partly or wholly combustible bar joist construction, sprinklers shall be installed whenever the total depth of the space exceeds 6 inches (152 mm) between roof or floor deck and ceiling. The spacing of sprinklers in that case may be on the basis of light hazard classification provided the space is not accessible for storage or other use.

2. In concealed spaces having exposed combustible concealments when any of the following conditions prevail:

a. When the ceiling is attached directly to the underside of the supporting beams of a combustible roof or floor deck.

b. When the concealed space is entirely filled with a noncombustible insulation. In solid joisted construction the insulation need fill only the space from the ceiling to the bottom edge of the joist of the roof or floor deck.

c. When there are small concealed spaces over rooms that do not exceed 50 sq ft (4.6 sq m) in area.

d. When the exposed surfaces have a flame spread rating less than 25 and the materials have been demonstrated not to propagate fire in the form in which they are installed in the space when the BTU content of the facing and substrate of insulation material does not exceed 1000 BTU per sq ft (11356 kJ/sq m).

3. In concealed spaces having exposed combustible construction or containing exposed combustible materials in located spaces, the combustibles shall be protected as follows:

a. If the exposed combustibles are in the vertical partitions or the walls around an all or a portion of the enclosure, a single row of sprinklers spaced not more
than 12 feet (3.7 m) apart nor more than 6 feet (1.8 m) from the inside of the partition may be installed to protect the surface. The first and last sprinklers in such a row shall not be over 5 ft (1.5 m) from the ends of the partition. b. If the exposed combustibles are in the horizontal plane, permission may be given to protect the area of the combustibles on a light hazard spacing and add a row of sprinklers on lines perpendicular to the line of the partition to the outline of the area and over 12 ft (3.7 m) on center along the outline. When the outline returns to a wall or other obstruction, the last sprinkler shall not be over 6 ft (1.7 m) from wall or obstruction.

(b) Spacing of Sprinklers Under Pitched Roofs. 1. Branch lines parallel to peaks of pitched roofs and sprinkler lines perpendicular to the peak of the roof shall be spaced throughout the distance measured along the slope. This will place a row of sprinklers either in the peak or one-half the spacing down the slope from the peak.

2. Under saw-toothed roofs, the row of sprinklers at the highest elevation shall not be more than 3 ft (0.9 m) down the slope from the peak.

3. When installed as described in subparagraphs 1. and 2., above, sprinklers in one near the peak shall have deflectors not more than 3 ft (0.9 m) vertically down from the peak.

4. In a steeply pitched roof, the distance from the peak to the deflectors may be increased to maintain a horizontal clearance of not less than 2 ft (0.6 m).

(c) Spacing of Sprinklers Under Curved Roofed Buildings. 1. When roofs are curved down to the Floor line, the horizontal clearance measured from the side wall or roof construction to the nearest sprinkler shall not be greater than one-half the allowable distance between sprinklers in the same direction.

2. Deflectors of sprinklers shall be parallel with the curve of the roof or tilted slightly toward the peak of the roof. Deflectors of sprinklers shall be located as described for beam and girder construction or for the closest comparable type of ceiling construction.

(d) Narrow Pocket. Girders, beams or trusses forming narrow pockets of combustible construction along walls when the depth of which will obstruct the spray discharge pattern may require additional sprinklers. Whether additional sprinklers are required shall be determined by the authority having jurisdiction.

(e) Elevators, Stairs and Floor Openings. 1. Vertical Shafts.

a. One sprinkler shall be installed at the top of all shafts.

b. When vertical shafts have combustible sides, one sprinkler shall be installed at each alternate floor level. When a shaft having combustible sides is trapped and sprinklers to the deflector shall be installed at the top of each trapped section.

c. When accessible shafts have noncombustible surfaces, one sprinkler shall be installed near the bottom.

d. When vertical openings are not protected by standard enclosures, sprinklers shall be so placed as to fully cover them. This necessitates placing sprinklers close to such openings at each floor level.

2. Stairways.

a. Stairways of combustible construction shall be sprinklered. (m) Commercial-type Cooking Equipment and Ventilation Systems. This rule chapter is not intended to be used and does not intend to establish requirements for commercial cooking equipment or related duct work.

b. Baffles. Baffles shall be installed whenever sprinklers are less than 6 ft (1.8 m) apart to prevent the sprinkler first opening from wetting adjoining sprinklers, thus delaying the operation. Baffles shall be installed midway between sprinklers and arranged to baffle the actuating elements. Baffles shall extend 2 to 3 inches (51 to 76 mm) above the deflectors.

(c) Small Rooms. Small room means a room with a smooth ceiling area not exceeding 800 sq ft (74.3 sq m) of light hazard classification.

1. Within small rooms, sprinklers may be located not over 9 ft (2.7 m) from any single wall. However, the sprinkler spacing limitations of Rule 4A-45.016(3)(a), and area limitations of Rule 4A-45.016(3)(b), shall not be exceeded.

curtain, with no sprinklers discharging less than 15 gpm (56.8 L/min). The number of sprinklers calculated in this water curtain shall be the number in the length corresponding to the length parallel to the branch lines in the design area. When sprinklers are closer than 6 ft (1.8 m), cross baffles shall be provided. When sprinklers in the normal pattern are closer than 6 ft (1.8 m) from the water curtain, it may be preferable to locate the water curtain sprinklers in recessed baffles pockets.

d. In noncombustible stair shafts, sprinklers shall be installed at the floor level and under the stair wall. The draft stops shall be located immediately adjacent to the opening, shall be at least 18 inches (457 mm) deep and shall be of noncombustible material which will stay in place before and during sprinkler operation. Sprinklers, spaced not more than 6 ft (1.8 m) apart, shall be placed 6 to 12 inches (152 mm to 305 mm) from the draft stop on the side away from the opening to form a water curtain. Sprinklers in this water curtain shall be hydraulically designed to provide a discharge of 3 gpm per lineal foot [(37 L/min)/m] of water.
2. Sprinklers may be omitted in bathrooms 55 sq ft or less providing that fixtures are noncombustible.

3. Sprinklers may be omitted in closets 24 sq ft or less if permitted by the authority having jurisdiction.

4. (a) Distance Between Branch Lines and Sprinklers on Branch Lines.
(b) Distance Between Branch Lines. Rooms or bays having widths in excess of 15 ft to 30 ft (4.6 m to 9.1 m) shall have sprinklers on two opposite walls or two opposite sides of bays with spacing as required in this subsection and sprinklers regularly staggered. Additional branch lines shall be provided in rooms over 30 ft (9.1 m) in width except where special sprinklers are used.

5. Distance Between Sprinklers on Branch Lines. Sidewall sprinklers shall be located not more than 14 ft (4.3 m) apart or spaced in accordance with their listing.

6. (b) Protection Area Limitations. 
   1. With noncombustible smooth ceiling the protection area per sprinkler shall not exceed 196 sq ft (15.6 sq m) with the distance between sprinklers on lines not in excess of 14 ft (4.3 m).
   2. With combustible smooth ceiling sheathed with plasterboard, metal or wood lath and plaster, the protection area per sprinkler shall not exceed 168 sq ft (15.56 sq m) with the distance between sprinklers on lines not in excess of 14 ft (4.3 m). When sheathing is combustible, the protection area per sprinkler shall not exceed 120 sq ft (11.1 sq m) with the distance between sprinklers on lines not in excess of 14 ft (4.3 m) or otherwise installed in accordance with the listing of the sprinkler. However, noncombustible smooth ceiling spacing is permitted beneath a noncombustible smooth ceiling attached directly to the underside of a combustible soffit or slanted concealed space.

(c) Position of Sidewall Sprinklers. Sprinkler deflectors shall be at a distance from walls and ceilings not more than 6 inches (152 mm) or less than 4 inches (102 mm), unless special construction arrangements make a different position advisable for prompt operation and effective distribution. However, horizontal-type sidewall sprinklers may be positioned 6 to 12 inches (152 to 305 mm) below noncombustible ceilings when listed for these positions.

(d) Graph Sheet. Water supply curves and system requirements shall be shown by a number and/or letter designation and shall correspond with comparable reference points shown on the hydraulic sheets.

2. Sprinklers. Description of sprinklers used.

3. System Design Criteria. The minimum rate of water application, and the water required for hose streams when applicable.

4. Actual Calculated Requirements. The total quantity of water and the water pressure required shall be noted at a common reference point for each system.

5. Elevation Data. Relative elevation of sprinkler, junction points and supply or reference points shall be noted.

6. Data Sheets and Abbreviations.
   (a) General. Hydraulic calculations shall be prepared on form sheets that include a summary sheet, detailed work sheets, and a graph sheet. (See copy of a typical form in NFPA 13, Figures A-7-3.3 and A-7-3.4.)

(b) Summary Sheet. The summary sheet shall contain the following information, when applicable:
   1. Date
   2. Location
   3. Name of owner and occupant
   4. Building number or other identification
   5. Description of the hazard
   6. Name and address of contractor or designer
   7. Name of approving agency
   8. System design requirements
   9. Total water requirements including allowance for inside hose when applicable.
   10. Water supply information.
   (c) Detailed Work Sheets. Detailed work sheets or computer printout sheets shall contain the following information:
   1. Site plan including location and street address
   2. Sprinkler description and discharge constant (K)
   3. Hydraulic reference points
   4. Flow in gpm
   5. Pipe size
   6. Pipe lengths, center to center of fittings
   7. Equivalent pipe lengths for fittings and devices
   8. Friction loss in psi per foot of pipe
   9. Total friction loss between reference points
   10. Elevation head pressure in psi between reference points
   11. Required pressure in psi at each reference point
   12. Velocity and normal pressure if included in calculations
   13. Notes to indicate starting points, reference to other sheets or to clarify data shown.
   14. Sketch to accompany gridted system calculations to indicate flow quantities and direction for lines with sprinklers operating in the remote area.
   (d) Graph Sheet. Water supply curves and system requirements, plus hose demand when applicable, shall be plotted on graph paper so as to present a graphic summary of the complete hydraulic calculation.

(e) Abbreviations and symbols. The following standard abbreviations and symbols shall be used on the calculation form:

   1. Pressure in psi
   2. gpm U.S. Gallons per minute
   3. q Flow increment in gpm
   4. G Summation of gpm at a specific location
   5. Pt Total pressure in psi at a specific point
   6. Pf Pressure loss due to friction between points
   7. Pe Pressure due to elevation difference (where minus, the (-) shall be used
   8. Pv Velocity pressure in psi at a point in a pipe
   9. Nn Normal pressure in psi at a point in a pipe

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shall be included in the calculations.

saddle type Fittings having Friction loss greater than data indicate other factors are appropriate. For fittings and devices unless the manufacturer's test used to determine the equivalent length of pipe for calculations.

at the junction point shall be carried into the only, pressures at hydraulic junction points shall balance within .5 psi (.03 bars). The highest pressure at the junction point shall be included in the calculations.

Velocity Pressure Formula. Velocity pressure shall be determined on the basis of the formula:

\[
p = \frac{0.00123 \times Q^2}{D^4}
\]

Where \( p \) is the frictional resistance in pounds per square inch per feet of pipe, \( Q \) is the gallons per minute flowing and \( D \) is the actual inside diameter of pipe in inches with \( C \) as the friction loss coefficient.

Velocity Pressure Formula: Velocity pressure shall be determined on the basis of the formula:

\[
PV = 0.001123 \times Q^2
\]

\[
PV = \text{velocity pressure psi}
\]

where

\[
Q = \text{flow in gpm}
\]

\[
D = \text{the inside diameter in inches}
\]

Normal pressure \( P_n \) shall be determined on the basis of the formula:

\[
Pn = Pt - PV
\]

where

\[
Pt = \text{total pressure in psi (bars)}
\]

\[
PV = \text{velocity pressure in psi (bars)}
\]

Hydraulic Junction Points. For gridded systems only, pressures at hydraulic junction points shall balance within .5 psi (.03 bars). The highest pressure at the junction point shall be carried into the calculations.

(b) Equivalent Pipe Lengths of Valves and Fittings. 1. The table in subparagraph 2. below, shall be used to determine the equivalent length of pipe for fittings and devices unless the manufacturer's test data indicate other factors are appropriate. For saddle type fittings having Friction loss greater than that shown in the table, the increased Friction loss shall be included in the calculations.

<table>
<thead>
<tr>
<th>Fittings and Valves</th>
<th>3/4 in.</th>
<th>1 in.</th>
<th>1 1/4 in.</th>
<th>1 1/2 in.</th>
<th>2 in.</th>
<th>2 1/2 in.</th>
<th>3 in.</th>
<th>3 1/2 in.</th>
<th>4 in.</th>
<th>5 in.</th>
<th>6 in.</th>
<th>8 in.</th>
<th>10 in.</th>
<th>12 in.</th>
</tr>
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<tbody>
<tr>
<td>45° Elbow</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td>90° Standard</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>14</td>
<td>18</td>
<td>22</td>
<td>27</td>
</tr>
<tr>
<td>Elbow</td>
<td>90° Long Turn Elbow</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>6</td>
<td>8</td>
<td>9</td>
<td>13</td>
<td>16</td>
</tr>
<tr>
<td>Tee or Cross</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>15</td>
<td>17</td>
<td>20</td>
<td>25</td>
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<td>(Flow turned 90°)</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Butterfly Valve</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>6</td>
<td>7</td>
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<td>Gate Valve</td>
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<td>Swing Check</td>
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<td>27</td>
<td>32</td>
<td>45</td>
<td>55</td>
<td>65</td>
</tr>
</tbody>
</table>

For SI Units 1 ft = 0.3048 m.

*Due to the variations in design of swing check valves, the pipe equivalents indicated in the above chart to be considered.

Equivalent Pipe Length Chart

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iv. Friction loss shall be excluded for the fitting directly connected to a sprinkler.

e. Orifice plates of sprinklers of different orifice sizes shall not be used for balancing the system, except for special use such as exposure protection, small rooms or enclosures or directional discharge sprinklers.

f. Sprinkler discharge in closets, washrooms and similar small compartments requiring only one sprinkler may be omitted from hydraulic calculations within the area of application.

g. Velocity pressure $P_v$ may or may not be included in hydraulic calculations at the discretion of the designer. If velocity pressures are used, they shall be used on both branch lines and cross mains where applicable.

