



# Department of Building & Fire Prevention

4701 W. Russell Road • Las Vegas, NV 89118  
(702) 455-3000 • Fax (702) 221-0630

Jerome A. Stueve, P.E., Director  
Samuel D. Palmer, P.E., Assistant Director • Jim Gerren, P.E. Assistant Director • Girard W. Page, Fire Marshal

## CLARK COUNTY BOARD OF FIRE CODE APPEALS

November 12, 2019

2:00 P.M. to 3:30 P.M.

4701 W. Russell Road, Las Vegas, NV 89118

Presentation Room

### AGENDA

- A. Call to Order
  - 1. Introductions
  - 2. Confirmation of Quorum.
- B. Public Comment (Discussion only) – *No action may be taken upon a matter raised under this item of the agenda until the matter itself has been specifically included on an agenda as an item upon which action may be taken. Public comments are limited to three (3) minutes unless the Board elects to extend the comments for purposes of further discussion. Comments will not be restricted based on viewpoint.*
- C. Introduction – Board of Fire Code Appeals representatives approved by the Clark County Board of County Commissioners during the regularly scheduled BCC meeting on June 18, 2019.
- D. Elections of Chairman and Vice Chairman. (Discussion/For Possible Action)
- E. Approval of Minutes of March 20, 2019. (Discussion/For Possible Action)
- F. Rules and Procedures of the Clark County Board of Fire Code Appeals discussion and approval. (Discussion/For Possible Action)
- G. Appeal by ACE Fire Systems of the code interpretation of NFPA Sections 25.2.1.5 and 25.21.6 2013 Edition. (Discussion/For Possible Action).
- H. Staff Comment (Discussion only)
- I. Public Comment (Discussion only)
- J. Next Meeting Date and Location
- K. Adjournment

*The Board may take action on items marked "Discussion/For Possible Action." Items may be taken out of the order on the agenda at the discretion of the Chairman. Items may be combined for consideration by the Board at the discretion of the Chairman. Items may be pulled or removed from the agenda at any time.*

This is a public meeting. In conformance with the Nevada Public Meeting Law, I Sarah Stevens, posted or caused the posting of this agenda on or before November 6, 2019, at the following locations:

- o Clark County Comprehensive Planning Department, CC Government Center, 1<sup>st</sup> Floor
- o Clark County Department of Building & Fire Prevention, Russell Road Complex
- o Clark County Courthouse
- o City of Las Vegas Plaza
- o Clark County Fire Station 18

The agenda is also posted on the Clark County Department of Building & Fire Prevention website [www.clarkcountynv.gov](http://www.clarkcountynv.gov) and the State of Nevada website <http://nv.gov>. For further information, please contact Jerome A. Stueve, P.E., Director/Building & Fire Code Official, Clark County Department of Building & Fire Prevention, by email ([jerry.stueve@clarkcountynv.gov](mailto:jerry.stueve@clarkcountynv.gov)) or by telephone at (702) 455-8187.

We are pleased to make reasonable accommodations for members of the public who are disabled. If special arrangements are necessary, please notify Sarah Stevens at (702) 455-7302; twenty-four (24) hours advance notice is requested.

Please take note actions can only be taken on agenda items.

BOARD OF COUNTY COMMISSIONERS  
MARILYN KIRKPATRICK, Chairman • LAWRENCE WEEKLY, Vice Chair  
LARRY BROWN • JAMES B. GIBSON • TICK SEGERBLOM • JUSTIN C. JONES • MICHAEL NAFT • TICK SEGERBLOM  
YOLANDA T. KING, County Manager

**CLARK COUNTY BOARD OF COMMISSIONERS  
AGENDA ITEM**

**Petitioner:** Jerome A. Stueve, Director of Building & Fire Prevention

**Recommendation:**

**Appoint eight qualified individuals to serve on the Clark County Board of Fire Code Appeals for four-year terms ending July 1, 2023, from the list of interested individuals: Allyn Vaughn, Brian Woodward, Timothy M. Mulrooney, Patrick Burke, Corey Wallace, Gordon Marx, Katherine A. Springstead, Roy Mares, Diane Cravotta, and Bill Laub; or take other action as appropriate. (For possible action)**

**FISCAL IMPACT:**

Fund #:	N/A	Fund Name:	N/A
Fund Center:	N/A	Funded PGM/Grant:	N/A
Amount:	N/A		
Description:	N/A		
Additional Comments:	N/A		

**BACKGROUND:**

The Clark County Board of Fire Code Appeals (CCBFCA) is a 9-member board appointed by the Clark County Board of Commissioners to hear and decide appeals of orders, decisions, or determinations made by the Fire Code Official relative to the application and interpretation of the County's fire code. Pursuant to County Code, Section 13.04.070, sub-section 108, the CCBFCA is required to be comprised of eight members representing the various fire-safety organizations and the Fire Chief of the Clark County Fire Department.

The following qualified individuals have submitted applications:

FIRE PROTECTION ENGINEER - Allyn Vaughn & Brian Woodward  
CIVIL ENGINEER - Timothy M. Mulrooney  
FIRE ALARM CONTRACTOR - Patrick Burke  
FIRE SPRINKLER CONTRACTOR - Corey Wallace & Gordon Marx  
EXHIBIT AND TRADE INDUSTRY REPRESENTATIVE - Katherine A. Springstead  
SPECIALIST IN FIRE SAFETY - Roy Mares  
SPECIALIST IN HAZARDOUS MATERIAL - Diane Cravotta  
LAYPERSON - Bill Laub

Following a careful review of the applications, staff recommends reappointing six members - Allyn Vaughn, Corey Wallace, Patrick Burke, Roy Mares, Diane Cravotta and Bill Laub; and appoint two new members - Timothy M. Mulrooney and Katherine A. Springstead to the CCBCFCA for four-year terms beginning July 1, 2019.

Staff recommends approval of this request.

Cleared for Agenda

6/18/2019

Agenda Item #

72.

**SUMMARY OF FINAL ACTION**

**AGENDA**

**JOINT MEETING OF THE CLARK COUNTY BOARD OF COMMISSIONERS,  
MOAPA VALLEY FIRE PROTECTION DISTRICT BOARD OF FIRE  
COMMISSIONERS, CLARK COUNTY WATER RECLAMATION DISTRICT BOARD  
OF TRUSTEES, AND UNIVERSITY MEDICAL CENTER OF SOUTHERN NEVADA  
BOARD OF TRUSTEES**

**9:00 A.M. TUESDAY, JUNE 18, 2019**

**CLARK COUNTY COMMISSION CHAMBERS, GOVERNMENT CENTER  
500 SOUTH GRAND CENTRAL PARKWAY, LAS VEGAS, NEVADA**

<b>This meeting has been properly noticed and posted in the following locations:</b>		<b>Agenda Also Available At:</b>	
CC Government Center 500 S. Grand Central Pkwy. Las Vegas, NV (Principal Office)	Regional Justice Center 200 Lewis Ave, 1st Fl. Las Vegas, NV	City of Las Vegas 400 E. Stewart Ave. Las Vegas, NV	City of North Las Vegas 2200 Civic Center Dr. No. Las Vegas, NV
Third Street Building 309 S. Third St. Las Vegas, NV	Paradise Park Pool & Center 4775 McLeod Dr. Las Vegas, NV	City of Henderson 200 Water St. Henderson, NV	City of Boulder City 400 California Ave. Boulder City, NV
Winchester Park & Center 3130 S. McLeod Dr Las Vegas, NV	Desert Breeze Park & Community Ctr 8275 Spring Mtn. Rd Las Vegas, NV	City of Mesquite 10 E. Mesquite Blvd. Mesquite, NV	Clark County Reg. Govt. Center 101 Civic Way Laughlin, NV

Tune in to the County's news magazine "Chronicles" Tuesday, June 18, 2019, at 6:30 p.m.  
 The min agenda is available on Clark County's Internet Web Site, <http://www.accessclarkcounty.com>.  
 This meeting will be broadcast live on Clark County Television, Channel 4 (CCTV 4) and over the Internet,  
<http://www.accessclarkcounty.com>. It will be replayed over CCTV 4 on Tuesday, June 18, 2019, at 8:00 p.m.  
 For more programming information, call the Public Communications Office at 455-6888.

**SEC. 1. OPENING CEREMONIES**

**CALL TO ORDER**

**INVOCATION**

**PLEDGE OF ALLEGIANCE**

- 1 Public Comment
- 2 Approval of Minutes of the Regular Meeting on May 7, 2019 and the Special Meetings held on May 14 and May 20, 2019. (For possible action) (Available in the County Clerk's Office, Commission Division)

**MOVED BY: Jim Gibson**

**ACTION: APPROVED SUBJECT MINUTES AS RECOMMENDED**

**VOTE: 6-0**

**VOTING AYE: Michael Naft , Justin Jones , Larry Brown , Marilyn Kirkpatrick , Jim Gibson , Tick Segerblom**

**VOTING NAY: NONE**

**ABSTAINING: NONE**

**ABSENT: Lawrence Weekly**

- 3 Approval of Agenda with the Inclusion of Any Emergency Items and Deletion of Any Items. (For possible action)

**MOVED BY: Michael Naft**

**ACTION: APPROVED AGENDA WITH DELETION OF ITEM NO. 38 AS RECOMMENDED**

**VOTE: 6-0**

**VOTING AYE: Michael Naft , Justin Jones , Larry Brown , Marilyn Kirkpatrick , Jim Gibson , Tick Segerblom**

**VOTING NAY: NONE**

**ABSTAINING: NONE**

**ABSENT: Lawrence Weekly**

**SEC. 2. CONSENT AGENDA: Items No. 4 through No. 57**

NOTE: All items listed on this agenda are for action by the Board/Trustees unless otherwise noted. Action may consist of any of the following: approve, deny, condition, hold, or table.

Consent Agenda - All matters in this sub-category are considered by the Board of County Commissioners, Board of Trustees, Licensing Board and Agency to be routine and may be acted upon in one motion. Most agenda items are phrased for a positive action. However, the Board/Trustees may take other actions such as hold, table, amend, etc.

**COMMENTS BY THE GENERAL PUBLIC**

According to Nevada's Open Meeting Law, it is the Board's/Trustees' discretion to take Public Comment during times other than during a Public Hearing or during the Public Comment Session. In all other instances, a citizen may speak on any matter before the Board/Trustees for consideration, after receiving recognition and consent of the Chairman of the Board. Public Comment will be limited to three minutes. If any member of the Board/Trustees wishes

to extend the length of a presentation, this will be done by the Chairman, or the Board/Trustees by majority vote.

If you wish to speak on a matter not listed as a public hearing or on a matter not posted on the agenda, you may do so during the Public Comment Session. Please step up to the speaker's podium, clearly state your name and address -- please spell your name for the record -- and limit your comments to no more than three minutes. No vote may be taken on any matter not listed on the posted agenda.

Consent Agenda items are routine and can be taken in one motion unless a Commissioner/Trustee/Licensing member requests that an item be taken separately. For all items left on the Consent Agenda, the action taken will be staff's recommendation as indicated on the item.

Items taken separately from the Consent Agenda by Commission/Trustees/Licensing members at the meeting will be heard following the Commissioners'/County Manager's Recognition Section.