2. Minimum operating pressure of any sprinkler shall be 7 psi (0.5 bar). However, when higher minimum operating pressure for the desired application is specified in the listing of the sprinkler, the higher pressure shall govern.

3. Begin calculations at the hydraulically most remote sprinkler with a flow rate and pressure in accordance with the individual residential sprinkler listing.

a. Discharge at each sprinkler shall be based on the calculated pressure at that sprinkler. This is determined by the equation:

$$ q = K \cdot P $$

where $q = \text{Flow in gpm}$

$K = \text{sprinkler discharge constant}$

$p = \text{pressure in psi}$

b. The system shall provide a discharge of not less than 19 gpm/min to any operating sprinkler and not less than 13 gal/min per sprinkler to all operating sprinklers in the design area. However, when a higher minimum discharge rate for the desired application is specified in the listing of the sprinkler, the higher rate shall govern.

4. Number of Design Sprinklers. The number of design sprinklers shall include all sprinklers within a compartment to a maximum of 4 sprinklers. When a compartment contains less than 4 sprinklers, the number of design sprinklers shall include all sprinklers in that compartment plus sprinklers in adjoining compartments to a total of 4 sprinklers. Adjoining corridors may be considered as compartments for purposes of these calculations. In all cases the design area shall include the 4 most hydraulically demanding sprinklers. The definition of compartment to determine the number of design sprinklers for purposes of this subparagraph is a space which is completely enclosed by walls and a ceiling. The compartment enclosure may have openings to an adjoining space if the openings have a minimum lintel depth of 8 inches from the ceiling.

5. Water Supplies.

(a) Acceptable water supplies are as follows:

1. Public water systems where pressure and discharge capacity meet the design requirements of the system as calculated.

2. Automatic fire pumps supplied under head from a water supply source adequate to meet hydraulically designed system requirements including public mains, reservoirs, and wells.

3. Pressure Tanks

4. Gravity tanks

(b) Each water supply source shall be automatic and of adequate capacity and pressure to supply the sprinkler system calculated demand for a period of not less than 30 minutes.

(c) Hose connections may be supplied from sprinkler risers.

(d) When hydrants are present, a water allowance of 100 gpm shall be added to the sprinkler requirement at the connection to the city water main, or at a yard hydrant, whichever is closer to the system riser.

SUBSTANTIATION: Present NFPA 13 standard allows use of very low-sensitivity sprinklers. They should not be permitted to protect residential occupancies.

The fire protection community in Florida has developed an affordable sprinkler standard for use in structures not required by Code to be sprinklered. The state of Florida has delayed consideration for the adoption of this standard because of some legal questions which must be resolved before further consideration is undertaken.

It is my opinion that this standard was drafted because there is a need for a National Standard that is more stringent than NFPA 130 and less stringent than NFPA 13. This standard would primarily cover multifamily structures up to three stories. It appears that the absence of this standard leaves a void in NFPA guidance to the communities desiring to help resolve their fire problems with the use of fire protection technology. Today, there are almost approximately 200 communities with a variety of residential sprinkler programs.

I believe that the NFPA 13 Committee should act now and develop a new NFPA 13 multifamily sprinkler standard. We do not need the results of the National Fire Protection Research Foundation ESFR program for the multifamily standard, we now know all we have to know. In order to expedite the drafting process, I hereby formally submit for consideration and modification the Florida Standard which follows the NFPA format.

My real concern is within the next two to five years I expect thousands of communities will undertake sprinkler programs with the interest of life safety. Can we ask them to wait?

COMMITTEE ACTION: Accept in Principle.

COMMITTEE COMMENT: The Committee appreciates the intent to provide low cost sprinkler protection for multifamily occupancies. However, the proposal includes specific recommendations for low hazard occupancies, which are not substantiated in this proposal. Issues such as water application densities and spacings are being addressed by the ORS Research Project. Until the research is completed systems can continue to be installed economically in conformance with the standard for low hazard occupancies. For the most part, the provisions in the proposal are already contained in the standard.

See Proposal 130-38 (Log #27) or Proposal 13-220 (Log #139) which proposes a new standard addressing low cost sprinkler protection for multi-family occupancies.
PART II
(Log #10)

13D-1 - (Title): Reject
SUBMITTER: Timothy G. Stillman, Ft. Lauderdale, FL
RECOMMENDATION: Revise title to read:
"Protecting Residential Properties by Automatic Fire Sprinklers."

2. Better description of alternate protection methods permitted by standard. A separate system is only one of several possible methods.

COMMITTEE ACTION: Reject.
COMMITTEE COMMENT: The proposal represents an expansion of the scope of NFPA 13D without technical justification. The submitter is referred to Proposal 13D-38 (Log #27) which proposes a new standard for residential occupancies up to 4 stories in height.

13D-2 - (Entire Standard): Reject
SUBMITTER: Timothy G. Stillman, Fort Lauderdale, FL
RECOMMENDATION: Add word "fire" before word "sprinklers" wherever it appears in standard.

SUBSTANTIATION: To identify fire sprinklers and remove public acceptance conflict with other sprinkler systems such as yard and lawn sprinklers.

COMMITTEE ACTION: Reject.
COMMITTEE COMMENT: Definitions in the standard for sprinklers and sprinkler systems include their use as a fire suppression device.

13D-3 - (1-1): Reject
SUBMITTER: Timothy G. Stillman, Fort Lauderdale, FL
RECOMMENDATION: Add "and apartment units."

SUBSTANTIATION: 1. NFPA 13 now permits use of 13D in individual living units (NFPA 13-1983, paragraph 3-16.2.9).
2. A condominium unit is legally equivalent to a single occupancy (apartment/single family home).

COMMITTEE ACTION: Reject.
COMMITTEE COMMENT: See Proposal 13D-1 (Log #10).

13D-4 - (1-1): Accept
SUBMITTER: Technical Committee on Automatic Sprinklers
RECOMMENDATION: Revise 1-1 to read:

1-1 Scope. This standard deals with the design and installation of automatic sprinkler systems for protection against the fire hazards in one and two family dwellings and mobile homes.

Revise the first sentence in A-1-1 to read:
"NFPA 13D is appropriate for the protection against fire hazards only in one and two family dwellings and mobile homes."

SUBSTANTIATION: The Committee wishes to clarify the intent of the standard as a means to protect against fire hazards in one and two family dwellings and mobile homes.

COMMITTEE ACTION: Accept.

13D-5 - (A-1-1): Accept
SUBMITTER: Rodney A. McPhee, Canadian Wood Council
RECOMMENDATION: In last sentence of first paragraph change the word "sections" to "buildings."

SUBSTANTIATION: This is to clarify where the design areas specified in NFPA 13 are to be utilized.

COMMITTEE ACTION: Accept.

13D-6 - (A-1-2 and A-2-2): Accept
SUBMITTER: Technical Committee on Automatic Sprinklers
RECOMMENDATION: Revise appendix material to reflect updated data available through the NFPA Data Analysts Division.

SUBSTANTIATION: It is the Committee's intent to reflect updated information made available from the NFPA Data Analysis Division.

COMMITTEE ACTION: Accept.

Table A-1-2.1
1980-84 One- and Two-Family Dwellings and Mobile Homes
Annual Averages

| Fires - 544,000 | Civilian Deaths - 3,900 | Civilian Injuries - 14,100 |

<table>
<thead>
<tr>
<th>Area of Origin (901 Code)</th>
<th>Civilian Deaths (Used for Ranking)</th>
<th>Fires</th>
<th>Civilian Injuries</th>
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<tbody>
<tr>
<td>Living room, den, lounge (14)</td>
<td>40.2</td>
<td>11.6</td>
<td>21.9</td>
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<tr>
<td>Bedroom (21-22)</td>
<td>24.1</td>
<td>11.6</td>
<td>20.9</td>
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<td>Kitchen (24)</td>
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<td>27.5</td>
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<td>Structural Area (70-79)</td>
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<td>18.5</td>
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<td>(Crawl space (71))</td>
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<td>(3.2)</td>
<td>(2.9)</td>
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<td>(Unspecified (79))</td>
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<td>(1.0)</td>
<td>(0.7)</td>
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<td>(Balcony, porch (72))</td>
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<td>(Ceiling/Floor assembly (73))</td>
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<td>(0.8)</td>
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<td>(2.0)</td>
<td>(0.8)</td>
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<td>1.6</td>
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<td>Garage* (42)</td>
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<td>Interior stairway (03)</td>
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<td>0.4</td>
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<td>0.6</td>
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<td>100.0</td>
<td>100.0</td>
</tr>
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</table>

*Does not include dwelling garages coded as property type, which is a large number.
130-7 (1-3): Reject
SUBMITTER: Timothy G. Stillman, Fort Lauderdale, FL
RECOMMENDATION: Add:
Apartment. A single-family dwelling unit in a multiple unit structure.

Residential Fire Sprinkler Head. An automatic fire sprinkler device which has been specifically designed, tested, and listed for use in residential occupancies.

SUBSTANTIATION: As individual units may be protected by 13D as a change in NFPA 13 (1983) paragraph 3-16.2.2(9) this definition is required.

Clarifies definition for standard users who are not in the fire protection profession.

COMMITTEE ACTION: Reject.
COMMITTEE COMMENT: See Proposal 130-1 (Log #10).

130-8 (1-3): Reject
SUBMITTER: Timothy G. Stillman, Fort Lauderdale, FL
RECOMMENDATION: Revise as follows:
(Fire) Sprinkler System

... with fire sprinkler heads which ... when required, the fire sprinkler system shall also include a control valve ... system operates in case of fire.

SUBSTANTIATION: Clarify language to those not in fire protection profession.

COMMITTEE ACTION: Reject.
COMMITTEE COMMENT: Definitions for both sprinklers and sprinkler systems as currently included in 13D are adequate. See 130-2 (Log #11).

130-9 (1-3): Reject
SUBMITTER: Rodney A. McPhee, Canadian Wood Council
RECOMMENDATION: A. In definition for Deluge System add the words "manually actuated or" before the word "opened."

B. In definition for Preaction System add the words "or manual release" after the word "system" in the second sentence.

SUBSTANTIATION: Both types of system can be actuated manually as well as automatically (See NFPA 13, 3-3.2). Such means should be referenced in the definition.

COMMITTEE ACTION: Reject.
COMMITTEE COMMENT: Guidance regarding deluge and preaction systems is not currently contained in NFPA 13D.

130-10 (1-5.1.2): Reject
SUBMITTER: Timothy G. Stillman, Fort Lauderdale, FL
RECOMMENDATION: Add Exception:
Exception: Any piping material permitted by local code may be used in parts of the residence that are protected by fire-rated enclosure.

SUBSTANTIATION: Permits use of substitute materials permitted by local code but not specifically listed for fire sprinkler systems in protected areas such as behind and over fire resistance rated ceilings and partitions.

COMMITTEE ACTION: Reject.
COMMITTEE COMMENT: For pipe materials other than in paragraph 3-3.1, technical basis and justification must be provided to assure that piping materials can be reliably used in a sprinkler system. See also 3-3.2.

130-11 (2-2(a)): Reject
SUBMITTER: Timothy G. Stillman, Fort Lauderdale, FL
RECOMMENDATION: Over words "water works systems" to "water service utility."

SUBSTANTIATION: Better description of supply method to conform to other regulatory rules and agencies. (keyword is "utility" as in "public utility commission")

COMMITTEE ACTION: Reject.
COMMITTEE COMMENT: This section implies/contemplates both public and private water works systems. We do not wish to imply only "public" systems, (i.e. public utilities) as acceptable.

130-12 (Chapter 3): Reject
SUBMITTER: Timothy G. Stillman, Fort Lauderdale, FL
RECOMMENDATION: "Components of residential automatic fire sprinkler systems and/or piping, fittings and materials used to supply water to automatic fire sprinkler heads."

SUBSTANTIATION: Revise title to provide for alternate methods, materials and procedures.

COMMITTEE ACTION: Reject.
COMMITTEE COMMENT: Present title, along with definitions in Chapter 1, scope, and purpose adequately describes intent. Alternate methods are allowed/handled in the standard. See Sections 1-2, 3-3.2 and 4-1.6.

130-13 (3-1.4 (New)): Reject
SUBMITTER: Timothy G. Stillman, Fort Lauderdale, FL
RECOMMENDATION: 3-1.4 Air Bleed Vents. An air bleed vent shall be installed at the highest point of an automatic fire sprinkler system serving more than one floor level.

NOTE: The air bleed vent may be used as a test or pressure gauge connection.

SUBSTANTIATION: An air bleed vent assures that the system is adequately filled and permits complete draining when required.

COMMITTEE ACTION: Reject.
COMMITTEE COMMENT: The cost of an addition of such device is not justified by experience.

130-14 (Table 3-3.1): Reject
SUBMITTER: Scott J. Elstad, Shell Chemical Company
RECOMMENDATION: Add to Table 3-3.1:

Specificat For Polybutylene Pipe (Listed) ASTM D3309

SUBSTANTIATION: Polybutylene piping is U.L. Listed for sprinkler system use. Revision to the standard is necessary to include polybutylene pipe information in the appropriate sections.

COMMITTEE COMMENT: Reject.
COMMITTEE COMMENT: ASTM D3309 includes materials that have not been specifically listed for fire protection systems.

130-15 (Table 3-3.1 and 3-3.6 Exception): Accept
SUBMITTER: Russell P. Fleming, National Fire Sprinkler Association
RECOMMENDATION: Delete references to 50-50 solder.

SUBSTANTIATION: The 1986 amendments to the Federal Safe Drinking Water Act prohibit the use of 50-50 solder in plumbing systems. While the prohibition does not specifically extend to residential sprinkler systems, it would not be good practice to continue using this leaded solder in such close proximity to the potable water system.

COMMITTEE ACTION: Accept.