**MOVED BY: Larry Brown**

**ACTION: APPROVED CONSENT AGENDA ITEM NOS. 4 THROUGH 57, EXCLUDING ITEM NOS. 16, 17, 18, 19, AND 38 AS RECOMMENDED**

**VOTE: 6-0**

**VOTING AYE: Michael Naft , Justin Jones , Larry Brown , Marilyn Kirkpatrick , Jim Gibson , Tick Segerblom**

**VOTING NAY: NONE**

**ABSTAINING: NONE**

**ABSENT: Lawrence Weekly**

#### **Purchasing & Contracts**

- 4** Approve the selection of, and contract award with Nevada HealthRight, and Master contract for SOQ No. 605063-18, to provide Pediatric and Adolescent Sexual Abuse Examinations, Medical Services, Oversight, Legal Testimony, Support, Laboratory Tests, Supplies and Transcription Services for the Clark County Southern Nevada Children's Advocacy Center, contingent upon submission of the required insurance; and authorize the Chief Financial Officer or her designee to sign the contract; or take other action as appropriate. (For possible action)

**ACTION: APPROVED AS RECOMMENDED**

ATTACHMENT: [Clark County Agenda Item.docx](#)

ATTACHMENT: [Q605063-18-Disclosure.pdf](#)

ATTACHMENT: [Q605063-18-Master Contract.pdf](#)

ATTACHMENT: [Q605063-18-Healthright.pdf](#)

ATTACHMENT: Clark County Agenda Item.docx

ATTACHMENT: PREVENT Grant Proposal.pdf

ATTACHMENT: FY19-Reducing-Child-Fatalities-508.pdf

- 55** Approve the submission and ratify the acceptance of the Bureau of Justice Assistance grant to the Eighth Judicial District Court's Mental Health Court to provide research, data collection, gender specific risk-needs assessments and training, and gender specific trauma focused curriculum in the amount of \$381,551 from 1/1/2019 to 12/31/2021; approve and authorize the Court Executive Officer or his designee to enter into agreements for services. (For possible action).

**ACTION: APPROVED AS RECOMMENDED**

ATTACHMENT: Clark County Agenda Item.docx

ATTACHMENT: Notice of Award - BJA.pdf

- 56** Authorize the Chair to sign the Interlocal Agreement with the University of Nevada, Las Vegas for CBE No. 605224-19, for Participation in the Criminal and Juvenile Justice and Mental Health Collaboration Program; or take other action as appropriate. (For possible action)

**ACTION: APPROVED AS RECOMMENDED**

ATTACHMENT: Clark County Agenda Item.docx

ATTACHMENT: C605224-19-Interlocal.pdf

- 57** Authorize the County Manager or her designee to submit Clark County's SolSmart application. (For possible action)

**ACTION: APPROVED AS RECOMMENDED**

ATTACHMENT: Clark County Agenda Item.docx

ATTACHMENT: SolSmart-Guide-2019.pdf

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**END OF CONSENT AGENDA**

**SEC. 3. COMMISSIONERS' / COUNTY MANAGER'S RECOGNITION**

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Present a proclamation to the Clark County Regional Flood Control District to recognize July 2019 as "Flash Flood Awareness Month" and help get the word out about the dangers of flash flooding and help improve the protection of life and property for residents and visitors.

ATTACHMENT: Clark County Agenda Item.docx

**PRESENTED AS RECOMMENDED**

- 59** Recognize MJBizCon as the largest business to business cannabis conference in the world.

ATTACHMENT: Clark County Agenda Item.docx

**RECOGNIZED AS RECOMMENDED**

- 60** Proclaim June 18, 2019 as Children’s Service Guild of Southern Nevada Day ("Guild") and present a proclamation to Lynda Kreitlow, President of the Guild. (For possible action)

ATTACHMENT: Clark County Agenda Item.docx

**PROCLAIMED/PRESENTED AS RECOMMENDED**

**PROCLAMATION PRESENTED TO ALEXIS HICKS, MISS NEVADA 2018**

**PROCLAMATION PRESENTED TO ANTI-DEFAMATION LEAGUE IN RECOGNITION OF THEIR "WALK AGAINST HATE"**

**SEC. 4. ITEMS TAKEN SEPARATELY FROM CONSENT AGENDA**

**SEC. 5. PUBLIC HEARINGS - 10 AM**

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- 61** Pursuant to NRS 288.153, conduct a public hearing; and approve and authorize the Chair to sign the Collective Bargaining Agreement between Clark County and the International Union of Elevator Constructors (IUEC) Local 18, effective July 1, 2019 through June 30, 2022. (For possible action)

ATTACHMENT: Clark County Agenda Item.docx

ATTACHMENT: Attachment I - IUEC 2019 Summary of Changes.docx

ATTACHMENT: Attachment II IUEC CBA 2019 to June 30 2022.doc

ATTACHMENT: Copy of Attachment III - IUEC 2019 Fiscal Impact Assessment Summary.xls

the Board of Hospital Trustees for University Medical Center of Southern Nevada  
(For possible action)

ATTACHMENT: UMC Agenda Item.docx

ATTACHMENT: ATTACHMENT I - Summary of Changes.pdf

ATTACHMENT: Attachment II - Appendix D2 .pdf

ATTACHMENT: Attachment III - Signed Tentative Agreement.pdf

ATTACHMENT: ATTACHMENT IV - Fiscal Impact Summary.pdf

**MOVED BY: Jim Gibson**

**ACTION: APPROVED AS RECOMMENDED**

**VOTE: 7-0**

**VOTING AYE: Michael Naft , Justin Jones , Larry Brown , Marilyn Kirkpatrick , Lawrence Weekly , Jim Gibson , Tick Segerblom**

**VOTING NAY: NONE**

**ABSTAINING: NONE**

**ABSENT: NONE**

- 64 Conduct a public hearing to approve, adopt, and authorize the Chair to sign an ordinance amending Section 2 of Clark County Ordinance 1711 regarding Justice Court Administrative Assessment fees; providing for other matters properly relating thereto; or take other action as appropriate. (For possible action)

ATTACHMENT: Clark County Agenda Item.docx

ATTACHMENT: Amendment to Justice Court Assessment Ordinance.docx

**MOVED BY: Lawrence Weekly**

**ACTION: APPROVED (INCLUDING ADOPTION OF ORDINANCE NO. 4701) AS RECOMMENDED**

**VOTE: 7-0**

**VOTING AYE: Michael Naft , Justin Jones , Larry Brown , Marilyn Kirkpatrick , Lawrence Weekly , Jim Gibson , Tick Segerblom**

**VOTING NAY: NONE**

**ABSTAINING: NONE**

**ABSENT: NONE**

**SEC. 6. INTRODUCTION OF ORDINANCES**

**This item is for introduction only. A date and time will be set for a public hearing. No public comments will be heard at this time.**

- 65 Introduce an ordinance to amend various provisions of Chapter 3.64 of Title 3 of the Clark County Code relating to the Asian-American Community Commission;







**ESTABLISH A TEMPORARY WORKING GROUP BETWEEN CLARK COUNTY AND THE MUNICIPALITIES**

- 78** Discuss the regulation of mobile billboard businesses. (For possible action)

ATTACHMENT: Clark County Agenda Item.docx

**DISCUSSED AS RECOMMENDED-STAFF DIRECTED TO PREPARE ORDINANCE TO ADDRESS REGULATION AND DEFINITION OF MOBILE BILLBOARDS, INCLUDING IMPOSING LICENSE FEE, AND PRESENT TO BOARD ALLOWING TIME FOR DISCUSSION AND REFINEMENT IN ORDER TO PUT INTO EFFECT BY JANUARY 1, 2020**

- 79** Discuss Clark County's pre-employment drug testing procedures. (For possible action)

ATTACHMENT: Clark County Agenda Item.docx

**STAFF DIRECTED TO RESEARCH NEW LAW AND BRING REPORT BACK TO BOARD OUTLINING ANY STEPS REQUIRED TO ENSURE THAT CLARK COUNTY IS IN COMPLIANCE**

- 80** Receive a report from staff on the 2019 Legislative Session: and take any action deemed appropriate. (For possible action)

ATTACHMENT: Clark County Agenda Item.docx

**REPORT RECEIVED-NO ACTION TAKEN BY BOARD**

- 81** Go into closed session, pursuant to NRS 241.015(3)(b)(2), to receive information from the District Attorney regarding potential or existing litigation involving a matter over which the Board has supervision, control, jurisdiction or advisory power, and to deliberate toward a decision on the matter, and pursuant to NRS Chapter 288.220, to receive a report on the status of ongoing labor negotiations; and direct staff accordingly. (For possible action)

ATTACHMENT: Clark County Agenda Item.docx

**NO ACTION TAKEN BY BOARD**

PUBLIC COMMENTS





# Department of Building & Fire Prevention

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## CLARK COUNTY BOARD OF FIRE CODE APPEALS

### MINUTES of March 20, 2019

**MEMBERS PRESENT:** Patrick Burke, Fire Alarm Contractor  
Diane Cravotta, Specialist/Hazardous Materials  
Roy Mares, Fire Safety Specialist  
Martie Sparks, CMP  
Allyn Vaughn, PE, FSFPE, LEED AP  
Corey Wallace, Fire Sprinkler Contractor

**STAFF PRESENT:** Jerry Stueve, Director/Building & Fire Code Official  
Samuel D. Palmer, P.E., Assistant Director  
Girard W. Page, Fire Marshal  
Carolyn Campbell, Deputy District Attorney  
Danny Horvat, Deputy Fire Marshal  
Sarah Stevens, Administrative Secretary

**MEMBERS ABSENT:** Gregory Cassell, Fire Chief, Clark County Fire Department  
Bill Laub, Specialist/Trade Partnerships/Private Citizen  
Todd Steadhäm, PE, LEED AP

**APPELLANTS PRESENT:** Lee Marks, American Fire  
Steve Marks, ACE Fire Systems, Incorporated

#### A. Call to Order

The meeting was called to order at approximately 1:06 p.m. by Chairman Allyn Vaughn.

1. Introductions were made around the table.
2. It was determined by Chairman Vaughn that a quorum was present.

#### B. Public Comment

There were no public comments.

#### C. Meeting Minutes – February 7, 2018

There were no public comments. A motion was made by Diane Cravotta, seconded by Martie Sparks, to approve the minutes of February 7, 2018 as written.

- D. Receive request submitted November 1, 2018 by Ace Fire Systems, Inc., by Jerry Stueve, for interpretation of hydrostatic testing requirements in NFPA 13, 2013 Edition, Sections 25.2.1.5 and 25.2.1.6, regarding testing existing elements or systems.
- E. Appeal of determination by Ace Fire Systems, Inc., of hydrostatic testing requirements referenced in 2013 NFPA 13 Sections 25.2.1.5 and 25.2.1.6 (Discussion/For Possible Action).

Steve Marks, Ace Fire Systems, presented his appeal citing the reasons for his opposition to Jerry Stueve's interpretation that the system has to be hydrostatically tested if it effects 20 or more heads, where 15 lineal feet of pipe is added. He stated that this requirement is not found anywhere in NFPA 13; that the code states hydrostatic testing is only required upon installation of new systems, to check integrity of workmanship. He further stated that because this is a modification to the system, the code states that the system can be tested without plugs, versus the testing entire system to 200 psi. The latter puts stress on the system and causes a liability that can effect the other occupants of the building. He further added that the code is speaking to heads being effected and does not pertain to piping.

Lee Marks, American Fire, testified in support and agreement of the appellant's opposition, stating NFPA.2.1.5 clearly states that testing is required for *new* systems and this is a modification. Return systems can be isolated and tested without plugs. Testing is only required for additions such as arm-overs, drops, sprig-ups, sprinkler and head changes, return bends, etc. He continued that leaks can be found by filling the system with water and that other agencies, such as with his recent job with City of Las Vegas, does not require testing to be done on a modification.

Chairman Allyn Vaughn opened the Board to questions for either party. The Board questioned the appellant with what was the main issue for the appeal;

Questions were raised by the Board to Jerry Stueve as to how the 15 lineal feet of piping stipulation was determined, and wanted to confirm that 15' is based on one psi. Jerry responded that he and other fire prevention personnel completed a hydraulic calculation and it worked out to be one psi. Jerry was also asked to clarify when calculating a sprinkler head, does one psi loss refer to system pressure or hydraulic loss. Jerry replied it would be hydraulic loss within the sprig or run of piping to a single sprig. Allyn commented that he did a calculation and determined if the flow to the head is 13 gpm or less, if doing ordinary group ones or twos, anything above a 1/2 " orifice, will exceed that psi. Allyn explained that he interprets it as friction loss in the new arm-over or drop, i.e. new work on the existing system. Jerry concurred.

The Board asked Jerry if he contacted NFPA and will the County be proposing to change the code requirement in the future? Jerry replied no; 252.15 is intended to say that this project is effecting more than 20 heads. The Board also asked Jerry if they are to review this appeal based on the 15' of pipe constituting a minor change and Jerry responded yes.

Questions were raised by the Board to Appellant Steve Marks as to the basis of his appeal, i.e. is the amount of pressure to be tested being questioned or the definition of a minor modification? Roy Mares commented that *hydrostatic* is a performance issue that would be covered in the calculations upon submittal. Appellant Steve Marks answered that this all started with his submittal of a Tenant Improvement with 22 heads, with modifications effecting 20 heads. It elevated to the supervisor requiring that the system be hydrostatic tested. He also clarified that he is willing to come to a compromise but has issue with hydrostatic testing being required with modifications, and the reference to 15' of pipe installation. Lee commented that he now understanding Jerry's interpretation

and suggested a possible compromise might be to know the number of footings there are and then do a hydrostatic test. Jerry asked Steve Marks how difficult it would be to test that one piece of pipe before installation; Marks replied that it would take a lot of time and it wouldn't test the system it was attached to, the point of connection.

Allyn Vaughn and Corey Wallace both agreed that one psi is too restrictive. Corey suggested using 26 gpm hydraulic calculation on ordinary hazard sprinklers. Allyn suggested that there is a good chance that there would be more of a 15' drop. Jerry agreed and suggested that the interpretation be redefined and issued to the appellant to see if an agreement can be made.

Motion to Revise Determination: Chairman Vaughn motioned that the Code Official revise the interpretation to meet more of the intent of relatively minor work and address to relocate the sprinklers and issue to the appellant for review. 2<sup>nd</sup> to motion made by Corey Wallace; all were in favor. There were no further comments.

E. Comments from Staff (Discussion only). There were no comments from staff.

F. Public Comment (Discussion only). There were no comments from public.

G. Adjournment

JAS:sas



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## RULES AND PROCEDURES OF THE CLARK COUNTY BOARD OF FIRE CODE APPEALS

Following are the rules and procedures as adopted on the date of the scheduled meeting, by the Clark County Board of Fire Code Appeals, as authorized by Clark County Code, Section 13.040.070 Subsection 108.

- The Board of Fire Code Appeals shall hold general public information meetings once each year, as well as, when requested by the Fire Code Official/Secretary of the Board for the purpose of hearing appeals.
- A Chairman of the Board Fire Code Appeals shall be elected by a majority of those regular members present at the first meeting of each calendar year to serve for a term of one calendar year. A Vice-Chairman shall be elected in the same manner at the same time for a term of one calendar year.
- The Chairman of the Board of Fire Code Appeals shall preside at all meetings, shall conduct all hearings, and exercise and perform such other powers and duties as may be from time to time assigned to him by the Fire Code Board of Appeals or prescribed by the rules and procedures. In presiding at meetings and hearings, the Chairman shall rule on procedure and on order of presentation.
- In the absence or disability of the Chairman, the Vice-Chairman shall perform all the duties of the Chairman and, when so acting, shall have all the powers of and be subject to all the restrictions upon the Chairman.
- In the absence of both the Chairman and the Vice-Chairman of the Board of Fire Code Appeals, a Chairman pro tempore shall be elected from among those members present by a majority vote of all the Board members present.

BOARD OF COUNTY COMMISSIONERS  
STEVE SISOLAK, Chairman • LARRY BROWN, Vice Chairman  
SUSAN BRAGER • CHRIS GUINCHIGLIANI • MARILYN KIRKPATRICK • MARY BETH SCOW • LAWRENCE WEEKLY  
DONALD G. BURNETTE, County Manager



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## Rules & Procedures

### Clark County Board of Fire Code Appeals

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- A quorum of members shall be declared upon the presence of four(4) regular members at a meeting properly noticed.
- Should any member have knowledge of facts which may constitute a conflict of interest in his consideration of any appeal, he shall forthwith notify the Fire Code Official and the members of the Board of said facts.
- The Secretary shall keep, or cause to be kept; summary minutes of the proceedings of the Board of Fire Code Appeals and shall prepare an agenda for each meeting which shall be furnished members prior to the actual hour of the meeting. The Secretary shall, in addition, be custodian of the records of the Board of Fire Code Appeals and shall, upon the filing of an appeal, furnish each regular member with a copy of the letter of appeal, information furnished by the appellant, and the related Clark County Code information related to the appeal.
- Appeals from decision of the Fire Code Official shall be in writing, shall be directed to a specific decision of the Fire Code Official, and consideration of said appeal by the Board of Fire Code Appeals to substantiate the written request for an appeal. The attached Guidelines for Preparing Appeals are recommended for use by appellant in filing of a written appeal.
- The appellant has the burden to submit adequate data to the Fire Code Board of Appeals to substantiate the written request for an appeal. The attached *Guidelines for Preparing Appeals* is recommended for use by appellant in filing of a written appeal.
- An appeal will be heard at a meeting called pursuant to law by the Fire Code Official/Secretary. Requests for hearing must be received not less than four (4) working days, nor more than sixty (60) days prior to such hearing.
- **Rules of Procedures.** The Appeals Board shall act in a quasi-judicial manner with all hearing and deliberations conducted in public. The Board shall "*Newly Revised Robert's Rules of Order*" to conduct meetings.





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## Rules & Procedures

### Clark County Board of Fire Code Appeals

Page 3

- **Scope of Authority.** The Board of Fire Code Appeals, under the appeal process, hears appeals from decisions of the Fire Code Official and shall provide final interpretations on the provisions of the codes specified in the Clark County Fire Code stated above to hear applications and to determine the suitability of modification of the requirements of the Clark County Fire Code pursuant to Clark County Code, Section 13.040.070, Subsection 108. The Board of Fire Code Appeals has no authority to grant waivers or variances to specific code requirements. Materials, methods or work offered must be, for the purpose intended, at least equivalent to that prescribed in the applicable code in suitability strength, effectiveness, fire resistance, durability, safety and sanitation.
- The appellant has the obligation to present his case of appeal to the Fire Code Board and may submit evidence or argument only to the appeal originally submitted in writing. Each Fire Code appeal shall be heard separately.
- The decision of the Board of Fire Code Appeals on an appeal shall be final.
- These bylaws may be amended by a vote of four (4) of the regular members of the Board of Fire Code Appeals.

*Allyn Vaughn*

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Allyn Vaughn, Chairman

*Bill Laub*

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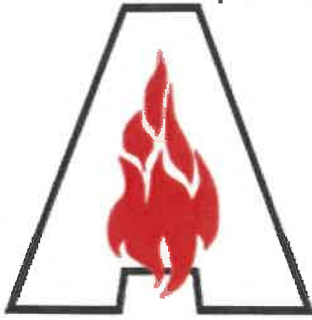
Bill Laub, Vice-Chairman

*Ronald L. Lynn*

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Ronald L. Lynn, Fire Code Official/Secretary

RL\sas



# ACE FIRE SYSTEMS, LLC

2620 WESTERN AVE.  
LAS VEGAS NV 89109  
P. 702-384-2932 FX. 702-384-7282

April 15, 2019

Jerry Stueve, Fire Code Official  
Clark County of Building & Fire Prevention  
4701 W Russell Rd  
Las Vegas, NV 89118

RE: Appeal of interpretation of section 25.2.1.5 and 25-2.1.6

Jerry:

We are appealing your interpretation in its entirety in your letter dated April 3, 2019, of section 25.2.1.5 and 25.2.1.6 .

Sincerely

Steve Marx



# Department of Building & Fire Prevention

4701 W. Russell Road • Las Vegas, NV 89118  
(702) 455-3000 • Fax (702) 221-0630

Jerome A. Stueve, P.E., Director  
Samuel D. Palmer, P.E., Assistant Director • Girard W. Page, Fire Marshal

April 3, 2019

ACE Fire Systems, Inc.  
ATTENTION: Steve Marx  
2620 Western Avenue  
Las Vegas, Nevada 89109

SUBJECT: Code Interpretation NFPA 13, 25.2.1.5 and 25.2.1.6

Dear Mr. Marx,

At the Board of Fire Code Appeals meeting held on March 20, 2019, the Board heard your appeal of the code interpretation issued by the Clark County Fire Code Official (CCFCO) in a letter dated December 5, 2018, as it relates to 2013 NFPA 13, Sections 25.2.1.5 and 25.2.1.6, particularly the testing of existing elements or systems.

After hearing arguments by both the complainant and the CCFCO, and after discussing the matter amongst the members, the Board did not support the interpretation as written and requested the CCFCO to revise the interpretation to more directly define what constitutes a "minor change or modification," as it relates to existing sprinklers. The provisions of the NFPA 13 being interpreted are as follows:

**"25.2.1.5** Where addition or modification to an existing system affecting more than 20 sprinklers, the new portion shall be isolated and tested at not less than 200 psi (13.8 bars)."

**"25.2.1.6** Modifications that cannot be isolated, such as relocated drops, shall not require testing in excess of system working pressure."

Therefore, in compliance with the determination of the Board, the code interpretation issued on December 5, 2019, is rescinded. Further, also in compliance of the Board, the following:

*Section 25.2.1.6 is not applicable if one or more of the following conditions exist:*

- 1) A single arm-over piping has a lateral length greater than 15 feet.*
- 2) A single drop, sprig or arm-over includes more than five (5) fittings.*
- 3) The number of sprinklers modified that are equal to or exceed 25 percent of the sprinklers served by the branch pipeline.*



## Department of Building & Fire Prevention

4701 W. Russell Road • Las Vegas, NV 89118  
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Jerome A. Stueve, P.E., Director  
Samuel D. Palmer, P.E., Assistant Director • Girard W. Page, Fire Marshal

You may appeal this interpretation to the Board of Fire Code by submitting a request in writing within 15 calendar days of receipt of this letter. Please submit your request for appeal to:

Jerry Stueve, Fire Code Official  
Clark County Building & Fire Prevention  
4701 W. Russell Road  
Las Vegas, Nevada 89118

Sincerely,

A handwritten signature in blue ink, appearing to read "JAS", is written over a circular stamp or watermark.

Jerome A. Stueve, P.E., CBO  
Director - Building/Fire Code Official  
Department of Building & Fire Prevention

JAS/ta



# ACE FIRE SYSTEMS, LLC

2620 WESTERN AVE.  
LAS VEGAS NV 89109  
P. 702-384-2932 FX. 702-384-7282

December 10, 2018

Jerry Stueve, Fire Code Official  
Clark County of Building & Fire Prevention  
4701 W Russell Rd  
Las Vegas, NV 89118

RE: Appeal of interpretation of section 25.2.1.5 and 25-2.1.6

Jerry:

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We are appealing your interpretation of section 25.2.1.5 and 25.2.1.6, 15 lineal feet, hydrostatic testing interpretation.