130-16 (3-3.2 Exception (New)): Reject
SUBMITTER: Timothy G. Stillman, Fort Lauderdale, FL
RECOMMENDATION: Exception: In a piping system where automatic fire sprinklers are supplied with water from a source also used for other water consuming uses; any material permitted by local plumbing of building codes may be used.
13D-17 - (Table 3-3.5): Reject.
SUBMITTER: Scott J. Elstad, Shell Chemical Company.
RECOMMENDATION: Add to Table 3-3.5.
Polybutylene
Polybutylene Socket
Fusion Fittings
ASTM D3309

13D-20 - (3-5.5 New): Accept
SUBMITTER: Technical Committee on Automatic Sprinklers
RECOMMENDATION: Add a new 3-5.5 as follows:
3-5.5 When nonmetallic sprinkler ceiling plates (escutcheons) or recessed escutcheons (metallic or nonmetallic) are used they shall be listed based on tests of the assembly as a residential sprinkler.
RENumben 3-5.4, etc. as appropriate.

13D-21 - (4-1.2 Exception New): Accept in Principle
SUBMITTER: Russell P. Fleming, National Fire Sprinkler Association
RECOMMENDATION: Add new exception as follows:
Exception: In compartments containing more than 2 sprinklers with sloped ceilings or ceiling heights exceeding 10 feet, the number of design sprinklers shall include all sprinklers within a compartment to a maximum of 4 sprinklers.

13D-22 - (A-4-1.2): Accept
SUBMITTER: Technical Committee on Automatic Sprinklers
RECOMMENDATION: Add a new second sentence to A-4-1.2:
"It is also intended that the number of design sprinklers is limited to a maximum of 2 sprinklers even if there are more than 2 sprinklers in the compartment, except as noted in A-4-2.3."

13D-23 - (4-1.2.1 and Exception New): Reject
SUBMITTER: Rodney A. McPhee, Canadian Wood Council
RECOMMENDATION: Delete last sentence of text and add Exception to read:
Exception: Unprotected openings to an adjoining space are permitted in the walls if the openings have a minimum lintel depth of 8 in. (203 mm) from the ceiling.
SUBSTANTIATION: Text is better written as an Exception, otherwise last sentence should be located in the Appendix as an option. Also, clarification is needed to indicate that openings to adjoining compartments need not be protected.

COMMITTEE ACTION: Reject.

COMMITTEE COMMENT: Committee feels guidance is more clear as written rather than as an exception.

130-24 - (A-4-2.3): Accept
SUBMITTER: Technical Committee on Automatic Sprinklers
RECOMMENDATION: Add to the end of the second sentence of existing A-4-2.3:
- . . . distribution, and a greater water supply may be necessary.

SUBSTANTIATION: Preliminary analysis of recent fire tests indicate that for the conditions cited in this section increased water supply may be necessary to meet the objectives of the design and the Committee will continue to monitor the available data. The 13D subcommittee will analyze the extensive test data available from the U.S. Fire Administration sponsored research at FMRC and propose corrective action to the standard if deemed necessary.

COMMITTEE ACTION: Accept.

130-25 - (4-3.2): Accept in Principle
SUBMITTER: Vincent Yambruch, Factory Fire Loss Control Co.
RECOMMENDATION: Delete the existing wording and insert new wording as follows:
4-3.2 Provision shall be made to protect piping from freezing in unheated areas by use of one of the following acceptable methods:
(a) Antifreeze system.
(b) Dry pipe system.

SUBSTANTIATION: There are building configurations where the antifreeze type nonfreezing arrangement is by far the better alternate to a dry pipe system arrangement due to ease of concealment of pipes, dependability of functioning and ease of maintenance. The sprinkler designer is the person best situated to evaluate the merits, pros and cons, of the best nonfreeze type of arrangement to be used in a particular circumstance. The choice of protecting sprinkler piping from freezing should be the prerogative of the sprinkler designer, not the code writing agency.

COMMITTEE ACTION: Reject.

COMMITTEE COMMENT: This subject is covered by 3-3.2, and this information is presented in the listing information for the listed material.

130-26 - (4-4.2): Accept
SUBMITTER: Technical Committee on Automatic Sprinklers
RECOMMENDATION: Revise 4-4.2 to appear as follows:
4-4.2 Minimum Pipe Size.
4-4.2.1 Minimum pipe size shall be 3/4 in. Exception: Minimum size of steel pipe shall be 1 in.
4-4.2.2 For other listed piping materials the minimum pipe size shall be in accordance with the listing.

SUBSTANTIATION: This revision is to emphasize the Committee's intent that the minimum pipe size, except for steel is 3/4 in.

COMMITTEE ACTION: Accept.

130-27 - (Table 4-4.3(c)): Reject
SUBMITTER: Scott O. Elstad, Shell Chemical Company
RECOMMENDATION: Change title of existing Table 4-4.3(c):
"Equivalent Length of Pipe in Feet For Steel, Copper and Polybutylene Fittings and Valves."

SUBSTANTIATION: Polybutylene piping is U.L. Listed for sprinkler system use. Revision to the standard is necessary to include polybutylene pipe information in the appropriate sections.

COMMITTEE ACTION: Reject.

COMMITTEE COMMENT: This subject is covered by 3-3.2, and this information is presented in the listing information for the listed material.

130-28 - (Table 4-4.3(c)): Reject
SUBMITTER: Scott J. Elstad, Shell Chemical Company
RECOMMENDATION: (see table below)

Table 4-4.3(c) Pressure Losses (PSI/FT)
Polybutylene - SDR-11 C-150
Flow Rate - GPM

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<th>PIPE SIZE TYPE</th>
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<th>12</th>
<th>14</th>
<th>16</th>
<th>18</th>
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<tr>
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</tbody>
</table>

(1) P = Iron Pipe Size, T = Copper Tube Size.

There has not been or is there a listed dry pendant residential sprinkler at this time within the knowledge of the submitter.

COMMITTEE ACTION: Accept in Principle.

Revise existing 4-3.2 by adding "or antifreeze" after "dry-pipe."

Add a new 4-3.3 to appear exactly as Section 5-5 from the 1987 edition of NFPA 13 including Appendix A items.

COMMITTEE COMMENT: Committee agrees that antifreeze systems may be a feasible means to protect systems from freezing and in addition has added antifreeze section from NFPA 13 to provide additional guidance to the user.
SUBMITTER: Rodney A. McPhee, Canadian Wood Council

COMMITTEE COMMENT: This subject is covered by 3-3.2, clarification.

COMMITTEE ACTION: Accept in Part in Principle.

SUBMITTER: Walter J. Swingler, Same-Fire Protection Consultant

RECOMMENDATION: Delete the statement in Section 4-6 Location of Sprinklers: Exception No. 2: Sprinklers may be omitted from small closets where the least dimension does not exceed 3 ft and the area does not exceed 24 sq ft.

SUBSTANTIATION: It is my judgement that the Committee is doing a disservice by permitting this exception in the standard even though it is qualified in Appendix, and it should be removed for following reasons:

I do not consider a closet of up to 24 sq ft area a small closet. It is well documented that all household closets are catchalls and jammed with practically everything including synthetic clothing, plastic toys, bed and toilet linens, etc. including aerosols and flammable liquids. It is therefore essential that all closets be sprinklered to obtain early detection and fire control at point of origin. If not the following may occur:

a) Toxic products of combustion can emanate from closets without detection and endanger life safety of inhabitants prior to operation of sprinklers.

b) When fire breaks out of closet it may be of such intensity that sprinklers may open in excess of design criteria resulting in total loss.

COMMITTEE COMMENT: Committee continues to support the material in Appendix A. See Committee Proposal 13D-31 (Log #1).

COMMITTEE ACTION: Reject.

SUBMITTER: Russell P. Fleming, National Fire Sprinkler Association

RECOMMENDATION: Revise Exception to read as follows:

Exception No. 2: Sprinklers may be omitted from small closets where the least dimension does not exceed 3 ft (0.9 m) and the area does not exceed 24 sq ft (2.2 m²) and the walls and ceilings are surfaced with noncombustible or limited combustible materials.

SUBSTANTIATION: As written Exception No. 2 would eliminate gypsum board and other wall and ceiling materials not meeting the definition of "noncombustible" as defined in NFPA 220.

COMMITTEE ACTION: Accept.

SUBMITTER: James R. Porter, Owens-Corning Fiberglas Corp.

RECOMMENDATION: Delete Exception No. 1.

SUBSTANTIATION: Exception No. 1 does not consider the amount of combustible materials normally found in the bathroom. These should include window and shower curtains, built-in combustible cabinets and portions of fixtures (seats and lids). These along with possible ignition sources such as hair dryers, curling irons and other electrical appliances provide a considerable hazard in bathrooms whether or not the fixtures are noncombustible. Also, the area limit of 55 sq ft is not justified since these combustible materials and electrical appliances may be found in bathrooms of any size.

COMMITTEE ACTION: Reject.

COMMITTEE COMMENT: See Proposal 13D-31 (Log #1).

COMMITTEE ACTION: Accept.

SUBMITTER: James R. Porter, Owens-Corning Fiberglas Corp.

RECOMMENDATION: Accept in Part in Principle.

COMMITTEE ACTION: Accept in Part in Principle.

COMMITTEE ACTION: Accept.

COMMITTEE ACTION: Accept.

COMMITTEE ACTION: Accept.
SUSTANTATION: It has never been the intent of 13D to require the installation of sprinklers within combustible concealed spaces, but the standard has lacked a definite statement to that effect.

COMMITTEE ACTION: Accept.

13D-34 - (4-6 Exception No. 4): Accept

SUBMITTER: Rodney A. McPhee, Canadian Wood Council

RECOMMENDATION: Accept in Part.

COMMITTEE ACTION: Accept in Part.

SUBSTANTIATION: Subdivisional fire protection is needed in multi-family dwellings and is to be used with an automatic fire sprinkler system. The system is proven, reliable today: the life-saving, rapid-response, residential sprinkler system.

COMMITTEE ACTION: Accept.

13D-35 - (3-5.1 Exception No. 2 (New), 4-3.2 Exception (New) and 4-6 Exception Nos. 3 and 6): Accept in Part

SUBMITTER: Russell P. Fleming, National Fire Protection Association

RECOMMENDATION: Accept in Part.

COMMITTEE ACTION: Accept in Part.

SUBSTANTIATION: Sprinklers may be omitted from garage areas not intended for living purposes.

COMMITTEE ACTION: Accept in Part.

13D-36 - (New Test Procedures): Reject


RECOMMENDATION: See following Preliminary Proposal/Sample Test:

(HEADING)

IMPORTANT NOTICE TO THE HOMEOWNER ABOUT THE FIRE SPRINKLER SYSTEM

(COPY)

You are the owner of a manufactured home equipped with the most advanced fire protection available today: the life-saving, rapid-response, residential fire sprinkler system. The system is proven, reliable and completely automatic. It meets or exceeds NFPA 130 specifications for fire sprinkler systems for one and two-family dwellings and is to be used with an approved smoke detector in accordance with NFPA 74. Your home fire sprinkler(s) will quickly extinguish or confine fire. It will also keep potentially fatal concentrations of carbon monoxide and other poisonous gases well below harmful levels. If there is a fire, all of your sprinkler heads will NOT go off at once. It is likely one or two heads will discharge water. One activated head releases 18 gallons of water per minute (gpm); two activated heads release a combined total of 26 gpm.

The main components of your system are as follows:
(a) rapid-response residential sprinkler heads in the living areas; (b) commercial-grade sprinkler heads for the furnace and hot water heater areas; (c) polyethylene plastic piping and fittings that greatly reduce the risk of freeze breakage; (d) pressure gauge for operating pressures; (e) back-flow water check valve to keep your drinking water separate and clean; (f) main control system valve which should remain open at all times; (g) drain/test valve used during testing and/or maintenance.

NOTE: The water which remains within your system at all times is supplied by your domestic water system and will NOT contaminate your drinking water.

READ THE FOLLOWING IMPORTANT ITEMS FOR PROPER FIRE SPRINKLER SYSTEM CARE

MAINTENANCE AND OPERATIONS:

1. IT IS THE SOLE RESPONSIBILITY AND OBLIGATION OF THE OWNER to properly test and maintain the fire sprinkler system. The system may not provide its life-saving benefits if these items are not followed.

2. VISUALLY CHECK AT LEAST ONCE A MONTH YOUR SPRINKLER HEAD AREAS to make sure nothing obstructs or interferes with the potential water spray pattern.

3. DO NOT HANG anything From the sprinkler heads.

4. DO NOT PAINT the sprinkler heads.

5. DO NOT HIT OR TAMPER WITH the sprinkler heads.

6. DO NOT CHANGE the SETTING of the water supply device (pressure relief valve) because this has been preset at the factory.

7. MAKE CERTAIN YOUR SYSTEM IS TESTED EACH TIME YOUR HOME IS MOVED OR A NEW APPLICATION (i.e., new pipe, new pump, new water supply, etc.) IS INVOLVED. Proper operation relates to the water pressure, water supply and water volume.

8. FOR HOMES HOOKED TO WELLS, IT IS ESSENTIAL YOUR SUPPLY IS SUFFICIENT, contact your dealer for additional information. No liability is assumed by the manufacturer, installer or supplier for the system's operation.

9. FOR PROFESSIONAL ASSISTANCE IN TESTING YOUR SYSTEM'S PROPER OPERATION, IT IS RECOMMENDED YOU CONTACT YOUR LOCAL FIRE DEPARTMENT. No liability is assumed by the manufacturer, installer or supplier for the system's operation.

10. IF PROFESSIONAL TESTING ASSISTANCE IS UNAVAILABLE, THE FOLLOWING STEPS CAN AID YOU IN DETERMINING WHETHER YOUR SYSTEM WILL FUNCTION PROPERLY:

   STEP 1: Make certain the main control valve is in open position. (OPEN IS FULLY COUNTERCLOCKWISE.)

   STEP 2: Open the test/drain valve. (Open, turn counterclockwise.)

   STEP 3: Then observe the water as it flows out of the open test/drain valve's drain pipe. The flow rate should be at a rate of 18 gallons per minute at the furthest head. One way to check this rate is to place a 10-gallon container under the drain pipe and make certain it fills to the top within 30 seconds. If you have an outside bell alarm connected to an electric water flow switch, it should sound continuously only while the water is running. The bell activates approximately 10 seconds after the water begins flowing.

   STEP 4: Next, check the pressure gauge while the water is flowing from the test/drain valve's drain pipe. The pressure reading should be a minimum of 28 p.s.i.

   STEP 5: Once this test is completed, close the test/drain valve (turn clockwise) and MAKE CERTAIN THE MAIN CONTROL VALVE REMAINS IN THE OPEN POSITION (fully counterclockwise) AT ALL TIMES. IMPORTANT: THE SYSTEM WILL NOT OPERATE IF THE MAIN CONTROL VALVE IS CLOSED.

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11. YOUR SYSTEM HAS SPECIAL LIFE-SAVING, RAPID-RESPONSE FIRE SPRINKLER HEADS designed specifically and only for residential use. Any replacement of the residential heads must be with an equivalent type with a minimum $K$ factor of 3.85. DO NOT USE A COMMERCIAL-GRADE FIRE SPRINKLER HEAD IN THE LIVING AREAS.

12. REPLACEMENT of any or all of the parts of this system MUST BE REFERRED BACK TO THE DEALER. If you do not have a dealer, contact the manufacturer of your home.

13. If your system is not equipped with an integrated electric water flow switch and bell alarm, contact your dealer for this additional safety feature. (Manifold configuration design may vary when adding water flow switch.)

14. ANY UNAPPROVED ADDITION, MODIFICATION, ALTERATION OR TAMPERING WITH THE SYSTEM NEGATES ALL STATED AND/OR IMPLIED WARRANTIES AND/OR GUARANTEES FROM THE MANUFACTURERS, SUPPLIERS AND/OR DEALERS.

15. ANY UNAPPROVED ADDITION, MODIFICATION, ALTERATION OR TAMPERING WITH THE SYSTEM NEGATES ALL STATED AND/OR IMPLIED WARRANTIES AND/OR GUARANTEES FROM THE MANUFACTURERS, SUPPLIERS AND/OR DEALERS.

16. IF YOU HAVE ANY QUESTIONS concerning the operation, maintenance or testing of your life-saving fire system, CONTACT YOUR DEALER FIRST. If you are unable to contact your dealer write or call the manufacturer of your home.

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**(KEYED DRAWING OF SYSTEM AND BLOW-UP OR MANIFOLD WITH COMPONENT'S LISTING)**

**(KEYED COPY -- MANIFOLD)**

UNIONS allows easy removal of manifold.

CHECK VALVE prevents back-flow from the sprinkler system into the domestic drinking water.

PRESSURE GAUGE indicates the water pressure (or p.s.i.).

PRESSURE RELIEF VALVE releases water to the outside should water pressure become too high.

TEST/DRAIN VALVE is used during system inspection.

DRAIN PIPES drain water outside during inspection, maintenance or excessive water pressure build-up.

DOMESTIC WATER SUPPLY PIPE feeds water into the home for fire protection and everyday use.

DRINKING WATER SUPPLY PIPE feeds into the home for everyday use.

SPRINKLER WATER SUPPLY PIPE feeds water to the sprinkler heads.

MAIN CONTROL VALVE controls on/off supply of water to the sprinkler system and must remain in the open position at all times for sprinkler operation.

ELECTRIC WATER FLOW SWITCH (optional) triggers operation of bell alarm.

**(DIAGRAM COPY CONTINUED)**

**(KEYED COPY -- SYSTEM)**

MANIFOLD, which you might call the fire sprinklers' control panel, has valves and gauges.

DOMESTIC WATER SUPPLY PIPE

DRINKING WATER SUPPLY PIPE

SPRINKLER WATER SUPPLY PIPE

SPRINKLER HEAD activates when the heat rises (usually at 160°F) and disperses water to quickly put out the fire.

(NEW SECTION) OUTSIDE BELL ALARM sounds warning when the sprinkler operates and is wired to the ELECTRIC WATER FLOW SWITCH, located on the manifold. This switch can also be tied directly into a security/fire monitoring service to notify authorities immediately.

SUBSTANTIATION: Competent testing procedures are necessary for mobile home owners to determine pass/fail of their sprinkler system on-site. As systems are being installed in the mobile home plant itself, prior to sale of the unit and ultimate sprinkler system hook-up in an unknown location, an on-site test is essential. Otherwise, the mobile homeowner may assume that he has adequate water pressure and volume to operate his system when in fact he does not.

COMMITTEE ACTION: Reject.

COMMITTEE COMMENT: The Committee agrees that maintenance and care instructions would be useful to the occupant. Although recognizing this usefulness, the Committee feels there are many areas within this recommendation that are beyond the scope of this standard, and in addition, the proposal appears limited to manufactured homes.

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**(LOG #20)**

13D- 37 - (New Section): Reject

SUBMITTER: Rowland Hall, R&G Sloane Mfg. Co., Inc.

RECOMMENDATION: Section on the use of CPVC Plastic, Pipe and Fittings.

SUBSTANTIATION: Due to the increasing use of CPVC Plastic Pipe and Fittings, there should be a section on this product with flow rates, pressure loss and other specific requirements.

COMMITTEE ACTION: Reject.

COMMITTEE COMMENT: This is addressed in 3-3.2. In addition the submitter has not provided any specific recommendation.

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**(LOG #27)**

13D- 38 - (Entire Standard): Accept in Principle

SUBMITTER: NFPA Engineering & Standards, National Fire Sprinkler Association

RECOMMENDATION: Create a new chapter or standard specifically for the installation of sprinklers in low-rise residential occupancies.

SUBSTANTIATION: There is a need to specifically compile sprinkler installation guidance for low-rise residential occupancies. Lacking such guidance, many jurisdictions are beginning to write their own rules, resulting in confusion and, in some instances, poor protection for life safety as well as property.

COMMITTEE ACTION: Accept in Principle.

COMMITTEE COMMENT: See Committee Proposal 13R-1, Part III of this Report.
The level of safety prescribed by the standard is not
strictly limited to the use of sprinkler systems or other
measures for protection against fire in residential
occupancies. The Committee recommends adoption of NFPA 13R,
Standard for the Installation of Sprinkler Systems in
Residential Occupancies, Up to Four Stories in Height,
to provide a high level of fire protection and life safety. It was determined
that there is a need for a standard that is more effective in preventing
flashover (total involvement) in the room of fire origin, when sprinklered,
and to improve the chance for occupants to escape or be evacuated.

Various levels of sprinkler protection are available to
provide life safety and property protection. The standard is designed to provide a high, but not
absolute, level of life safety and a lesser level of
property protection. Greater protection to both life
and property could be achieved by sprinklering all
areas in accordance with NFPA 13, which permits the use of residential sprinklers in residential areas. It is intended that this standard provide a method
for those individuals wishing to install a sprinkler system for life safety and property protection. It is
not the purpose of this standard to require the installation of an automatic sprinkler system. This standard assumes that one or more smoke detectors will
be installed in accordance with NFPA 74, Standard for the
Installation, Maintenance, and Use of Household
Fire Warning Equipment.

In addition, it is felt that this new standard will meet
the intent of the submitter.

COMMITTEE ACTION: Accept.

NFPA 13R
Standard for the
Installation of Sprinkler Systems in
Residential Occupancies Up to Four Stories in Height

NOTICE: An asterisk (*) following the number or
letter designating a paragraph indicates explanatory
material on that paragraph in Appendix A.

Preface

It is intended that this standard provide a method
for those individuals wishing to install a sprinkler system for life safety and property protection. It is
not the purpose of this standard to require the installation of an automatic sprinkler system. This standard assumes that one or more smoke detectors will
be installed in accordance with NFPA 74, Standard for the
Installation, Maintenance, and Use of Household
Fire Warning Equipment.

Chapter 1 General Information

1-1 Scope. This standard deals with the design and
installation of automatic sprinkler systems for
protection against fire hazards in residential
occupancies up to four stories in height.

1-2 Purpose. The purpose of this standard is to
provide installation requirements for a sprinkler system that will aid in the detection and control of
fires in residential occupancies and thus provide improved protection against injury, life loss, and
property damage. A sprinkler system installed in
accordance with this standard is expected to prevent
flashover (total involvement) in the room of fire
origin, when sprinklered, and to improve the chance
for occupants to escape or be evacuated.

Nothing in this standard is intended to restrict new
technologies or alternate arrangements, providing that
the level of safety prescribed by the standard is not
lowered.
NOTE: The means for identifying listed equipment may vary for each organization concerned with product evaluation, some of which do not recognize equipment as listed unless it is also labeled. The "authority having jurisdiction" should utilize the system employed by the listing organization to identify a listed product.

Multipurpose Piping Systems. Piping systems within residential occupancies intended to serve both domestic and fire protection needs.

Residential Occupancies. Residential occupancies as included in the scope of this standard include the following, as defined in NFPA 101®, Life Safety Code:

(1) Apartment buildings.
(2) Lodging and rooming houses.
(3) Board and care facilities with 16 or less occupants (prompt evacuation type).

Residential Sprinkler. An automatic sprinkler that has been specifically listed for use in residential occupancies.

Shall. Indicates a mandatory requirement.

Should. Indicates a recommendation or that which is advised but not required.

Sprinkler-Automatic. A fire suppression device that operates automatically when its heat-actuated element is heated to or above its thermal rating, allowing water to discharge over a specific area.

Sprinkler System. An integrated system of piping connected to a water supply, with listed sprinklers that will automatically initiate water discharge over a fire area. When required, the sprinkler system also includes a control valve and a device for actuating an alarm when the system operates.

Standard. A document containing only mandatory provisions using the word "shall" to indicate requirements. Explanatory material may be included only in the form of "fine print" notes, in Footnotes, or in an Appendix.

Supply Pressure. A pressure within the system (i.e., above the control valve).

Water Flow Alarm. A sounding device activated by a water flow detector or alarm check valve.

Water Flow Detector. An electric signaling indicator or alarm check valve actuated by water flow in one direction only.

Wet System. A system employing automatic sprinklers attached to a piping system containing water and connected to a water supply, so that water discharges immediately from sprinklers opened by a fire.

1-4 Units. Metric units of measurement in this standard are in accordance with the International System of Units (SI). Two units (1 liter and 1 bar), outside of but recognized by SI, are commonly used in international fire protection. These units are listed, with conversion factors, in Table 1-4.

1-4.1 If a value for measurement as given in this standard is followed by an equivalent value in other units, the first stated is to be regarded as the requirement. A given equivalent value may be approximate.

1-4.2 The conversion procedure for the SI units has been to multiply the quantity by the conversion factor and then round the result to the appropriate number of significant digits.

1-5 Piping.

1-5.1 Pipe or tube used in sprinkler systems shall be of the materials in Table 1-5.1 or in accordance with 1-5.2 through 1-5.5. The chemical properties, physical properties, and dimensions of the materials listed in Table 1-5.1 shall be at least equivalent to the standards cited in the table and designed to withstand a working pressure of not less than 175 psi (12.1 bars).

<table>
<thead>
<tr>
<th>Table 1-5.1</th>
<th>Materials and Dimensions</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specification for Black and Hot-Dipped Zinc Coated (Galvanized) Welded and Seam Seamless Steel Pipe for Fire Protection Use</td>
<td>ASTM A795</td>
<td></td>
</tr>
<tr>
<td>Specification for Welded and Seamless Steel Pipe</td>
<td>ASTM A53</td>
<td></td>
</tr>
<tr>
<td>Wrought-Steel Pipe</td>
<td>ANSI B36.10</td>
<td></td>
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<tr>
<td>Specification for Electric-Resistance Welded Steel Pipe</td>
<td>ASTM A135</td>
<td></td>
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<tr>
<td>Copper Tube (Drawn, Seamless) Specification for Seamless Copper and Copper-Alloy Tube</td>
<td>ASTM B88</td>
<td></td>
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<tr>
<td>Specification For Wrought Seamless Copper and Copper-Alloy Tube</td>
<td>ASTM B251</td>
<td></td>
</tr>
<tr>
<td>Brazing Filler Metal (Classification BCUP-3 or BCUP-4)</td>
<td>AWS A5.8</td>
<td></td>
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<tr>
<td>Specification For Solder Metal, 9-5 (Tin-Antimony-Grade 95TA)</td>
<td>ASTM B32</td>
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</tr>
</tbody>
</table>

1-5.2 Other types of pipe or tube may be used, but only those listed for this service.

1-5.3 Whenever the word pipe is used in this standard, it shall be understood to also mean tube.

1-5.4 Pipe joined with mechanical grooved fittings shall be joined by a listed combination of fittings, gaskets, and grooves. When grooves are cut or rolled on the pipe they shall be dimensionally compatible with the fittings.

Exception: Steel pipe with wall thicknesses less than Schedule 30 (in sizes 8 in. and larger) or Schedule 40 (in sizes less than 8 in.) shall not be joined by fittings used with pipe having cut grooves.

1-5.5 Fittings used in sprinkler systems shall be of the materials listed in Table 1-5.5 or in accordance with 1-5.7. The chemical properties, physical properties, and dimensions of the materials listed in Table 1-5.5 shall be at least equivalent to the standards cited in the table. Fittings used in sprinkler systems shall be designed to withstand the working pressures involved, but not less than 175 psi (12.1 bars) cold water pressure.

<table>
<thead>
<tr>
<th>Table 1-4</th>
<th>Name of Unit</th>
<th>Unit Symbol</th>
<th>Conversion Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>liter</td>
<td>L</td>
<td>1 gal = 3.785 L</td>
<td></td>
</tr>
<tr>
<td>pascal</td>
<td>Pa</td>
<td>1 psi = 6894.757 Pa</td>
<td></td>
</tr>
<tr>
<td>bar</td>
<td>bar</td>
<td>1 psi = 0.0689 bar</td>
<td></td>
</tr>
<tr>
<td>bar</td>
<td>bar</td>
<td>1 bar = 105 Pa</td>
<td></td>
</tr>
</tbody>
</table>

For additional conversions and information see ASTM E380, Standard for Metric Practice.
Table 1-5.6

<table>
<thead>
<tr>
<th>Material and Dimensions</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cast Iron</td>
<td>ANSI B16.4</td>
</tr>
<tr>
<td>Cast Iron Threaded Fittings Class 125 and 250</td>
<td></td>
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<tr>
<td>Cast Iron Pipe Flanges and Flanged Fittings</td>
<td>ANSI B16.1</td>
</tr>
<tr>
<td>Malleable Iron</td>
<td>ANSI B16.3</td>
</tr>
<tr>
<td>Malleable Iron Threaded Fittings Class 150 and 300</td>
<td></td>
</tr>
<tr>
<td>Steel</td>
<td>ANSI B16.9</td>
</tr>
<tr>
<td>Factory-made Threaded Fittings Class 150 and 300</td>
<td></td>
</tr>
<tr>
<td>Buttwelding Ends For Pipe, Valves Flanges and Fittings</td>
<td>ANSI B16.25</td>
</tr>
<tr>
<td>Spec. for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures</td>
<td>ASTM A234</td>
</tr>
<tr>
<td>Pipe Flanges and Flanged Fittings, Steel Nickel Alloy and Other Special Alloys</td>
<td>ANSI B16.5</td>
</tr>
<tr>
<td>Forged Steel Fittings, Socket Welded and Threaded</td>
<td>ANSI B16.11</td>
</tr>
<tr>
<td>Copper</td>
<td>ANSI B16.22</td>
</tr>
<tr>
<td>Wrought Copper and Copper Alloy-Solder-Joint Pressure Fittings</td>
<td></td>
</tr>
<tr>
<td>Cast Copper Alloy Solder-Joint Pressure Fittings</td>
<td>ANSI B16.10</td>
</tr>
</tbody>
</table>

1-5.6 Joints for the connection of copper tube shall be brazed.