Sincerely

Steve Marx



# ACE FIRE SYSTEMS, LLC

2620 WESTERN AVE.  
LAS VEGAS NV 89109  
P. 702-384-2932 FX. 702-384-7282

December 10, 2018

Clark County Dept of Building & Fire Prevention  
4701 W Russell Rd  
Las Vegas, NV 89118

Att: Jerry Stueve – Fire Code Official

RE: Interpretation of NFPA 13, Section 25.2.1.5 and 25.2.1.6

Jerry:

Your interpretation of 15' lineal feet of 1" diameter threaded pipe, where is the code that limits the length of 1" pipe that you're referring to. Your reference to hydrostatic test pressure must be clearly stated on the drawings. City pressure fluctuates and city pressure is city pressure. In addition for calculations on 1" pipe that exceeds 15' could you please refer to what code you are referring to that requires calculations and that the head loss cannot exceed 1 PSI.

Warehouses that have drops, arm over, sprigs or return bends in excess of 15' do not require calculations that I am aware of or to prove a 1 PSI loss, if there is can you please refer me to the code section that requires this in NFPA 13 for remodels.

Sincerely

Steve Marx



# Department of Building & Fire Prevention

4701 W Russell Road • Las Vegas NV 89118  
(702) 455-3000 • Fax (702) 221-0630

Jerome A. Stueve, P.E., Director  
Samuel D. Palmer, P.E., Assistant Director • Girard W. Page, Fire Marshal

December 5, 2018

ACE Fire Systems, Inc.  
2620 Western Avenue  
Las Vegas, Nevada 89109  
Attention: Steve Marx

Dear Mr. Marx,

A request was submitted for an interpretation of the hydrostatic testing requirements stating in 2013 NFPA 13, Sections 25.2.1.5 and 25.2.1.6, particularly as it relates to testing existing elements or systems.

**"25.2.1.5** Where addition or modification to an existing system affecting more than 20 sprinklers, the new portion shall be isolated and tested at not less than 200 psi (13.8 bars)."

**"25.2.1.6** Modifications that cannot be isolated, such as relocated drops, shall not require testing in excess of system working pressure."

After researching this matter; it has been determined that the number of heads being added or modified is less critical when determining whether or not the modifications can be isolated and whether or not the addition or modification is considered as a minor change. The critical factors appear to be the amount and type of pipe that is added or modified.

Therefore, the Fire Code Official interpretation of NFPA 13 Section 25.2.1.6 is as follows:

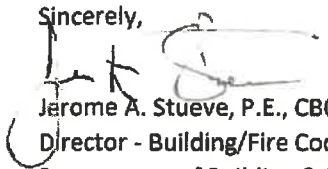
*"Modifications consisting solely of arm overs, springs, drops or return bends, consisting of a maximum of 15 linear feet of 1-inch nominal diameter threaded pipe and each serving a single sprinkler head, connecting to an existing branch line by either an existing outlet or a new listed mechanical tee welded half-coupling, shall be considered modifications that cannot be isolated, and do not require testing in excess of system working pressure regardless of number heads installed or modified under a permit.*

*In the event that hydrostatic testing is to be conducted using system working pressure, the hydrostatic testing pressure must be clearly noted on the drawings. In addition, if more than 15 feet of piping is installed to serve any single sprinkler head is installed, testing at system working pressure will only be permissible with the submission and approval of hydraulic calculations that demonstrate that the head loss within each arm over, spring, drop or return bend does not exceed 1 psi."*

You may appeal this interpretation to the Board of Fire Code by submitting your request in writing within 15 calendar days of receipt of this letter. Please submit your request for appeal to:

Jerry Stueve, Fire Code Official  
Clark County Building & Fire Prevention  
4701 W. Russell Road  
Las Vegas, Nevada 89118

Sincerely,

  
Jerome A. Stueve, P.E., CBO  
Director - Building/Fire Code Official  
Department of Building & Fire Prevention



## ACE FIRE SYSTEMS, INC.

2620 Western Ave.  
Las Vegas, NV 89109  
Phone: (702) 384-2932  
Fax: (702) 384-7282

### Interpretation of NFPA 13 25.2.1.5 and 25.2.1.6 2013 Edition

Steve Marx – Ace Fire Systems Inc.

[Acefire1@gmail.com](mailto:Acefire1@gmail.com)

November 1, 2018

25.2.1.5 Where addition or modification is made to an existing system affecting more than 20 sprinklers, the new portion shall be isolated and tested at not less than 200 psi (13.8 bar) for 2 hours.

25.2.1.6 Modifications that cannot be isolated, such as relocated drops, shall not require testing in excess of system working pressure.

#### Definitions:

**Existing:** materials that were in the system before permitted work was started.

**New:** materials that were added to an existing system when permitted work was initiated such as main lines, grid lines, branch lines, feed mains, cross mains, arm overs, sprigs, drops, return bends.

#### Interpretation:

When new materials are added to an existing system such as main lines, grid lines, branch lines, feed mains, cross mains; a hydrostatic test at 200 psi for 2 hours is performed for the entire existing system.

When arm overs, sprigs, drops, or return bends are modified to an existing system the new work cannot be isolated from the existing branch line therefore the system is not hydrostatically tested at 200 psi for 2 hours but tested at system working pressure.



- (1) A connection to an approved public or private waterworks system in accordance with 24.2.2
- (2) A connection including a fire pump in accordance with 24.2.3
- (3) A connection to a water storage tank at grade or below grade installed in accordance with NFPA 22 and filled from an approved source
- (4) A connection to a pressure tank in accordance with 24.2.4 and filled from an approved source
- (5) A connection to a gravity tank in accordance with 24.2.5 and filled from an approved source
- (6) A penstock, flume, river, lake, pond, or reservoir in accordance with 24.2.6
- (7)\*A source of recycled or reclaimed water where the building owner (or their agent) has analyzed the source of the water and the treatment process (if any) that the water undergoes before being made available to the sprinkler system and determined that any materials, chemicals, or contaminants in the water will not be detrimental to the components of the sprinkler system it comes in contact with

#### 24.2.2\* Connections to Waterworks Systems.

24.2.2.1 A connection to a reliable waterworks system shall be an acceptable water supply source.

24.2.2.2\* The volume and pressure of a public water supply shall be determined from waterflow test data or other approved method.

24.2.3\* **Pumps.** A single automatically controlled fire pump installed in accordance with NFPA 20 shall be an acceptable water supply source.

#### 24.2.4 Pressure Tanks.

##### 24.2.4.1 Acceptability.

24.2.4.1.1 A pressure tank installed in accordance with NFPA 22 shall be an acceptable water supply source.

24.2.4.1.2 Pressure tanks shall be provided with an approved means for automatically maintaining the required air pressure.

24.2.4.1.3 Where a pressure tank is the sole water supply, an approved trouble alarm shall also be provided to indicate low air pressure and low water level with the alarm supplied from an electrical branch circuit independent of the air compressor.

24.2.4.1.4 Pressure tanks shall not be used to supply other than sprinklers and hand hose attached to sprinkler piping.

##### 24.2.4.2 Capacity.

24.2.4.2.1 In addition to the requirements of 24.1.2, the water capacity of a pressure tank shall include the extra capacity needed to fill dry pipe or preaction systems where installed.

24.2.4.2.2 The total volume shall be based on the water capacity plus the air capacity required by 24.2.4.3.

##### 24.2.4.3\* Water Level and Air Pressure.

24.2.4.3.1 Pressure tanks shall be kept with a sufficient supply of water to meet the demand of the fire protection system as calculated in Chapter 23 for the duration required by Chapter 11, Chapter 12, or Chapter 22.

24.2.4.3.2 The pressure shall be sufficient to push all of the water out of the tank while maintaining the necessary residual pressure (required by Chapter 23) at the top of the system.

24.2.5 **Gravity Tanks.** An elevated tank installed in accordance with NFPA 22 shall be an acceptable water supply source.

24.2.6 **Penstocks, Flumes, Rivers, or Lakes.** Water supply connections from penstocks, flumes, rivers, lakes, or reservoirs shall be arranged to avoid mud and sediment and shall be provided with approved double removable screens or approved strainers installed in an approved manner.

## Chapter 25 Systems Acceptance

25.1 **Approval of Sprinkler Systems and Private Fire Service Mains.** The installing contractor shall do the following:

- (1) Notify the authority having jurisdiction and the property owner or the property owner's authorized representative of the time and date testing will be performed
- (2) Perform all required acceptance tests (see Section 25.2)
- (3) Complete and sign the appropriate contractor's material and test certificate(s) (see Figure 25.1)
- (4) Remove all caps and straps prior to placing the sprinkler system in service

#### 25.2 Acceptance Requirements.

##### 25.2.1\* Hydrostatic Tests.

25.2.1.1 Unless permitted by 25.2.1.2 through 25.2.1.8, all piping and attached appurtenances subjected to system working pressure shall be hydrostatically tested at 200 psi (13.8 bar) and shall maintain that pressure without loss for 2 hours.

25.2.1.2 Portions of systems normally subjected to system working pressures in excess of 150 psi (10.4 bar) shall be tested as described in 25.2.1.1, at a pressure of 50 psi (3.5 bar) in excess of system working pressure.

25.2.1.3 Where cold weather will not permit testing with water, an interim air test shall be permitted to be conducted as described in 25.2.2. This provision shall not remove or replace the requirement for conducting the hydrostatic test as described in 25.2.1.1.

25.2.1.4 Modifications affecting 20 or fewer sprinklers shall not require testing in excess of system working pressure.

25.2.1.5 Where addition or modification is made to an existing system affecting more than 20 sprinklers, the new portion shall be isolated and tested at not less than 200 psi (13.8 bar) for 2 hours.

25.2.1.6 Modifications that cannot be isolated, such as relocated drops, shall not require testing in excess of system working pressure.

25.2.1.7 Loss shall be determined by a drop in gauge pressure or visual leakage.

25.2.1.8\* The test pressure shall be read from a gauge located at the low elevation point of the system or portion being tested. The pressures in piping at higher elevations shall be permitted to be less than 200 psi (13.8 bar) when accounting for elevation losses. Systems or portions of systems that can be isolated shall be permitted to be tested separately.

25.2.1.9\* Additives, corrosive chemicals such as sodium silicate, or derivatives of sodium silicate, brine, or similar acting chemicals shall not be used while hydrostatically testing systems or for stopping leaks.

**25.2.1.10** Piping between the exterior fire department connection and the check valve in the fire department inlet pipe shall be hydrostatically tested in the same manner as the balance of the system. After repair or replacement work affecting the fire department connection, the piping between the exterior and the check valve in the fire department inlet pipe shall be isolated and hydrostatically tested at 150 psi (10.3 bar).

**25.2.1.11** When systems are being hydrostatically tested, tests shall be permitted to be conducted with pendent or horizontal sidewall sprinklers or plugs installed in fittings. Any plugs shall be replaced with pendent or horizontal sidewall sprinklers after the test is completed.

**25.2.1.12** When deluge systems are being hydrostatically tested, plugs shall be installed in fittings and replaced with open sprinklers after the test is completed, or the operating elements of automatic sprinklers shall be removed after the test is completed.

**25.2.1.13** Provision shall be made for the proper disposal of water used for flushing or testing.

**25.2.1.14\* Test Blanks.**

**25.2.1.14.1** Test blanks shall have painted lugs protruding in such a way as to clearly indicate their presence.

**25.2.1.14.2** The test blanks shall be numbered, and the installing contractor shall have a recordkeeping method ensuring their removal after work is completed.

**25.2.1.15** When subject to hydrostatic test pressures, the clapper of a differential-type valve shall be held off its seat to prevent damaging the valve.

**25.2.2 Dry Pipe and Double Interlock Preaction System(s) Air Test.**

**25.2.2.1** In addition to the standard hydrostatic test, an air pressure leakage test at 40 psi (2.8 bar) shall be conducted for 24 hours. Any leakage that results in a loss of pressure in excess of 1½ psi (0.1 bar) for the 24 hours shall be corrected.

**25.2.2.2** Where systems are installed in spaces that are capable of being operated at temperatures below 32°F (0°C), air or nitrogen gas pressure leakage tests required in 25.2.2 shall be conducted at the lowest nominal temperature of the space.

**25.2.3 System Operational Tests.**

**25.2.3.1 Waterflow Devices.** Waterflow detecting devices including the associated alarm circuits shall be flow tested through the inspector's test connection and shall result in an audible alarm on the premises within 5 minutes after such flow begins and until such flow stops.

**25.2.3.2\* Dry Pipe Systems.**

**25.2.3.2.1** A working test of the dry pipe valve alone and with a quick-opening device, if installed, shall be made by opening the inspector's test connection.

**25.2.3.2.2\*** The test shall measure the time to trip the valve and the time for water to be discharged from the inspector's test connection. All times shall be measured from the time the inspector's test connection is completely opened.

**25.2.3.2.2.1\*** Dry systems calculated for water delivery in accordance with 7.2.3.6 shall be exempt from any specific delivery time requirement.

**25.2.3.2.3** The results shall be recorded using the contractor's material and test certificate for aboveground piping (see Figure 25.1).

**25.2.3.3 Deluge and Preaction Systems.**

**25.2.3.3.1** The automatic operation of a deluge or preaction valve shall be tested in accordance with the manufacturer's instructions.

**25.2.3.3.2** The manual and remote control operation, where present, shall also be tested.

**25.2.3.4 Main Drain Valves.**

**25.2.3.4.1** The main drain valve shall be opened and remain open until the system pressure stabilizes.

**25.2.3.4.2\*** The static and residual pressures shall be recorded on the contractor's material and test certificate (see Figure 25.1).

**25.2.3.5 Operating Test for Control Valves.** All control valves shall be fully closed and opened under system water pressure to ensure proper operation.

**25.2.4 Pressure-Reducing Valves.**

**25.2.4.1** Each pressure-reducing valve shall be tested upon completion of installation to ensure proper operation under flow and no-flow conditions.

**25.2.4.2** Testing shall verify that the device properly regulates outlet pressure at both maximum and normal inlet pressure conditions.

**25.2.4.3** The results of the flow test of each pressure-reducing valve shall be recorded on the contractor's material and test certificate (see Figure 25.1).

**25.2.4.4** The results shall include the static and residual inlet pressures, static and residual outlet pressures, and the flow rate.

**25.2.5 Backflow Prevention Assemblies.**

**25.2.5.1** The backflow prevention assembly shall be forward flow tested to ensure proper operation.

**25.2.5.2** The minimum flow rate shall be the system demand, including hose stream allowance where applicable.

**25.2.6 Exposure Systems.** Operating tests shall be made of exposure protection systems upon completion of the installation, where such tests do not risk water damage to the building on which they are installed or to adjacent buildings.

**25.3 Circulating Closed Loop Systems.**

**25.3.1** For sprinkler systems with non-fire protection connections, additional information shall be appended to the contractor's material and test certificate for aboveground piping shown in Figure 25.1 as follows:

- (1) Certification that all auxiliary devices, such as heat pumps, circulating pumps, heat exchangers, radiators, and luminaires, if a part of the system, have a pressure rating of at least 175 psi or 300 psi (12.1 bar or 20.7 bar) if exposed to pressures greater than 175 psi (12.1 bar).
- (2) All components of sprinkler system and auxiliary system have been pressure tested as a composite system in accordance with 25.2.2.

mains or risers shall be of the size required for the total number of sprinklers.

**23.5.1.6 Stair Towers.** Stair towers, or other construction with incomplete floors, if piped on independent risers, shall be treated as one area with reference to pipe sizes.

**23.5.2 Schedule for Light Hazard Occupancies.**

**23.5.2.1 Branch Lines.**

**23.5.2.1.1** Unless permitted by 23.5.2.1.2 or 23.5.2.1.3, branch lines shall not exceed eight sprinklers on either side of a cross main.

**23.5.2.1.2** Where more than eight sprinklers on a branch line are necessary, lines shall be permitted to be increased to nine sprinklers by making the two end lengths 1 in. (25.4 mm) and 1¼ in. (33 mm), respectively, and the sizes thereafter standard.

**23.5.2.1.3** Ten sprinklers shall be permitted to be placed on a branch line, making the two end lengths 1 in. (25.4 mm) and 1¼ in. (33 mm), respectively, and feeding the tenth sprinkler by a 2½ in. (64 mm) pipe.

**23.5.2.2 Pipe Sizes.**

**23.5.2.2.1** Pipe sizes shall be in accordance with Table 23.5.2.2.1.

**Table 23.5.2.2.1 Light Hazard Pipe Schedules**

Steel		Copper	
1 in.	2 sprinklers	1 in.	2 sprinklers
1¼ in.	3 sprinklers	1¼ in.	3 sprinklers
1½ in.	5 sprinklers	1½ in.	5 sprinklers
2 in.	10 sprinklers	2 in.	12 sprinklers
2½ in.	30 sprinklers	2½ in.	40 sprinklers
3 in.	60 sprinklers	3 in.	65 sprinklers
3½ in.	100 sprinklers	3½ in.	115 sprinklers
4 in.	See Section 8.2	4 in.	See Section 8.2

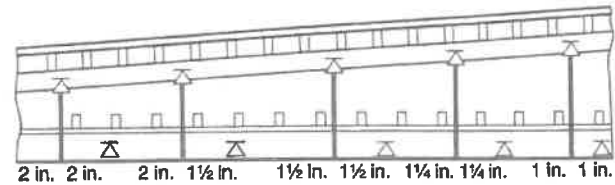
For SI units, 1 in. = 25.4 mm.

**23.5.2.2.2** Each area requiring more sprinklers than the number specified for 3½ in. (89 mm) pipe in Table 23.5.2.2.1 and without subdividing partitions (not necessarily fire walls) shall be supplied by mains or risers sized for ordinary hazard occupancies.

**23.5.2.3** Where sprinklers are installed above and below ceilings in accordance with Figure 23.5.2.3(a) through Figure 23.5.2.3(c), and such sprinklers are supplied from a common set of branch lines or separate branch lines from a common cross main, such branch lines shall not exceed eight sprinklers above and eight sprinklers below any ceiling on either side of the cross main.

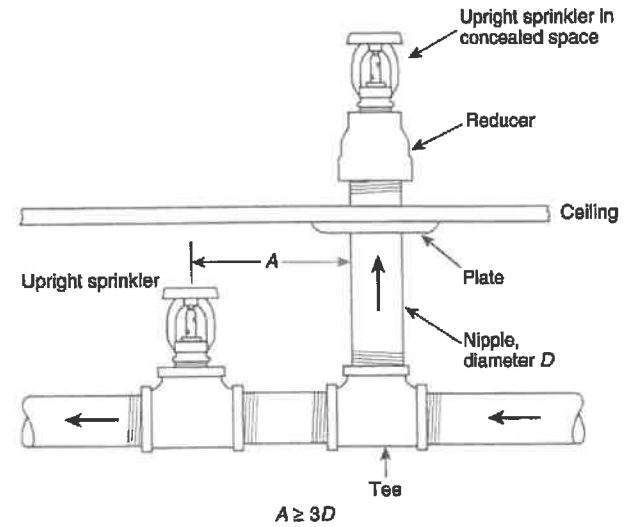
**23.5.2.4** Unless the requirements of 23.5.2.5 are met, pipe sizing up to and including 2½ in. (64 mm) shall be as shown in Table 23.5.2.4 utilizing the greatest number of sprinklers to be found on any two adjacent levels.

**23.5.2.5** Branch lines and cross mains supplying sprinklers installed entirely above or entirely below ceilings shall be sized in accordance with Table 23.5.2.2.1.



For SI units, 1 in. = 25.4 mm.

**FIGURE 23.5.2.3(a) Arrangement of Branch Lines Supplying Sprinklers Above and Below Ceiling.**



**FIGURE 23.5.2.3(b) Sprinkler on Riser Nipple from Branch Line in Lower Fire Area.**

**23.5.2.6\*** Where the total number of sprinklers above and below a ceiling exceeds the number specified in Table 23.5.2.2.1 for 2½ in. (64 mm) pipe, the pipe supplying such sprinklers shall be increased to 3 in. (76 mm) and sized thereafter according to the schedule shown in Table 23.5.2.2.1 for the number of sprinklers above or below a ceiling, whichever is larger.

**23.5.3 Schedule for Ordinary Hazard Occupancies.**

**23.5.3.1** Unless permitted by 23.5.3.2 or 23.5.3.3, branch lines shall not exceed eight sprinklers on either side of a cross main.

**23.5.3.2** Where more than eight sprinklers on a branch line are necessary, lines shall be permitted to be increased to nine sprinklers by making the two end lengths 1 in. (25.4 mm) and 1¼ in. (33 mm), respectively, and the sizes thereafter standard.

**23.5.3.3** Ten sprinklers shall be permitted to be placed on a branch line, making the two end lengths 1 in. (25.4 mm) and 1¼ in. (33 mm), respectively, and feeding the tenth sprinkler by a 2½ in. (64 mm) pipe.

**23.5.3.4** Pipe sizes shall be in accordance with Table 23.5.3.4.

**23.5.3.5** Where the distance between sprinklers on the branch line exceeds 12 ft (3.7 m) or the distance between the branch lines exceeds 12 ft (3.7 m), the number of sprinklers for a given pipe size shall be in accordance with Table 23.5.3.5.

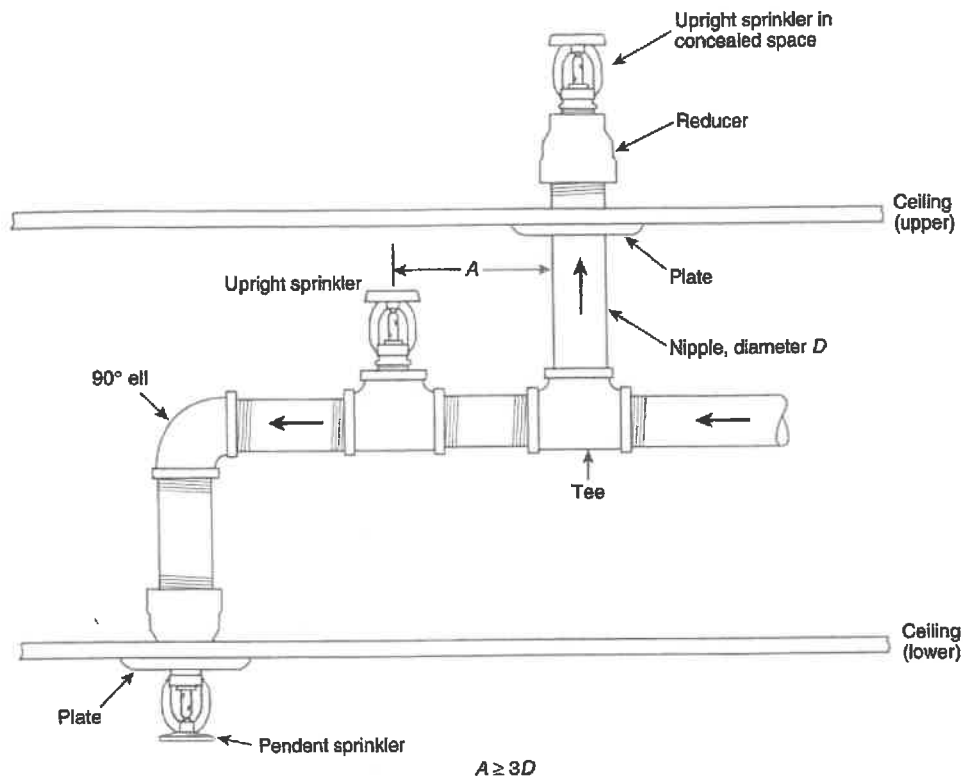


FIGURE 23.5.2.3(c) Arrangement of Branch Lines Supplying Sprinklers Above, Between, and Below Ceilings.