Exception: Soldered joints (95-5 solder metal) may be used for wet-pipe copper tube systems.

1-5.7 Other types of fittings may be used, but only those listed for this service.

1-6 System Types.

1-6.1 Wet-Pipe Systems. A wet-pipe system shall be used when all piping is installed in areas not subject to freezing.

1-6.2 Provision shall be made to protect piping from freezing in unheated areas by use of one of the following acceptable methods:

(a) Antifreeze system.

(b) Dry-pipe system.

Exception: Listed standard dry pendent or dry sidewall sprinklers may be extended into unheated areas not intended for living purposes.

1-6.2.1 Antifreeze solutions shall be installed in accordance with Section 5-5.3 of NFPA 13, Standard for the Installation of Sprinkler Systems.

Chapter 2 Residential Occupancies


2-1.1 Maintenance. The owner is responsible for the condition of a sprinkler system and shall keep the system in normal operating condition.

2-1.2 Working Plans.

2-1.2.1 Working plans shall be submitted for approval to the authority having jurisdiction before any equipment is installed or remodeled. Deviations from approved plans will require permission of the authority having jurisdiction.

2-1.2.2 Working plans shall be drawn to an indicated scale, on sheets of uniform size, with a plan of each floor, made so that they can be easily duplicated, and shall show the following data:

(a) Name of owner and occupant.

(b) Location, including street address.

(c) Point of compass.

(d) Ceiling construction.

(e) Full height cross section.

(f) Location of fire walls.

(g) Location of partitions.

(h) Occupancy of each area or room.

(i) Location and size of concealed spaces, attics, closets, and bathrooms.

(j) Any small enclosures in which no sprinklers are to be installed.

(k) Size of city main in street, pressure and whether dead-end or circulating and, if dead-end, direction and distance to nearest circulating main, city main test results including elevation of test hydrant.

(l) Make, manufacturer, type, heat response element, temperature rating, and nominal orifice size, of sprinkler.

(m) Temperature rating and location of high-temperature sprinklers.

(n) Number of sprinklers on each riser per floor.

(o) Kind and location of alarm bells.

(p) Type of pipe and fittings.

(q) Type of protection for nonmetallic pipe.

(r) Nominal pipe size with lengths shown to scale.

NOTE: Where typical branch lines prevail, it will be necessary to size only one line.

(s) Location and size of riser nipples.

(t) Type of fittings and joints and location of all welds and bends.

(u) Types and locations of hangers, sleeves, braces, and methods of securing sprinklers, where applicable.

(v) All control valves, check valves, drain pipes, and test connections.

(w) Underground pipe size, length, location, weight, material, point of connection to city main; the type of valves, meters, and valve pits; and the depth at which top of the pipe is laid below grade.

(x) For hydraulically designed systems, the material to be included on the hydraulic data nameplate.

(y) Name and address of contractor.

2-1.3 Approval of Sprinkler Systems.

2-1.3.1 The installer shall perform all required acceptance tests (see Section 2-1.4), complete the Contractor's Material and Test Certificate(s), and forward the certificate(s) to the authority having jurisdiction, prior to asking for approval of the installation.
2-1.3.2 When the authority having jurisdiction desires to be present during the conducting of acceptance tests, the installer shall give advance notification of the time and date the testing will be performed.

2-1.4 Acceptance Tests.

2-1.4.1 Flushing of Underground Connections.

2-1.4.1.1 Underground mains and lead-in connections to system risers shall be flushed before connection is made to sprinkler piping, in order to remove foreign materials that may have entered the underground piping during the course of the installation. For all systems, the flushing operation shall be continued until water is clear.

2-1.4.1.2 Underground mains and lead-in connections shall be flushed at the hydraulically calculated water demand rate of the system.

2-1.4.1.3 To avoid property damage, provision shall be made for the disposal of water issuing from test outlets.

2-1.4.2* All systems shall be tested for leakage at 50 psi above maximum system design pressure.

Exception: When a Fire department connection is provided, hydrostatic pressure tests shall be provided in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems.

2-2 Design and Installation.

2-2.1 Devices and Materials.

2-2.1.1* Only new sprinklers shall be employed in the installation of sprinkler systems.

2-2.1.2 Only listed and approved devices and approved materials shall be used in sprinkler systems.

2-2.1.3 Sprinkler systems shall be designed for a maximum working pressure of 175 psi (12.1 bars).

Exception: Higher design pressures may be used when all system components are rated for pressures higher than 175 psi (12.1 bars).

2-3 Water Supply.

2-3.1 General Provisions. Every automatic sprinkler system shall have at least one automatic water supply. When stored water is used as the sole source of supply, the minimum quantity shall equal the water demand rate times 30 minutes (See 2-5.1.3).

2-3.2* Water Supply Sources. The following water supply sources are acceptable:

(a) A connection to a reliable water works system with or without a booster pump, as required.

(b) An elevated tank.

(c) A pressure tank installed in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems, and NFPA 22, Standard for Water Tanks for Private Fire Protection.

(d) A stored water source with an automatically operated pump, installed in accordance with NFPA 20, Standard for the Installation of Centrifugal Fire Pumps.

2-3.3 Multipurpose Piping System.

2-3.3.1 A common supply main to the building, serving both sprinklers and domestic uses, shall be acceptable when the domestic design demand is added to the sprinkler system demand.

2-3.3.2 Sprinkler systems with nonfire protection connections shall comply with Section 5-6 of NFPA 13, Standard for the Installation of Sprinkler Systems.

2-4 System Components.

2-4.1 Valve and Drains.

2-4.1.1 When a common supply main is used to supply both domestic and sprinkler systems, a single listed control valve shall be provided to shut off both the domestic and sprinkler systems, and a separate shutoff valve shall be provided for the domestic system only. [See Figure A-2-3.2(a)].

Exception: The sprinkler system piping may have a separate control valve when supervised by one of the following methods:

(a) Central station, proprietary, or remote station alarm service.

(b) Local alarm service that will cause the sounding of an audible signal at a constantly attended point, or

(c) Locking the valves open.

2-4.1.2 Each sprinkler system shall have a 1-in. or larger drain and test connection with valve on the system side of the control valve.

2-4.1.3 Additional 1/2-in. drains shall be installed for each trapped portion of a dry system that is subject to freezing temperatures.

2-4.2 A single 1 1/2 in. fire department connection shall be provided when the sprinkler system has 20 sprinklers or more.

2-4.3 Pressure Gages. Pressure gages shall be provided to indicate pressures on the supply and system sides of main check valves and dry pipe valves, and to indicate pressure on water supply pressure tanks.


2-4.5 Sprinklers.

2-4.5.1 Listed residential sprinklers shall be used inside dwelling units. The basis of such a listing shall be tests to establish the ability of the sprinklers to control residential fires under standardized fire test conditions. The standardized room fires shall be based on a residential array of furnishings and finishes.

Exception: Residential sprinklers shall not be used in dry systems unless specifically listed for that purpose.

2-4.5.2 Ordinary temperature rated residential sprinklers (135 ° - 170 ° F) shall be installed where maximum ambient ceiling temperatures do not exceed 100 ° F.

2-4.5.3 Intermediate temperature rated residential sprinklers (175 ° - 225 ° F) shall be installed where maximum ambient ceiling temperatures are between 101 ° and 150 ° F.

2-4.5.4 The following practices shall be observed when installing residential sprinklers, unless maximum expected ambient temperatures are otherwise determined.

(a) Sprinklers under glass or plastic skylights exposed to direct rays of the sun shall be of intermediate temperature classification.

(b) Sprinklers in an unventilated concealed space under an uninsulated roof, or in an unventilated attic, shall be of intermediate temperature classification.

2-4.5.5 When residential sprinklers are installed within a compartment, as defined in 2-5.1.2.2 all sprinklers shall be from the same manufacturer and have the same heat response element, including temperature rating.

2-4.5.6 When listed non-residential sprinklers are installed in a dwelling unit, they shall be of intermediate temperature rating.
## Contractor's Material & Test Certificate for Aboveground Piping

**Procedure**

Upon completion of work, inspection and tests shall be made by the contractor's representative and witnessed by an owner's representative. All defects shall be corrected and system left in service before contractor's personnel finally leave the job.

A certificate shall be filled out and signed by both representatives. Copies shall be prepared for approving authorities, owners and contractor. It is understood the owner's representative's signature in no way prejudices any claim against contractor for faulty material, poor workmanship, or failure to comply with approving authority's requirements or local ordinances.

### Property Information
- **Property Name**
- **Property Address**
- **Date**

### Plans
- **Accepted by Approving Authority(s) Names**
- **Address**
- **Installation conforms to accepted plans**
- **Equipment used is approved**
- **If No, explain deviations**

### Instructions
- **Has person in charge of fire equipment been instructed as to location of control valves and care and maintenance of this new equipment**
- **If No, explain**

### Location of System
- **Supplies Bldgs.**

### Sprinklers
- **Type**
- **Make**
- **Model**
- **Year of Manufacture**
- **Orifice Size**
- **Quantity**
- **Temperature**
- **Rating**

### Pipe and Fittings
- **Type of Pipe**
- **Type of Fittings**

### Alarm Valve or Flow Indicator
- **Alarm Device**
- **Type**
- **Make**
- **Model**
- **Maximum Time to Operate Through Test Connection**
- **Min.**
- **Sec.**

### DRY Valve
- **Make**
- **Model**
- **Serial No.**
- **Q.D.D.**
- **Time to Trip Thru Test Connection**
- **Water Pressure**
- **Air Pressure**
- **Trip Point**
- **Air Pressure**
- **Time Water Reached Test Outlet**
- **Alarm Operated Properly**
- **Min.**
- **Sec.**
- **Q.D.D.**

### DRY Pipe Operating Test
- **Without Q.D.D.**
- **With Q.D.D.**
- **If No, explain**

*Measured from time inspector's test connection is opened.*
## Deluge & Pneumatic Valve Tests

### Test Description

- **Hydraulic:** Hydrotstatic tests shall be made at not less than 50 psi (34 bars) above design pressure for two hours. Differential dry-pipe valve dippers shall be left open during test to prevent damage. All aboveground piping leakage shall be stopped.

- **Pneumatic:** Establish 40 psi (2.7 bars) at pressure and measure drop which shall not exceed 1-1/2 psi (0.1 bars) in 24 hours. Test pressure tanks at normal water level and at pressure and measure air pressure drop which shall not exceed 1-1/2 psi (0.1 bars) in 24 hours.

### Tests

<table>
<thead>
<tr>
<th>Test Description</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piping</td>
<td>Hydrostatically Tested at</td>
<td>Yes</td>
</tr>
<tr>
<td>Equipment</td>
<td>Operates Properly</td>
<td>Yes</td>
</tr>
<tr>
<td>Drain Test</td>
<td>Reading of Gage Located Near Water</td>
<td>Residual Pressure with Valve in Test</td>
</tr>
<tr>
<td>Ground Sprinkler Piping</td>
<td>Flushed by Installer of Underground</td>
<td>Other</td>
</tr>
</tbody>
</table>

### Blank Testing Gaskets

<table>
<thead>
<tr>
<th>Number Used</th>
<th>Locations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number Removed</td>
<td></td>
</tr>
</tbody>
</table>

### Welding

- **Welding Procedure Compliance:**
  - Certified that welding procedures comply with the requirements of at least AWS D10.9, Level AR-3
  - Certified that welding was performed by welders qualified in compliance with the requirements of at least AWS D10.9, Level AR-3
  - Certified that welding was carried out in compliance with a documented quality control procedure to ensure that all discs are retrieved, that openings in piping are smooth, that slags and other welding residue are removed, and that the internal diameters of piping are not penetrated

### Cutouts (Discs)

- Certified that you have a control feature to ensure that all cutouts (discs) are retrieved

### Hydraulic Data

- **Nameplate Location:**
  - Date left in service with all control valves open

### Remarks

- Name of Sprinkler Contractor

### Signatures

- For Property Owner (Signed) Title Date
- For Sprinkler Contractor (Signed) Title Date

### Additional Explanation and Notes

Contractor's Material and Test Certificate for Aboveground Piping
2-4.5.6 Standard sprinklers shall be used in areas outside the dwelling unit.

Exception: Residential sprinklers may be used in adjoining corridors or lobbies with flat, smooth ceilings and a height not exceeding 10 ft.

2-4.5.7 Operated or damaged sprinklers shall be replaced with sprinklers having the same performance characteristics as original equipment.

2-4.5.8 When nonmetallic sprinkler ceiling plates (escutcheons) or recessed escutcheons (metallic or nonmetallic) are used, they shall be listed.

2-4.5.9 Painting and Ornamental Finishes.

2-4.5.9.1 Sprinkler frames may be factory painted or enameled as ornamental finish in accordance with 2-4.5.9.2; otherwise, sprinklers shall not be painted and any sprinklers that have been painted, except those with factory applied coatings, shall be replaced with new listed sprinklers.

2-4.5.9.2* Ornamental finishes shall not be applied to sprinklers by anyone other than the sprinkler manufacturer, and only sprinklers listed with such finishes shall be used.