Table 23.5.2.4 Number of Sprinklers Above and Below Ceiling

Steel		Copper	
1 in.	2 sprinklers	1 in.	2 sprinklers
1 1/4 in.	4 sprinklers	1 1/4 in.	4 sprinklers
1 1/2 in.	7 sprinklers	1 1/2 in.	7 sprinklers
2 in.	15 sprinklers	2 in.	18 sprinklers
2 1/2 in.	50 sprinklers	2 1/2 in.	65 sprinklers

For SI units, 1 in. = 25.4 mm.

23.5.3.6 Where sprinklers are installed above and below ceilings and such sprinklers are supplied from a common set of branch lines or separate branch lines supplied by a common cross main, such branch lines shall not exceed eight sprinklers above and eight sprinklers below any ceiling on either side of the cross main.

23.5.3.7 Pipe sizing up to and including 3 in. (76 mm) shall be as shown in Table 23.5.3.7 in accordance with Figure 23.5.2.3(a), Figure 23.5.2.3(b), and Figure 23.5.2.3(c) utilizing the greatest number of sprinklers to be found on any two adjacent levels.

23.5.3.8 Branch lines and cross mains supplying sprinklers installed entirely above or entirely below ceilings shall be sized in accordance with Table 23.5.3.4 or Table 23.5.3.5.

Table 23.5.3.4 Ordinary Hazard Pipe Schedule

Steel		Copper	
1 in.	2 sprinklers	1 in.	2 sprinklers
1 1/4 in.	3 sprinklers	1 1/4 in.	3 sprinklers
1 1/2 in.	5 sprinklers	1 1/2 in.	5 sprinklers
2 in.	10 sprinklers	2 in.	12 sprinklers
2 1/2 in.	20 sprinklers	2 1/2 in.	25 sprinklers
3 in.	40 sprinklers	3 in.	45 sprinklers
3 1/2 in.	65 sprinklers	3 1/2 in.	75 sprinklers
4 in.	100 sprinklers	4 in.	115 sprinklers
5 in.	160 sprinklers	5 in.	180 sprinklers
6 in.	275 sprinklers	6 in.	300 sprinklers
8 in.	See Section 8.2	8 in.	See Section 8.2

For SI units, 1 in. = 25.4 mm.

Table 23.5.3.5 Number of Sprinklers — Greater Than 12 ft (3.7 m) Separations

Steel		Copper	
2 1/2 in.	15 sprinklers	2 1/2 in.	20 sprinklers
3 in.	30 sprinklers	3 in.	35 sprinklers
3 1/2 in.	60 sprinklers	3 1/2 in.	65 sprinklers

For SI units, 1 in. = 25.4 mm.

Note: For other pipe and tube sizes, see Table 22.5.3.4.

mains or risers shall be of the size required for the total number of sprinklers.

**23.5.1.6 Stair Towers.** Stair towers, or other construction with incomplete floors, if piped on independent risers, shall be treated as one area with reference to pipe sizes.

**23.5.2 Schedule for Light Hazard Occupancies.**

**23.5.2.1 Branch Lines.**

**23.5.2.1.1** Unless permitted by 23.5.2.1.2 or 23.5.2.1.3, branch lines shall not exceed eight sprinklers on either side of a cross main.

**23.5.2.1.2** Where more than eight sprinklers on a branch line are necessary, lines shall be permitted to be increased to nine sprinklers by making the two end lengths 1 in. (25.4 mm) and 1 1/4 in. (33 mm), respectively, and the sizes thereafter standard.

**23.5.2.1.3** Ten sprinklers shall be permitted to be placed on a branch line, making the two end lengths 1 in. (25.4 mm) and 1 1/4 in. (33 mm), respectively, and feeding the tenth sprinkler by a 2 1/2 in. (64 mm) pipe.

**23.5.2.2 Pipe Sizes.**

**23.5.2.2.1** Pipe sizes shall be in accordance with Table 23.5.2.2.1.

**Table 23.5.2.2.1 Light Hazard Pipe Schedules**

Steel		Copper	
1 in.	2 sprinklers	1 in.	2 sprinklers
1 1/4 in.	3 sprinklers	1 1/4 in.	3 sprinklers
1 1/2 in.	5 sprinklers	1 1/2 in.	5 sprinklers
2 in.	10 sprinklers	2 in.	12 sprinklers
2 1/2 in.	30 sprinklers	2 1/2 in.	40 sprinklers
3 in.	60 sprinklers	3 in.	65 sprinklers
3 1/2 in.	100 sprinklers	3 1/2 in.	115 sprinklers
4 in.	See Section 8.2	4 in.	See Section 8.2

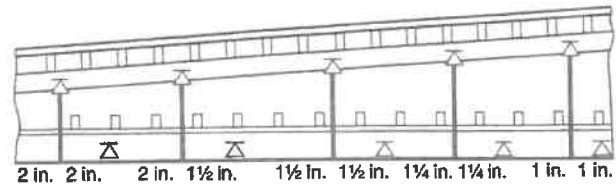
For SI units, 1 in. = 25.4 mm.

**23.5.2.2.2** Each area requiring more sprinklers than the number specified for 3 1/2 in. (89 mm) pipe in Table 23.5.2.2.1 and without subdividing partitions (not necessarily fire walls) shall be supplied by mains or risers sized for ordinary hazard occupancies.

**23.5.2.3** Where sprinklers are installed above and below ceilings in accordance with Figure 23.5.2.3(a) through Figure 23.5.2.3(c), and such sprinklers are supplied from a common set of branch lines or separate branch lines from a common cross main, such branch lines shall not exceed eight sprinklers above and eight sprinklers below any ceiling on either side of the cross main.

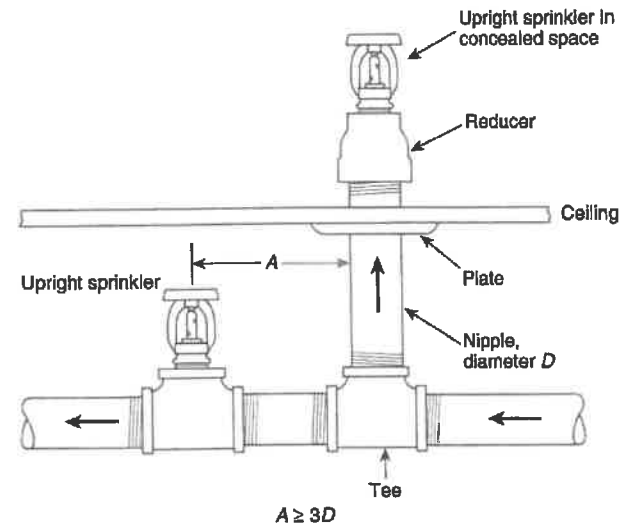
**23.5.2.4** Unless the requirements of 23.5.2.5 are met, pipe sizing up to and including 2 1/2 in. (64 mm) shall be as shown in Table 23.5.2.4 utilizing the greatest number of sprinklers to be found on any two adjacent levels.

**23.5.2.5** Branch lines and cross mains supplying sprinklers installed entirely above or entirely below ceilings shall be sized in accordance with Table 23.5.2.2.1.



For SI units, 1 in. = 25.4 mm.

**FIGURE 23.5.2.3(a) Arrangement of Branch Lines Supplying Sprinklers Above and Below Ceiling.**



**FIGURE 23.5.2.3(b) Sprinkler on Riser Nipple from Branch Line in Lower Fire Area.**

**23.5.2.6\*** Where the total number of sprinklers above and below a ceiling exceeds the number specified in Table 23.5.2.2.1 for 2 1/2 in. (64 mm) pipe, the pipe supplying such sprinklers shall be increased to 3 in. (76 mm) and sized thereafter according to the schedule shown in Table 23.5.2.2.1 for the number of sprinklers above or below a ceiling, whichever is larger.

**23.5.3 Schedule for Ordinary Hazard Occupancies.**

**23.5.3.1** Unless permitted by 23.5.3.2 or 23.5.3.3, branch lines shall not exceed eight sprinklers on either side of a cross main.

**23.5.3.2** Where more than eight sprinklers on a branch line are necessary, lines shall be permitted to be increased to nine sprinklers by making the two end lengths 1 in. (25.4 mm) and 1 1/4 in. (33 mm), respectively, and the sizes thereafter standard.

**23.5.3.3** Ten sprinklers shall be permitted to be placed on a branch line, making the two end lengths 1 in. (25.4 mm) and 1 1/4 in. (33 mm), respectively, and feeding the tenth sprinkler by a 2 1/2 in. (64 mm) pipe.

**23.5.3.4** Pipe sizes shall be in accordance with Table 23.5.3.4.

**23.5.3.5** Where the distance between sprinklers on the branch line exceeds 12 ft (3.7 m) or the distance between the branch lines exceeds 12 ft (3.7 m), the number of sprinklers for a given pipe size shall be in accordance with Table 23.5.3.5.

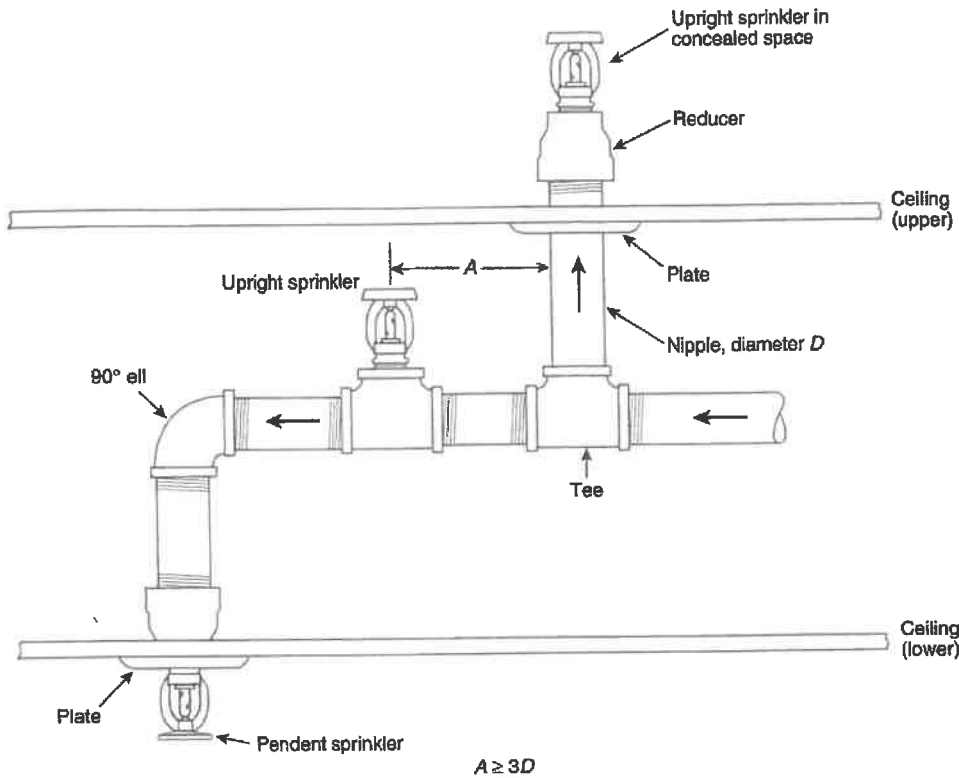


FIGURE 23.5.2.3(c) Arrangement of Branch Lines Supplying Sprinklers Above, Between, and Below Ceilings.