2-4.6 Alarms. Local water flow alarms shall be provided on all sprinkler systems and shall be connected to the building fire alarm system, when provided.

2-5 System Design.

2-5.1 Design Criteria - Inside Dwelling Unit.

2-5.1.1 Design Discharge. The system shall provide a discharge of not less than 18 gallons per minute (68 L/min) to any single operating sprinkler and not less than 13 gallons per minute (49 L/min) per sprinkler to the number of design sprinklers.

2-5.1.2* Number of Design Sprinklers.

2-5.1.2.1 The number of design sprinklers shall include all sprinklers within a compartment to a maximum of four sprinklers.

2-5.1.2.2 The definition of compartment for use in 2-5.1.2.1 to determine the number of design sprinklers is a space that is completely enclosed by walls and a ceiling. The compartment enclosure may have openings to an adjoining space if the openings have a minimum lintel depth of 8 in. (20 cm) from the ceiling.

2-5.1.3 Water Demand. The water demand for the system shall be determined by multiplying the design discharge of 2-5.1.1 by the number of design sprinklers of 2-5.1.2.

2-5.1.4 Sprinkler Coverage.

2-5.1.4.1 Residential sprinklers shall be spaced so that the maximum area protected by a single sprinkler does not exceed 144 sq ft (13.4 m²).

2-5.1.4.2 The maximum distance between sprinklers shall not exceed 12 ft (3.7 m) and the maximum distance to a wall or partition shall not exceed 6 ft (1.8 m).

2-5.1.4.3 The minimum distance between sprinklers within a compartment shall be 8 ft (2.4 m).

2-5.1.5 The minimum operating pressure of any sprinkler shall be in accordance with the listing information of the sprinkler and shall provide the minimum flow rates specified in 2-5.1.1.

2-5.1.6 Application rates, design areas, areas of coverage, and minimum design pressures other than those specified in 2-5.1.1, 2-5.1.2, 2-5.1.4, and 2-5.1.5 may be used with special sprinklers that have been listed for such specific residential installation conditions.

2-5.1.7 Position of Residential Sprinklers.

2-5.1.7.1 Pendent and upright sprinklers shall be positioned so that the deflectors are within 1 to 4 in. (25.4 to 102 mm) from the ceiling.

Exception: Special residential sprinklers shall be installed in accordance with the listing limitations.

2-5.1.7.2 Sidewall sprinklers shall be positioned so that the deflectors are within 4 to 6 in. (102 mm to 152 mm) from the ceiling.

Exception: Special residential sprinklers shall be installed in accordance with listing limitations.

2-5.1.7.3* Sprinklers shall be positioned so that the response time and discharge are not unduly affected by obstructions such as ceiling slope, beams, or light fixtures.

2-5.2 Design Criteria - Outside Dwelling Unit. The design discharge, number of design sprinklers, water demand of the system, sprinkler coverage, and position of sprinklers for areas to be sprinklered outside the dwelling unit shall comply with specifications in NFPA 13, Standard for the Installation of Sprinkler Systems.

Exception No. 1: When compartmented into areas of 500 sq ft (46 m²) or less by 30-minute fire-rated construction, and the area is protected by standard or quick response sprinklers not exceeding 130 sq ft (12 m²) per sprinkler, the system demand may be limited to the number of sprinklers in the compartment area, but not less than a total of four sprinklers.

Exception No. 2: Lobbies, foyers, corridors, and halls outside the dwelling unit, with flat, smooth ceilings and not exceeding 10 ft in height, may be protected with residential sprinklers, with a maximum system demand of four sprinklers.

2-5.3 Pipe Sizing. Piping shall be sized in accordance with hydraulic calculation procedures to comply with NFPA 13, Standard for the Installation of Sprinkler Systems.

2-6 Location of Sprinklers. Sprinklers shall be installed in all areas.

Exception No. 1: Sprinklers may be omitted from bathrooms not exceeding 55 sq ft (5.1 m²) with noncombustible plumbing fixtures.

Exception No. 2: Sprinklers may be omitted from small closets where the least dimension does not exceed 3 ft (0.9 m) and the area does not exceed 24 sq ft (2.2 m²) and the walls and ceiling are surfaced with noncombustible or limited combustible materials.

Exception No. 3: Sprinklers may be omitted from open attached: porches, balconies, corridors, and stairs where access to a means of egress is possible in two directions.

Exception No. 4: Sprinklers may be omitted from attics, penthouse equipment rooms, crawl spaces, elevator shafts, and other sealed spaces which are not used or intended for living purposes or storage.

Chapter 3 Referenced Publications

3-1 The following documents or portions thereof are referenced within this document and shall be considered part of the requirements of this document. The edition indicated for each reference is the current edition as of the date of the NFPA issuance of this document.

3-1.1 NFPA Publications. National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

NFPA 13A-1987, Standard for the Installation of Sprinkler Systems

NFPA 13-1987, Recommended Practice for the Inspection, Testing and Maintainance of Sprinkler Systems

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Appendix A

This Appendix is not a part of the requirements of this NFPA document, but is included for information purposes only.

A-1-1 NFPA 13R is appropriate for use only in residential occupancies, as defined in this standard, up to four stories in height. Residential portions of any other building may be protected with residential sprinklers in accordance with 3-16.2.9 of NFPA 13, Standard for the Installation of Sprinkler Systems. Other portions of such sections should be protected in accordance with NFPA 13.

The criteria in this standard are based on full-scale fire tests of rooms containing typical furnishings found in residential living rooms, kitchens, and bedrooms. The furnishings were arranged as typically found in dwelling units in a manner similar to that shown in Figures A-1-1(a), A-1-1(b), and A-1-1(c). Sixty full-scale fire tests were conducted in a two-story dwelling in Los Angeles, California, and 16 tests were conducted in a 14-ft (4.3 m) wide mobile home in Charlotte, North Carolina. Sprinkler systems designed and installed according to this standard are expected to prevent flashover within the compartment of origin if sprinklers are installed in the compartment. A sprinkler system designed and installed according to this standard cannot, however, be completely expected to control a fire involving unusually higher average fuel loads than typical for dwelling units [10 lbs/ft² (49 kg/m²)] and where the interior finish has an unusually high flame spread rating (greater than 225).

A-1-2 Levels of Protection. Various levels of sprinkler protection are available to provide life safety and property protection. The standard is designed to provide a high, but not absolute, level of life safety and a lesser level of property protection. Greater protection to both life and property could be achieved by sprinklering all areas in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems, which permits the use of residential sprinklers in residential areas.

This standard recommends, but does not require, sprinklering of all areas in the building; it permits sprinklers to be omitted in certain areas. These areas are the ones shown by NFPA statistics to be ones where the incidence of life loss from fires in residential occupancies is low. Such an approach produces a reasonable degree of fire safety. (See Table A-1-1 for Deaths and Injuries in Multifamily Residential Buildings Up to 4 Stories.)

It should be recognized that the omission of sprinklers from certain areas could result in the development of untenable conditions in adjacent spaces. Where evacuation times may be delayed, additional sprinkler protection and other fire protection features, such as detection and compartmentation, may be necessary.
Table A-1-2
Annual Averages of Deaths and Injuries in Apartments 1980 - 1984

Fires - 123,000 Civilian Deaths - 930 Civilian Injuries - 5,470

Percentages by Area of Origin

<table>
<thead>
<tr>
<th>Area of Origin (901 Code)</th>
<th>Civilian Deaths (Used For Ranking)</th>
<th>Fires</th>
<th>Civilian Injuries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Living room, den, lounge (14)</td>
<td>38.5</td>
<td>11.3</td>
<td>23.2</td>
</tr>
<tr>
<td>Bedroom (21-22)</td>
<td>28.7</td>
<td>17.4</td>
<td>27.1</td>
</tr>
<tr>
<td>Kitchen (24)</td>
<td>9.8</td>
<td>35.3</td>
<td>27.2</td>
</tr>
<tr>
<td>Hallway corridor (101)</td>
<td>4.3</td>
<td>3.2</td>
<td>3.4</td>
</tr>
<tr>
<td>Interior stairway (03)</td>
<td>3.2</td>
<td>1.0</td>
<td>1.1</td>
</tr>
<tr>
<td>Structural Area (70-79)</td>
<td>3.1</td>
<td>8.1</td>
<td>3.5</td>
</tr>
<tr>
<td>[Balcony, porch (72)]</td>
<td>(1.2)</td>
<td>(1.3)</td>
<td>(0.7)</td>
</tr>
<tr>
<td>[Unspecified (79)]</td>
<td>(1.0)</td>
<td>(0.5)</td>
<td>(0.2)</td>
</tr>
<tr>
<td>Ceiling/Roof Assembly (74)</td>
<td>(0.3)</td>
<td>(0.7)</td>
<td>(0.3)</td>
</tr>
<tr>
<td>Lobby (05)</td>
<td>1.3</td>
<td>0.6</td>
<td>0.7</td>
</tr>
<tr>
<td>Dining room (23)</td>
<td>1.2</td>
<td>0.8</td>
<td>1.0</td>
</tr>
<tr>
<td>Closet (42)</td>
<td>1.2</td>
<td>1.9</td>
<td>1.9</td>
</tr>
<tr>
<td>Balcony, porch (72)</td>
<td>1.2</td>
<td>1.3</td>
<td>0.7</td>
</tr>
<tr>
<td>Other known single area</td>
<td>4.1</td>
<td>17.8</td>
<td>8.8</td>
</tr>
<tr>
<td>[Bathroom (25)]</td>
<td>(0.6)</td>
<td>(2.1)</td>
<td>(1.3)</td>
</tr>
<tr>
<td>Multiple areas (97)</td>
<td>1.6</td>
<td>0.7</td>
<td>0.9</td>
</tr>
<tr>
<td>Unclassified, not applicable (98-99)</td>
<td>1.8</td>
<td>0.6</td>
<td>0.5</td>
</tr>
<tr>
<td><strong>TOTAL:</strong></td>
<td><strong>100.0</strong></td>
<td><strong>100.0</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>
A-2-1.1 The responsibility for properly maintaining a sprinkler system is the obligation of the owner or manager who should understand the sprinkler system operation. A minimum monthly maintenance program should include the following:

(a) Visual inspection of all sprinklers to ensure against obstruction of spray.
(b) Inspection of all valves to assure that they are open.
(c) Testing of all water flow devices.
(d) Testing of the alarm system, if installed.

NOTE: When it appears likely that the test will result in a response of the fire department, notification to the fire department should be made prior to the test.

(e) Operation of pumps, where employed, should be operated. See NFPA 20, Standard for the Installation of Centrifugal Fire Pumps.

(f) Checking of the pressure of air used with dry systems.

(g) Checking of water level in tanks.

(h) Care should be taken to see that sprinklers are not painted either at the time of installation or during subsequent redecoration. When painting sprinkler piping or painting in areas next to sprinklers, the sprinklers may be protected by covering with a bag, which should be removed immediately after painting has finished.

For further information see NFPA 13A, Recommended Practice for the Inspection, Testing and Maintenance of Sprinkler Systems.

Table A-2-1.1

<table>
<thead>
<tr>
<th>Component</th>
<th>Activity</th>
<th>Frequency</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Valve</td>
<td>Inspection</td>
<td>Monthly</td>
<td>NFPA 13A, 2-7.1.4</td>
</tr>
<tr>
<td></td>
<td>Maintenance</td>
<td>Annually</td>
<td>NFPA 13A, 2-6.1</td>
</tr>
<tr>
<td>Main Drain Valve</td>
<td>Flow Test</td>
<td>Annually</td>
<td>NFPA 13A, 2-6.1</td>
</tr>
<tr>
<td>Inspectors' Test V.</td>
<td>Flow Test</td>
<td>Annually</td>
<td>NFPA 13A, 2-6.1</td>
</tr>
<tr>
<td>Water Flow Alarm</td>
<td>Flow Test</td>
<td>Annually</td>
<td>NFPA 13A, 4-5.3,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4-7.1</td>
</tr>
<tr>
<td>Sprinklers</td>
<td>Test</td>
<td>50 Yrs.</td>
<td>NFPA 13A, 3-3.3</td>
</tr>
<tr>
<td>Sprinklers, Res/QR</td>
<td>Test</td>
<td>20 Yrs.</td>
<td>NFPA 13A, 3-3.4</td>
</tr>
<tr>
<td>Pump</td>
<td>Flow Test</td>
<td>Annually</td>
<td>NFPA 13A, 2-4.2.5</td>
</tr>
<tr>
<td>Antifreeze Solutions</td>
<td>Test</td>
<td>Annually</td>
<td>NFPA 13A, 4-7.3</td>
</tr>
</tbody>
</table>

A-2-1.4.2 Testing of a system can be accomplished by filling the system with water and checking visually for leakage at each joint or coupling.

Fire department connections are not required for systems covered by this standard, but may be installed at the discretion of the owner. In these cases hydrostatic tests in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems, are required.

Dry systems should also be tested by placing the system under air pressure. Any leak that results in a drop in system pressure greater than 2 lb/sq in. (0.14 bars) in 24 hours should be corrected. Check for leaks using soapy water brushed on each joint or coupling. Leaks will be shown by the presence of bubbles. This test should be made prior to concealing of piping.

A-2-2.1.1 At least three spare sprinklers of each type, temperature rating, and orifice size used in the system should be kept on the premises. When fused sprinklers are replaced by the owner, fire department, or others, care should be taken to assure that the replacement sprinkler has the same operating characteristics.

A-2-3.2 Connection for fire protection to city mains is often subject to local regulation concerning metering and backflow prevention requirements. Preferred and acceptable water supply arrangements are shown in Figures A-2-3.2(a), (b), and (c). When a meter must be used between the city water main and the sprinkler system supply, an acceptable arrangement is shown in Figure A-2-3.2(c). Under these circumstances, the flow characteristics of the meter must be included in the hydraulic calculation of the system. When a tank is used for both domestic and fire protection purposes, a low water alarm actuated when the water level falls below 110 percent of the minimum quantity specified in Section 2-3.1 should be provided.

A-2-4.5.9.2 Decorative painting of a residential sprinkler is not to be confused with the temperature identification colors as referenced in 3-16.6 of NFPA 13, Standard for the Installation of Sprinkler Systems.

Figure A-2-3.2(a) Preferable Arrangement.

Figure A-2-3.2(b) Acceptable Arrangement with Valve Supervision (see 2-4.1.1 Exception).
A-2-5.1.7.3 Fire testing has indicated the need to wet walls in the area protected by residential sprinklers at a level closer to the ceiling than that accomplished by standard sprinkler distribution. Where beams, light fixtures, sloped ceilings, and other obstructions occur, additional residential sprinklers may be necessary to achieve proper response and distribution, and a greater water supply may be necessary.

Table A-2-5.1.7.3 and Figure A-2-5.1.7.3 provide guidance for location of sprinklers near ceiling obstructions.

Table A-2-5.1.7.3 Maximum Distance From Sprinkler Deflector to Bottom of Ceiling Obstruction

<table>
<thead>
<tr>
<th>Distance from Sprinkler to Side of Ceiling Obstruction</th>
<th>Maximum Distance From Sprinkler Deflector to Bottom of Ceiling Obstruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 in. or less</td>
<td>Not permitted</td>
</tr>
<tr>
<td>6 in. to less than 1 ft</td>
<td>0 in.</td>
</tr>
<tr>
<td>1 ft to less than 2 ft</td>
<td>1 in.</td>
</tr>
<tr>
<td>2 ft to less than 2 ft 6 in.</td>
<td>2 in.</td>
</tr>
<tr>
<td>2 ft 6 in. to less than 3 ft</td>
<td>3 in.</td>
</tr>
<tr>
<td>3 ft to less than 3 ft 6 in.</td>
<td>4 in.</td>
</tr>
<tr>
<td>3 ft 6 in. to less than 4 ft</td>
<td>6 in.</td>
</tr>
<tr>
<td>4 ft to less than 4 ft 6 in.</td>
<td>7 in.</td>
</tr>
<tr>
<td>4 ft 6 in. to less than 5 ft</td>
<td>9 in.</td>
</tr>
<tr>
<td>5 ft to less than 5 ft 6 in.</td>
<td>11 in.</td>
</tr>
<tr>
<td>5 ft 6 in. to less than 6 ft</td>
<td>14 in.</td>
</tr>
</tbody>
</table>

For SI Units: 1 in. = 25.4 mm; 1 ft = 0.3048 m

*Rubber lined check valves optional.

Figure A-2-3.2(c) Acceptable Arrangement with Valve Supervision (see 2-4.1.1 Exception).

A-2-5.1.2 It is intended that the design area is to include up to four adjacent sprinklers producing the greatest water demand within the compartment.

Table A-2-5.1.7.3 and Figure A-2-5.1.7.3 provide guidance for location of sprinklers near ceiling obstructions.

Table A-2-5.1.7.3 Maximum Distance From Sprinkler Deflector to Bottom of Ceiling Obstruction

<table>
<thead>
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For SI Units: 1 in. = 25.4 mm; 1 ft = 0.3048 m

*Rubber lined check valves optional.

Figure A-2-3.2(c) Acceptable Arrangement with Valve Supervision (see 2-4.1.1 Exception).

A-2-5.1.2 It is intended that the design area is to include up to four adjacent sprinklers producing the greatest water demand within the compartment.

Table A-2-5.1.7.3 and Figure A-2-5.1.7.3 provide guidance for location of sprinklers near ceiling obstructions.

Table A-2-5.1.7.3 Maximum Distance From Sprinkler Deflector to Bottom of Ceiling Obstruction

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The Correlating Committee ballot does not confirm the Committee Action because the necessary three-fourths affirmative vote was not achieved. Per 10-14 of the Regulations Governing Committee Projects, the Report is published in this ICR to allow for Public Comment.

14A-1 (New Standard): Accept

SUBMITTER: Technical Committee on Standpipes

RECOMMENDATION: The Technical Committee on Standpipes recommends adoption of NFPA 14A, Recommended Practice for the Inspection, Testing and Maintenance of Standpipe and Hose Systems to read as follows.

SUBSTANTIATION: This draft standard was developed at the request of fire departments and fire agencies throughout North America with the intention of assisting them in developing their own guidelines for inspecting, testing, and maintaining standpipe and hose systems. Much of the information contained in the draft was obtained from existing industry documents and model building codes. This standard effectively organizes and directs this information specifically to standpipe and hose systems.

COMMITTEE ACTION: Accept.

NFPA 14A

Recommended Practice for the Inspection, Testing and Maintenance of Standpipe and Hose Systems

Information on referenced publications can be found in Chapter 6.

Foreword

A Standpipe and Hose System is an arrangement of piping, valves, hose outlets and allied equipment installed in a building or structure with outlets located in such a manner that water can be discharged in streams or spray patterns through hose and nozzles attached to such hose outlets for the purpose of fire extinguishment.

A standpipe and hose system that is properly designed, equipped, and maintained is one of the best internal means for extinguishing fire in buildings and structures. Even in buildings equipped with automatic sprinkler systems, standpipes are a necessary complement. The standpipe system furnishes a reliable means of obtaining effective fire streams in the shortest possible time in places such as the upper stories of high buildings or large-area, low-height buildings, and in other structures where construction, size, or other features limit the use of hose streams from the exterior.

If not properly maintained, a standpipe and hose system may become inoperative. The following chapters offer advice and suggestions relative to the inspection, testing, and maintenance of standpipe and hose systems upon which the safety of life and property may depend.

Chapter 1 General Information

1-1 Scope. This recommended practice provides minimum recommendations for the inspection, testing and maintenance of standpipe and hose systems.

1-2 Purpose. The purpose of this recommended practice is to provide guidance for inspection, testing and maintenance of standpipe and hose systems.

1-3 Definitions.

Approved. Acceptable to the "authority having jurisdiction."

NOTE: The National Fire Protection Association does not approve, inspect, or certify any installations, procedures, equipment, or materials nor does it approve or evaluate testing laboratories. In determining the acceptability of installations or procedures, equipment or materials, the authority having jurisdiction may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure or use. The authority having jurisdiction may also refer to the listings or labeling practices of an organization concerned with product evaluations which is in a position to determine compliance with appropriate standards for the current production of listed items.

Authority Having Jurisdiction. The "authority having jurisdiction" is the organization, office or individual responsible for "approving" equipment, an installation or a procedure.

NOTE: The phrase "authority having jurisdiction" is used in NFPA documents in a broad manner since jurisdictions and "approval" agencies vary as do their responsibilities. Where public safety is primary, the "authority having jurisdiction" may be a federal, state, local or other regional department or individual such as a fire chief, fire marshal, chief of a fire prevention bureau, labor department, health department, building official, electrical inspector, or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the "authority having jurisdiction." In many circumstances the property owner or his designated agent assumes the role of the "authority having jurisdiction"; at government installations, the commanding officer or departmental official may be the "authority having jurisdiction."

Cabinet, Interior. Interior cabinets contain hose rack assemblies, Class I, II or III fire department valves, fire extinguishers, or various combinations of these.

Fire Department Connection. A connection through which the public fire department can pump water into the standpipe system.

Hose Storage Devices.

Hose Reel - a circular device capable of a minimum swing of 180°.

Horizontal Rack - the hose is connected to the valve, then stack folded horizontally to the top of the rack.
Conventional Pin Rack - the hose is folded vertically and attached over the pins.

Semi-Automatic Hose Rack Assembly - the same as the "conventional" pin rack or hose reel except after the valve is opened a retaining device holds the hose and water until the last few feet are removed.

Inspection. A visual examination of a standpipe system or portion thereof to verify that it appears to be in operating condition and is free from physical damage and readily accessible.

Listed. Equipment or materials included in a list published by an organization acceptable to the "authority having jurisdiction" and concerned with product evaluation, that maintains periodic inspection of production of listed equipment or materials and whose listing states either that the equipment or material meets appropriate standards or has been tested and found suitable for use in a specified manner.

NOTE: The means for identifying listed equipment may vary for each organization concerned with product evaluation, some of which do not recognize equipment as listed unless it is also labeled. The "authority having jurisdiction" should utilize the system employed by the listing organization to identify a listed product.

Maintenance. Maintenance is a thorough examination and any necessary repair or replacement as outlined in Section 4-1. It is intended to give maximum assurance that the standpipe system will operate effectively and safely.

Nozzle. An approved and listed nozzle provided for Class II service that may be constructed of cast brass, aluminum or plastic.

Standpipe Systems (Class of Service).

Class I - for use by the Fire department and those trained in handling heavy fire streams (2-1/2 in. (6.4 cm) hose).

Class II - for use primarily by the building occupants until the arrival of the fire department (1-1/2 in. (3.8 cm) hose), or provided for Fire department use when approved by the authority having jurisdiction.

Class III - for use by either Fire departments and those trained in handling heavy hose streams (2-1/2 in. (6.4 cm) hose) or by the building occupants (1-1/2 in. (3.8 cm) hose).

Combined Systems - one where the water piping serves both 2-1/2 in. (6.4 cm) outlets for fire department use and outlets for automatic sprinklers.

Testing. Conducting periodic physical checks on the standpipe and hose system in accordance with this Recommended Practice.

Valves.

Hose Valves. Valves used on standpipe systems to control water flow at hose racks and Fire department stations.

Regulating Valves. These valves automatically control water pressure under flow and no-flow conditions. They are factory preset to any specification and/or may be field adjustable.

Restricting Valves. Valves with a pressure restricting device at a specified flow.

1-4 Units. Metric units of measurement in this recommended practice are in accordance with the modernized metric system known as the International System of Units (SI). Two units (liter and bar), outside of but recognized by SI, are commonly used in international fire protection. These units are listed in Table 1-4 with conversion factors.

Table 1-4

<table>
<thead>
<tr>
<th>Name of Unit</th>
<th>Unit Symbol</th>
<th>Conversion Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>liter</td>
<td>L</td>
<td>1 gal = 3.785 L</td>
</tr>
<tr>
<td>cubic decimeter</td>
<td>dm³</td>
<td>1 gal = 3.785 dm³</td>
</tr>
<tr>
<td>pascal</td>
<td>Pa</td>
<td>1 psi = 6894.757 Pa</td>
</tr>
<tr>
<td>bar</td>
<td>bar</td>
<td>1 psi = 0.0689 bar</td>
</tr>
<tr>
<td></td>
<td>bar</td>
<td>1 bar = 10^5 Pa</td>
</tr>
</tbody>
</table>
For additional conversions and information see ASTM E380, Standard for Metric Practice.

1-4.1 If a value for measurement as given in this recommended practice is followed by an equivalent value in other units, the first stated is to be regarded as the recommendation. A given equivalent value may be approximate.

1-4.2 The conversion procedure for the SI units has been to multiply the quantity by the conversion factor and then round the result to the appropriate number of significant digits.

1-5 Responsibility of the Owner or Occupant.

1-5.1 The responsibility for properly maintaining a standpipe and hose system is the obligation of the owners, occupant (tenant) or agent of the property.

By means of periodic tests, the equipment is shown to be in good operating condition or any defects or impairments are revealed. Such tests are made, however, at the responsibility and risk of the owner, occupant or agent of the property. Intelligent cooperation in the performance of these tests shows evidence of their interest in property conservation.

1-5.2 Standpipe and hose systems installed in accordance with NFPA 14, Standard for the Installation of Standpipe and Hose Systems, require a minimum of inspection, testing and maintenance; however, deterioration or impairment may result from neglect. Definite provision for periodic competent attention is a prime requirement if the system is to serve its purpose effectively.

1-5.3 A competent and reliable employee or service agency should be given the responsibility of regularly inspecting, testing and maintaining the system and reporting any troubles or defects to his employer. This employee or service agency should have proper instruction and training and a general understanding of the mechanical requirements of operation.

1-5.4 Supporting personnel should be trained in inspection, testing and maintenance and be fully capable of taking over the functions at any time when the responsible individual is unavailable.

Chapter 2 Water Supplies

2-1 General. The source and quantity of water is of fundamental importance. To ensure the continued existence of proper flow, it is necessary that periodic inspections and tests be conducted by qualified personnel.

2-2 Gravity Tanks and Suction Tanks. (See NFPA 22, Standard for Water Tanks for Private Fire Protection.)

2-2.1 Inspections should be made at least monthly to check the maintenance of water at proper level in the tank.

Constant maintenance of a full supply of water in gravity tanks is necessary not only to ensure proper performance of the standpipe system in the event of a fire, but to prevent shrinkage of wooden tanks and minimize corrosion of steel tanks.

2-2.2 Heating devices should be kept in order and the water temperature in the tank should be checked daily during freezing weather to maintain a minimum temperature of 40°F (4°C).

2-2.3 The tank roof should be kept tight and in good repair, with the hatches fastened closed and the frostproof casing of the tank riser in good repair.

2-2.4 Ice should not be allowed to form on any part of the tank structure. The prevention of freezing in the riser of the formation of ice in the tank itself is extremely important. Freezing in the riser of an elevated tank may obstruct the flow of water from the tank. The formation of a layer of ice on the water of elevated or suction tanks also may impede or prevent the flow from the tank. The formation of heavy icicles through leaking of the tank is dangerous as tank collapse may ensue or people may be endangered by falling icicles.

2-2.5 The bases of the tower columns should be kept free from dirt and rubbish which would otherwise permit the accumulation of moisture with consequent corrosion. The tops of foundation piers should always be at least 6 in. (152 mm) above the ground level.

2-2.6 Before repainting, the surface should be thoroughly dried and all loose paint, rust, scale and other surface contamination should be removed. After proper surface preparation, the original paint system should be restored. It may be necessary or economical to repaint the entire inside surface. On the exterior, normal maintenance will involve local patching and periodic applications of one complete finish coat when the preceding has weathered thin, or for improved appearance after patching.

The painters should not allow any scrapings or other foreign material to fall down the riser or outlet. If the opening is covered for protection, this cover must be removed at the completion of the job.

For detailed information refer to NFPA 22, Standard for Water Tanks for Private Fire Protection, Care and Maintenance Section.

2-2.7 Necessary periodic emptying of steel tanks for repainting can be minimized by use of a cathodic corrosion prevention system that counters the natural electrolytic action that is the basis for most corrosion. Such a system needs periodic attention to the condition of suspended electrodes. If chemical water additives are used to inhibit corrosion, semi-annual chemical analysis of the water should be made. (See also NFPA 22, Standard for Water Tanks for Private Fire Protection, paragraph A-2-7.13.)