Table 23.5.2.4 Number of Sprinklers Above and Below Ceiling

Steel		Copper	
1 in.	2 sprinklers	1 in.	2 sprinklers
1¼ in.	4 sprinklers	1¼ in.	4 sprinklers
1½ in.	7 sprinklers	1½ in.	7 sprinklers
2 in.	15 sprinklers	2 in.	18 sprinklers
2½ in.	50 sprinklers	2½ in.	65 sprinklers

For SI units, 1 in. = 25.4 mm.

23.5.3.6 Where sprinklers are installed above and below ceilings and such sprinklers are supplied from a common set of branch lines or separate branch lines supplied by a common cross main, such branch lines shall not exceed eight sprinklers above and eight sprinklers below any ceiling on either side of the cross main.

23.5.3.7 Pipe sizing up to and including 3 in. (76 mm) shall be as shown in Table 23.5.3.7 in accordance with Figure 23.5.2.3(a), Figure 23.5.2.3(b), and Figure 23.5.2.3(c) utilizing the greatest number of sprinklers to be found on any two adjacent levels.

23.5.3.8 Branch lines and cross mains supplying sprinklers installed entirely above or entirely below ceilings shall be sized in accordance with Table 23.5.3.4 or Table 23.5.3.5.

Table 23.5.3.4 Ordinary Hazard Pipe Schedule

Steel		Copper	
1 in.	2 sprinklers	1 in.	2 sprinklers
1¼ in.	3 sprinklers	1¼ in.	3 sprinklers
1½ in.	5 sprinklers	1½ in.	5 sprinklers
2 in.	10 sprinklers	2 in.	12 sprinklers
2½ in.	20 sprinklers	2½ in.	25 sprinklers
3 in.	40 sprinklers	3 in.	45 sprinklers
3½ in.	65 sprinklers	3½ in.	75 sprinklers
4 in.	100 sprinklers	4 in.	115 sprinklers
5 in.	160 sprinklers	5 in.	180 sprinklers
6 in.	275 sprinklers	6 in.	300 sprinklers
8 in.	See Section 8.2	8 in.	See Section 8.2

For SI units, 1 in. = 25.4 mm.

Table 23.5.3.5 Number of Sprinklers — Greater Than 12 ft (3.7 m) Separations

Steel		Copper	
2½ in.	15 sprinklers	2½ in.	20 sprinklers
3 in.	30 sprinklers	3 in.	35 sprinklers
3½ in.	60 sprinklers	3½ in.	65 sprinklers

For SI units, 1 in. = 25.4 mm.

Note: For other pipe and tube sizes, see Table 22.5.3.4.

NFPA 120, *Standard for Fire Prevention and Control in Coal Mines*, 2010 edition.

NFPA 122, *Standard for Fire Prevention and Control in Metal/Nonmetal Mining and Metal Mineral Processing Facilities*, 2010 edition.

NFPA 130, *Standard for Fixed Guideway Transit and Passenger Rail Systems*, 2010 edition.

NFPA 140, *Standard on Motion Picture and Television Production Studio Soundstages, Approved Production Facilities, and Production Locations*, 2008 edition.

NFPA 150, *Standard on Fire and Life Safety in Animal Housing Facilities*, 2013 edition.

NFPA 214, *Standard on Water-Cooling Towers*, 2011 edition.

NFPA 307, *Standard for the Construction and Fire Protection of Marine Terminals, Piers, and Wharves*, 2011 edition.

NFPA 318, *Standard for the Protection of Semiconductor Fabrication Facilities*, 2012 edition.

NFPA 400, *Hazardous Materials Code*, 2013 edition.

NFPA 415, *Standard on Airport Terminal Buildings, Fueling Ramp Drainage, and Loading Walkways*, 2013 edition.

NFPA 423, *Standard for Construction and Protection of Aircraft Engine Test Facilities*, 2010 edition.

NFPA 804, *Standard for Fire Protection for Advanced Light Water Reactor Electric Generating Plants*, 2010 edition.

NFPA 805, *Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants*, 2010 edition.

NFPA 851, *Recommended Practice for Fire Protection for Hydroelectric Generating Plants*, 2010 edition.

NFPA 909, *Code for the Protection of Cultural Resource Properties — Museums, Libraries, and Places of Worship*, 2010 edition.

### Chapter 3 Definitions

**3.1 General.** The definitions contained in this chapter shall apply to the terms used in this standard. Where terms are not defined in this chapter or within another chapter, they shall be defined using their ordinarily accepted meanings within the context in which they are used. *Merriam-Webster's Collegiate Dictionary*, 11th edition, shall be the source for the ordinarily accepted meaning.

#### 3.2 NFPA Official Definitions.

**3.2.1\* Approved.** Acceptable to the authority having jurisdiction.

**3.2.2\* Authority Having Jurisdiction (AHJ).** An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

**3.2.3\* Listed.** Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been tested and found suitable for a specified purpose.

**3.2.4 Shall.** Indicates a mandatory requirement.

**3.2.5 Should.** Indicates a recommendation or that which is advised but not required.

**3.2.6 Standard.** A document, the main text of which contains only mandatory provisions using the word "shall" to indicate

requirements and which is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions are not to be considered a part of the requirements of a standard and shall be located in an appendix, annex, footnote, informational note, or other means as permitted in the *Manual of Style for NFPA Technical Committee Documents*.

#### 3.3 General Definitions.

**3.3.1 Automatic Sprinkler.** A fire suppression or control device that operates automatically when its heat-activated element is heated to its thermal rating or above, allowing water to discharge over a specified area.

**3.3.2\* Bathroom.** Within a dwelling unit, any room or compartment dedicated to personal hygiene, containing a toilet, sink, or bathing capability such as a shower or tub.

**3.3.3 Ceiling Height.** The distance between the floor and the underside of the ceiling above (or roof deck) within the area.

**3.3.4\* Ceiling Pocket.** An architectural ceiling feature that consists of a bounded area of ceiling located at a higher elevation than the attached lower ceiling.

#### 3.3.5 Ceiling Types.

**3.3.5.1 Flat Ceiling.** A continuous ceiling in a single plane.

**3.3.5.2 Horizontal Ceiling.** A ceiling with a slope not exceeding 2 in 12.

**3.3.5.3 Sloped Ceiling.** A ceiling with a slope exceeding 2 in 12.

**3.3.5.4 Smooth Ceiling.** A continuous ceiling free from significant irregularities, lumps, or indentations.

**3.3.6 Compartment.** A space completely enclosed by walls and a ceiling. Each wall in the compartment is permitted to have openings to an adjoining space if the openings have a minimum lintel depth of 8 in. (200 mm) from the ceiling and the total width of the openings in each wall does not exceed 8 ft (2.4 m). A single opening of 36 in. (900 mm) or less in width without a lintel is permitted when there are no other openings to adjoining spaces.

**3.3.7\* Control Valve.** A valve controlling flow to water-based fire protection systems.

**3.3.8\* Draft Curtain.** A continuous material protruding downward from the ceiling to create a reservoir for collecting smoke and heat.

**3.3.9 Drop-Out Ceiling.** A suspended ceiling system, which is installed below the sprinklers, with listed translucent or opaque panels that are heat sensitive and fall from their setting when exposed to heat.

**3.3.10 Dwelling Unit (for sprinkler system installations).** One or more rooms arranged for the use of one or more individuals living together, as in a single housekeeping unit normally having cooking, living, sanitary, and sleeping facilities that include, but are not limited to, hotel rooms, dormitory rooms, apartments, condominiums, sleeping rooms in nursing homes, and similar living units.

**3.3.11 Fire Control.** Limiting the size of a fire by distribution of water so as to decrease the heat release rate and pre-wet adjacent combustibles, while controlling ceiling gas temperatures to avoid structural damage.

**3.3.12 Fire Suppression.** Sharply reducing the heat release rate of a fire and preventing its regrowth by means of direct and sufficient application of water through the fire plume to the burning fuel surface.

**3.3.13 Fuel-Fired Heating Unit.** An appliance that produces heat by burning fuel.

**3.3.14 High Volume Low Speed Fan.** A ceiling fan that is approximately 6 ft to 24 ft in diameter with a rotational speed of approximately 30 to 70 revolutions per minute.

**3.3.15 Hydraulically Designed System.** A calculated sprinkler system in which pipe sizes are selected on a pressure loss basis to provide a prescribed water density, in gallons per minute per square foot (mm/min), or a prescribed minimum discharge pressure or flow per sprinkler, distributed with a reasonable degree of uniformity over a specified area.

**3.3.16\* Limited-Combustible (Material).** Refers to a building construction material not complying with the definition of noncombustible material that, in the form in which it is used, has a potential heat value not exceeding 3500 Btu/lb (8141 kJ/kg), where tested in accordance with NFPA 259, and includes either of the following: (1) materials having a structural base of noncombustible material, with a surfacing not exceeding a thickness of 1/8 in. (3.2 mm) that has a flame spread index not greater than 50; or (2) materials, in the form and thickness used, having neither a flame spread index greater than 25 nor evidence of continued progressive combustion, and of such composition that surfaces that would be exposed by cutting through the material on any plane would have neither a flame spread index greater than 25 nor evidence of continued progressive combustion, when tested in accordance with ASTM E 84, *Standard Test Method of Surface Burning Characteristics of Building Materials*, or ANSI/UL 723, *Standard Test Method of Surface Burning Characteristics of Building Materials*.

**3.3.17 Noncombustible Material.** A material that, in the form in which it is used and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapors, when subjected to fire or heat; materials that are reported as passing ASTM E 136, *Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C*, shall be considered noncombustible materials.

### 3.3.18 Obstruction.

**3.3.18.1 Continuous Obstruction.** An obstruction located at or below the level of sprinkler deflectors that affect the discharge pattern of two or more adjacent sprinklers.

**3.3.18.2 Noncontinuous Obstruction.** An obstruction at or below the level of the sprinkler deflector that affects the discharge pattern of a single sprinkler.

**3.3.19\* Raw Water Source.** A water supply that has not been treated and could contain foreign material that could enter the sprinkler system.

**3.3.20 Shop-Welded.** As used in this standard, *shop* in the term *shop-welded* means either (1) a sprinkler contractor's or fabricator's premise or (2) an area specifically designed or authorized for welding, such as a detached outside location, maintenance shop, or other area (either temporary or permanent) of noncombustible or fire-resistive construction free of combustible and flammable contents and suitably segregated from adjacent areas.