When cathodic protection is maintained in a steel tank, the tank should be cleaned out to prevent sediment and scale entering the discharge pipe.

2-2.8 The authority having jurisdiction should always be notified, in advance, when and for how long the tank is to be out of service.

2-3 Pressure Tanks. (See NFPA 22, Standard for Water Tanks for Private Fire Protection.)

2-3.1 Pressure tanks should be inspected regularly, checking the water level and air pressure at least monthly.

2-3.2 The interior of pressure tanks should be inspected carefully at three-year intervals to determine if corrosion is taking place and if repainting or repairing is needed. When necessary, they should be thoroughly scraped, wire brushed and repainted with an approved metal-protective paint.

2-3.3 Applicable safety codes should be consulted with respect to the maintenance and testing of pressure tanks.

2-3.4 The tank should be pressure tested at intervals as required by the ASME Non-Fired Pressure Vessel Code.

2-3.5 Sight gage valves should be kept closed except when a test for water level is being made.

2-3.6 The tank and its supports should be examined and painted as recommended for gravity tanks.

2-3.7 The heat within the tank enclosure should be checked daily during cold weather to maintain a 40°F (4°C) room temperature.
2-4 Fire Pumps. (See NFPA 20, Standard for Installation of Centrifugal Fire Pumps.)

2-4.1 General.

2-4.1.1 The pump room should be kept clean and accessible at all times. The fire pump, driver and controller should be protected against possible interruption of service through damage caused by explosion, fire, flood, earthquake, rodents, insects, windstorm, freezing, vandalism and other adverse conditions.

2-4.1.2 The suction pipes, intakes, foot valves and screens of fire pumps should be examined frequently to make sure that they are free from any obstruction. Mud, gravel, leaves and other foreign material entering the suction pipe may cause damage to the pump or obstruction of the piping of the standpipe system. The formation of ice may also impair the operation of the pump.

NOTE: Horizontal pumps should be provided with water under a positive head.

2-4.1.3 Suitable means should be provided for maintaining the temperature of a pump room or pump house, where required, above 40°F (4°C). Where pumps are driven by internal combustion engines the temperature of the pump room, pump house, or area where engines are installed should never be less than the minimum recommended by the engine manufacturer.

2-4.1.4 Pump rooms and pump houses should be dry and free of condensate. Accumulation of water in the steam pump supply line or drainage equipment may be dangerous and should be avoided. Where condensate is a problem some heat should be provided.

2-4.1.5 Fire pumps should be operated only in connection with fire protection service.

2-4.1.6 Oil in internal combustion engine pumps should be changed in accordance with manufacturer’s instructions, but not less than annually.

2-4.1.7 Storage batteries should be tested frequently to determine the condition of battery cells and the amount of charge in the battery. Only distilled water should be used in battery cells. The plates should be kept submerged at all times.

2-4.1.8 Fuel storage tanks should be kept full at all times.

2-4.2 Periodic Operation and Testing.

2-4.2.1 The pump should be operated every week at rated speed. Inspect the condition of the pump, bearings, stuffing boxes, suction pipe strainers and the various other details pertaining to the driver and control equipment. The examination should be extended to include the condition and reliability of the electric power supply and, if the pump is engine driven, the storage batteries, lubrication system and oil and fuel supplies.

Exception: Electric motor driven fire pumps should be tested monthly.

2-4.2.2 When automatically controlled pumping units are to be tested weekly by manual means, at least one start should be accomplished by reducing the water pressure either with the test drain on the pressure sensing line or with a larger flow from the system.

2-4.2.3 If the driver has an internal combustion engine, it should be run for at least 30 minutes to bring it up to normal running temperature and to make sure it is running smoothly at rated speed. Automatically controlled equipment should be arranged to automatically start the engine with the initiating means being a solenoid valve drain on the pressure control line.

2-4.2.4 Steam pumps should be operated until water is discharged freely from the relief valve. Regular inspections should be made: checking the maintenance of ample pressure; proper supply of lubricating oil; operative condition of relief valve and level of water in the priming tank.

2-4.2.5 A yearly flow test should be performed to ensure that neither pump nor suction pipe is obstructed and that the pump is operating properly. When the water supply is from a public service main, pump operation should not reduce the suction head at the pump below the pressure allowed by the local authority. At this time both the static and pumping water level of vertical shaft pumps should be determined.

2-5 Hydrants. (See NFPA 24, Standard for Private Fire Service Mains and Their Appurtenances.)

2-5.1 Inspection of hydrants.

(a) Public hydrants near the building should be observed for any signs of damage or vandalism.

(b) Private hydrants should be inspected monthly to verify that they are visible and readily accessible with caps in place.

2-5.2 Maintenance.

(a) Lubricate private hydrants twice yearly.

(b) Private hydrants should be serviced as recommended by manufacturers.

2-5.3 Testing. At least annually, private hydrants should be opened and closed to ensure proper water flow and drainage.

Chapter 3 Standpipe Systems

3-1 General.

3-1.1 Components of standpipe-and hose systems should be visually checked monthly. Standpipe systems should be free of corrosion, foreign material, no obvious physical damage, or tampering, or any condition that would prevent operation. (See Chapter 4.)

3-1.2 The valves in all connections to the automatic sources of water supply should be inspected weekly to verify that they are in the open position.

3-2 Testing of Standpipe and Hose Systems.

3-2.1 General.

3-2.1.1 Flow and Hydrostatic Tests.

3-2.1.1.1 Flow tests of standpipe and hose systems in all buildings or structures should be conducted at least every five years or when an inspection indicates that there is reason to believe that the system would fail to operate properly in an emergency. (See NFPA 13, Standard for the Installation of Sprinkler Systems.) This should include a backflush of fire department connections when provided. (See Figure 3-2.1.1.1.)
Figure 3-2.1.1.1 Typical Method of BackFlushing Fire Department Connection.

3-2.1.1.2 Hydrostatic tests should be conducted every five years on dry systems.

3-2.1.1.3 Hydrostatic tests should be conducted on any system that has been modified or repaired, or when an inspection indicates there is reason to believe that the system would fail to operate properly in an emergency.

3-2.1.2 The tests should be conducted by a person qualified to perform the full testing procedure for the particular standpipe system.

3-2.1.3 The local fire department should be notified at least one working day in advance of the performance of any required test to allow a representative of the fire department to witness the test.

3-2.1.4 At the conclusion of each test, the authority having jurisdiction should be notified of any fire protection equipment that was determined to be impaired or inoperable.

3-2.1.5 When a standpipe system or any portion thereof is out of service for any reason, notice should be given to the local fire department and a sign should be posted on each fire department connection indicating what portion of the system is out of service.

3-2.1.6 When the standpipe system is determined to be operable, the owner or his agent should certify its condition in writing to the authority having jurisdiction.

3-2.1.7 When water damage is a possibility, air test the system at 25 psi prior to introducing water to the system.

3-2.2 Flow Test Procedure. All systems should be flow tested to the flow and pressure requirements in effect at the time of installation.

3-2.3 Hydrostatic Test Procedure. Hydrostatically test the system for two hours at a pressure 50 psi greater than the maximum pressure but in no case less than 200 psi.

3-2.4 When provided, water flow alarm and supervisory devices should be tested in accordance with applicable standards such as NFPA 71, 72A, 72B, 72C, 72D.

3-2.5 Pump Test. Fire pumps should be tested (see NFPA 20 "Centrifugal Fire Pumps" Chapter 11). If the pump performance characteristics when tested are more than 10 percent below the manufacturer's certified shop test characteristic curve or as specified on the pump housing, the pump should be repaired and restored to its original condition. Caution should be taken when drawing residual pressure below 20 psi on public service mains during testing as this may cause damage to the mains. Pump supervisory devices should be tested for proper functioning and to assure that the alarm is transmitting to the proper location.

3-2.6 Gravity tank supply. Determine that the automatic filling system operates if the system is supplied by gravity tank.

3-2.7 Pressure tank supply. Determine that automatic filling systems operate when flow test is conducted. Check air-pressure and water-supply apparatus where installed.

3-2.8 Test each outlet valve in the system every five years by operating to determine that it will function properly. This may be accomplished without water in the system.

3-2.9 Pressure regulating devices should be tested every five years in accordance with manufacturer's instructions.

Chapter 4: Standpipe and Hose System Components

4-1 General.

4-1.1 The following monthly check lists are provided for guidance in the inspection, testing and maintenance of all classes of standpipe and hose systems.

4-1.2 Component Check Points and Corrective Action.

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<thead>
<tr>
<th>CHECK POINTS</th>
<th>COMPONENTS</th>
<th>CORRECTIVE ACTION</th>
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</thead>
<tbody>
<tr>
<td></td>
<td><strong>FIRE DEPARTMENT CONNECTION</strong></td>
<td></td>
</tr>
<tr>
<td>1. Inlet caps missing.</td>
<td>1. Inspect interior, replace.</td>
<td></td>
</tr>
<tr>
<td>2. Couplings damaged</td>
<td>2. Repair or replace, lubricate for smooth rotation.</td>
<td></td>
</tr>
<tr>
<td>8. Check valve leaking</td>
<td>8. Repair or replace.</td>
<td></td>
</tr>
<tr>
<td>10. Automatic Ball Drip Valve not functioning properly</td>
<td>10. Repair or replace.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th><strong>HOSE VALVE OUTLETS</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Cap missing</td>
<td>1. Replace.</td>
<td></td>
</tr>
<tr>
<td>2. Fire hose connection damaged</td>
<td>2. Repair.</td>
<td></td>
</tr>
<tr>
<td>4. Cap gaskets missing or deteriorated</td>
<td>4. Replace.</td>
<td></td>
</tr>
<tr>
<td>5. Valve leaking</td>
<td>5. Close or repair.</td>
<td></td>
</tr>
<tr>
<td>7. Restricting device missing</td>
<td>7. Replace.</td>
<td></td>
</tr>
</tbody>
</table>
PIPING

1. Damaged piping. 1. Repair.
2. Control valves damaged. 2. Repair or replace.
3. Missing or damaged pipe support devices. 3. Repair or replace.
4. Damaged supervisory devices. 4. Repair or replace.

HOSE

1. Mildew, cuts, abrasions and deterioration evident. 1. Replace with approved lined hose.
2. Coupling damaged. 2. Replace or repair.
3. Gaskets missing or deteriorated. 3. Replace.
4. Incompatible threads on coupling. 4. Replace or provide thread adapter.
5. Hose not connected to hose rack nipple or valve. 5. Connect.
6. Hose test date outdated. 6. Retest or replace. (See NFPA 1962, Standard for the Care, Use, and Maintenance of Fire Hose Including Connections and Nozzles.)

NOZZLE

1. Nozzle missing. 1. Replace with approved nozzle.
2. Gasket missing or deteriorated. 2. Replace.
3. Obstructions. 3. Remove.
4. Nozzle does not operate smoothly. 4. Repair or replace.

HOSE STORAGE DEVICE

1. Difficult to operate. 1. Repair or replace.
2. Damaged. 2. Repair or replace.
3. Obstruction. 3. Remove.
4. Hose improperly racked or rolled. 4. Re-rack or re-roll.
5. Nozzle clip in place and nozzle correctly contained? 5. Replace if necessary.
6. If enclosed in cabinet, will hose rack swing out at least 90 degrees? 6. Repair or remove any obstructions.

CABINET

1. Check overall condition for corroded or damaged parts. 1. Repair or replace parts. Replace entire cabinet if necessary.
2. Difficult to open. 2. Repair.

3. Cabinet door will not open 180 degrees. 3. Repair or remove any obstructions.
4. Door glazing cracked or broken. 4. Replace.
5. If cabinet is break-glass type, is lock functioning properly? 5. Repair or replace.
6. Glass break device missing or not attached. 6. Replace and/or attach.
7. Not properly identified as containing fire equipment. 7. Provide identification.
9. All valves, hose, nozzles, fire extinguisher, etc., not related, easily accessible. 9. Remove any material not related.

Chapter 5 Fire Records

5-1 Protection Records.

5-1.1 In the development of a fire protection record plan, it is advisable to consider the advice and recommendations from various sources as below. Records must be maintained of inspections, tests, and maintenance.
(a) Authority Having Jurisdiction (Rating Bureaus, Fire Prevention Bureaus, Fire Marshals, Etc.)
(b) Manufacturers of Various Devices
(c) Fire Insurance Companies
(d) Independent Fire Protection Consultants
(e) Mechanical Contractors
(f) Other Applicable NFPA Codes as outlined in the Appendix.

Chapter 6 Referenced Publications

6-1 The following documents or portions thereof are referenced within this document and should be considered part of the recommendations of this document. The edition indicated for each reference is the current edition as of the date of the NFPA issuance of this document.

6-1.1 NFPA Publications. National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

- NFPA 13-1987, Standard for the Installation of Sprinkler Systems
- NFPA 13A-1987, Recommended Practice for the Inspection, Testing and Maintenance of Sprinkler Systems
- NFPA 14-1986, Standard for the Installation of Standpipe and Hose Systems
- NFPA 20-1987, Standard for the Installation of Centrifugal Fire Pumps
- NFPA 22-1987, Standard for Water Tanks for Private Fire Protection
- NFPA 24-1987, Standard for Private Fire Service Mains and Their Appurtenances
- NFPA 26-1983, Recommended Practice for the Supervision of Valves Controlling Water Supplies for Fire Protection
NFPA 71-1987, Standard for Central Station Signaling Systems

NFPA 72A-1987, Standard for Local Protective Signaling Systems

NFPA 72B-1986, Standard for Auxiliary Protective Signaling Systems

NFPA 72C-1986, Standard for Remote Station Protective Signaling Systems

NFPA 72D-1986, Standard for Proprietary Protective Signaling Systems

NFPA 291-1983, Recommended Practice for Fire Flow Testing and Marking of Hydrants


6-1.2 ASME Code. This publication makes reference to the following ASME Code. It is available from the American Society of Mechanical Engineers, 345 East 47th Street, New York, NY 10017.

ASME Non-Fired Pressure Vessel Code, 1986

6-1.3 ASTM Standards. This publication makes reference to the following ASTM standard and the year date indicates the latest edition available. It is available from the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.