**3.3.21 Small Room.** A compartment of light hazard occupancy classification having unobstructed construction and a floor area not exceeding 800 ft<sup>2</sup> (74.3 m<sup>2</sup>).

**3.3.22\* Sprinkler System.** A system that consists of an integrated network of piping designed in accordance with fire protection engineering standards that includes a water supply source, a water control valve, a waterflow alarm, and a drain and is commonly activated by heat from a fire, discharging water over the fire area. The portion of the sprinkler system above ground is a network of specifically sized or hydraulically designed piping installed in a building, structure, or area, generally overhead, and to which sprinklers are attached in a systematic pattern. The system is commonly activated by heat from a fire and discharges water over the fire area.

**3.3.23 System Working Pressure.** The maximum anticipated static (nonflowing) or flowing pressure applied to sprinkler system components exclusive of surge pressures and exclusive of pressure from the fire department connection.

**3.3.24 Thermal Barrier.** A material that limits the average temperature rise of the unexposed surface to not more than 250°F (139°C) above ambient for a specified fire exposure duration using the standard time-temperature curve of ASTM E 119, *Standard Test Methods for Fire Tests of Building Construction and Materials*.

## 3.4 Sprinkler System Type Definitions.

**3.4.1 Antifreeze Sprinkler System.** A wet pipe system using automatic sprinklers that contains a liquid solution to prevent freezing of the system, intended to discharge the solution upon sprinkler operation, followed immediately by water from a water supply.

**3.4.1.1 Premixed Antifreeze Solution.** A mixture of an antifreeze material with water that is prepared and factory-mixed by the manufacturer with a quality control procedure in place that ensures that the antifreeze solution remains homogeneous and that the concentration is as specified.

**3.4.2 Circulating Closed-Loop Sprinkler System.** A wet pipe sprinkler system having non-fire protection connections to automatic sprinkler systems in a closed-loop piping arrangement for the purpose of utilizing sprinkler piping to conduct water for heating or cooling, where water is not removed or used from the system but only circulated through the piping system.

**3.4.3 Combined Dry Pipe-Reaction Sprinkler System.** A sprinkler system employing automatic sprinklers attached to a piping system containing air under pressure with a supplemental detection system installed in the same areas as the sprinklers. Operation of the detection system actuates tripping devices that open dry pipe valves simultaneously and without loss of air pressure in the system. The detection system also serves as an automatic fire alarm system.

**3.4.4 Dehaze Sprinkler System.** A sprinkler system employing open sprinklers or nozzles that are attached to a piping system that is connected to a water supply through a valve that is opened by the operation of a detection system installed in the same areas as the sprinklers or the nozzles. When this valve opens, water flows into the piping system and discharges from all sprinklers or nozzles attached thereto.

**3.4.5 Dry Pipe Sprinkler System.** A sprinkler system employing automatic sprinklers that are attached to a piping system containing air or nitrogen under pressure, the release of which (as from



the opening of a sprinkler) permits the water pressure to open a valve known as a dry pipe valve, and the water then flows into the piping system and out the opened sprinklers.

**3.4.6\* Gridded Sprinkler System.** A sprinkler system in which parallel cross mains are connected by multiple branch lines, causing an operating sprinkler to receive water from both ends of its branch line while other branch lines help transfer water between cross mains.

**3.4.7\* Looped Sprinkler System.** A sprinkler system in which multiple cross mains are tied together so as to provide more than one path for water to flow to an operating sprinkler and branch lines are not tied together.

**3.4.8 Multicycle System.** A type of sprinkler system capable of repeated on-off flow cycles in response to heat.

**3.4.9 Pipe Schedule System.** A sprinkler system in which the pipe sizing is selected from a schedule that is determined by the occupancy classification and in which a given number of sprinklers are allowed to be supplied from specific sizes of pipe.

**3.4.10\* Preaction Sprinkler System.** A sprinkler system employing automatic sprinklers that are attached to a piping system that contains air that might or might not be under pressure, with a supplemental detection system installed in the same areas as the sprinklers.

**3.4.11 Wet Pipe Sprinkler System.** A sprinkler 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 heat from a fire.

### 3.5\* System Component Definitions.

**3.5.1 Air Receiver.** A chamber, compatible with an air compressor, that can store air under pressure that is higher in pressure than that in the dry pipe or preaction system piping.

**3.5.2 Air Reservoir.** A chamber that can store air at the same pressure that is in the wet pipe system piping.

**3.5.3 Arm-Over.** A horizontal pipe that extends from the branch line to a single sprinkler or a sprinkler above and below a ceiling.

**3.5.4 Branch Lines.** The pipes supplying sprinklers, either directly or through sprigs, drops, return bends, or arm-overs.

**3.5.5 Cross Mains.** The pipes supplying the branch lines, either directly or through riser nipples.

**3.5.6 Feed Mains.** The pipes supplying cross mains, either directly or through risers.

**3.5.7 Flexible Listed Pipe Coupling.** A listed coupling or fitting that allows axial displacement, rotation, and at least 1 degree of angular movement of the pipe without inducing harm on the pipe. For pipe diameters of 8 in. (203.2 mm) and larger, the angular movement shall be permitted to be less than 1 degree but not less than 0.5 degree.

**3.5.8 Riser Nipple.** Vertical piece of pipe between the main and branch line.

**3.5.9 Risers.** The vertical supply pipes in a sprinkler system.

**3.5.10 Sprig.** A pipe that rises vertically and supplies a single sprinkler.

**3.5.11 Supervisory Device.** A device arranged to supervise the operative condition of automatic sprinkler systems.

**3.5.12 System Riser.** The aboveground horizontal or vertical pipe between the water supply and the mains (cross or feed) that contains a control valve (either directly or within its supply pipe), pressure gauge, drain, and a waterflow alarm device.

**3.5.13 Waterflow Alarm Device.** An attachment to the sprinkler system that detects a predetermined water flow and is connected to a fire alarm system to initiate an alarm condition or is used to mechanically or electrically initiate a fire pump or local audible or visual alarm.

### 3.6 Sprinkler Definitions.

**3.6.1\* General Sprinkler Characteristics.** The following are characteristics of a sprinkler that define its ability to control or extinguish a fire. (1) Thermal sensitivity. A measure of the rapidity with which the thermal element operates as installed in a specific sprinkler or sprinkler assembly. One measure of thermal sensitivity is the response time index (RTI) as measured under standardized test conditions. (a) Sprinklers defined as fast response have a thermal element with an RTI of 50 (meters-seconds)<sup>1/2</sup> or less. (b) Sprinklers defined as standard response have a thermal element with an RTI of 80 (meters-seconds)<sup>1/2</sup> or more. (2) Temperature rating. (3) K-factor (see Chapter 6). (4) Installation orientation (see 3.6.2). (5) Water distribution characteristics (i.e., application rate, wall wetting). (6) Special service conditions (see 3.6.3).

**3.6.2 Installation Orientation.** The following sprinklers are defined according to orientation.

**3.6.2.1 Concealed Sprinkler.** A recessed sprinkler with cover plate.

**3.6.2.2 Flush Sprinkler.** A sprinkler in which all or part of the body, including the shank thread, is mounted above the lower plane of the ceiling.

**3.6.2.3 Pendant Sprinkler.** A sprinkler designed to be installed in such a way that the water stream is directed downward against the deflector.

**3.6.2.4 Recessed Sprinkler.** A sprinkler in which all or part of the body, other than the shank thread, is mounted within a recessed housing.

**3.6.2.5 Sidewall Sprinkler.** A sprinkler having special deflectors that are designed to discharge most of the water away from the nearby wall in a pattern resembling one-quarter of a sphere, with a small portion of the discharge directed at the wall behind the sprinkler.

**3.6.2.6 Upright Sprinkler.** A sprinkler designed to be installed in such a way that the water spray is directed upwards against the deflector.

**3.6.3 Special Service Conditions.** The following sprinklers are defined according to special application or environment.

**3.6.3.1 Corrosion-Resistant Sprinkler.** A sprinkler fabricated with corrosion-resistant material, or with special coatings or platings, to be used in an atmosphere that would normally corrode sprinklers.

**3.6.3.2\* Dry Sprinkler.** A sprinkler secured in an extension nipple that has a seal at the inlet end to prevent water from entering the nipple until the sprinkler operates.

**3.6.3.3 Institutional Sprinkler.** A sprinkler specially designed for resistance to load-bearing purposes and with components not readily converted for use as weapons.

**3.6.3.4 Intermediate Level Sprinkler/Rack Storage Sprinkler.** A sprinkler equipped with integral shields to protect its operating elements from the discharge of sprinklers installed at higher elevations.

**3.6.3.5 Ornamental/Decorative Sprinkler.** A sprinkler that has been painted or plated by the manufacturer.

**3.6.3.6 Pilot Line Detector.** A standard spray sprinkler or thermostatic fixed-temperature release device used as a detector to pneumatically or hydraulically release the main valve, controlling the flow of water into a fire protection system.

**3.6.4 Sprinkler Types.** The following sprinklers are defined according to design and performance characteristics.

**3.6.4.1\* Control Mode Specific Application (CMSA) Sprinkler.** A type of spray sprinkler that is capable of producing characteristic large water droplets and that is listed for its capability to provide fire control of specific high-challenge fire hazards.

**3.6.4.2\* Early Suppression Fast-Response (ESFR) Sprinkler.** A type of fast-response sprinkler that has a thermal element with an RTI of 50 (meters-seconds)<sup>1/2</sup> or less and is listed for its capability to provide fire suppression of specific high-challenge fire hazards.

**3.6.4.3 Extended Coverage Sprinkler.** A type of spray sprinkler with maximum coverage areas as specified in Sections 8.8 and 8.9 of this standard.

**3.6.4.4 Nozzles.** A device for use in applications requiring special water discharge patterns, directional spray, or other unusual discharge characteristics.

**3.6.4.5 Old-Style/Conventional Sprinkler.** A sprinkler that directs from 40 percent to 60 percent of the total water initially in a downward direction and that is designed to be installed with the deflector either upright or pendent.

**3.6.4.6 Open Sprinkler.** A sprinkler that does not have actuators or heat-responsive elements.

**3.6.4.7\* Quick-Response (QR) Sprinkler.** A type of spray sprinkler that has a thermal element with an RTI of 50 (meter-seconds)<sup>1/2</sup> or less and is listed as a quick-response sprinkler for its intended use.

**3.6.4.7.1\* Quick-Response Early Suppression (QRES) Sprinkler.** A type of quick-response sprinkler that has a thermal element with an RTI of 50 (meter-seconds)<sup>1/2</sup> or less and is listed for its capability to provide fire suppression of specific fire hazards.

**3.6.4.7.2 Quick-Response Extended Coverage Sprinkler.** A type of quick-response sprinkler that has a thermal element with an RTI of 50 (meter-seconds)<sup>1/2</sup> or less and complies with the extended protection areas defined in Chapter 8.

**3.6.4.8 Residential Sprinkler.** A type of fast-response sprinkler having a thermal element with an RTI of 50 (meters-seconds)<sup>1/2</sup> or less, that has been specifically investigated for its ability to enhance survivability in the room of fire origin, and that is listed for use in the protection of dwelling units.

**3.6.4.9 Special Sprinkler.** A sprinkler that has been tested and listed as prescribed in 8.4.8.

**3.6.4.10 Spray Sprinkler.** A type of sprinkler listed for its capability to provide fire control for a wide range of fire hazards.

**3.6.4.10.1 Standard Spray Sprinkler.** A spray sprinkler with maximum coverage areas as specified in Sections 8.6 and 8.7 of this standard.

### 3.7 Construction Definitions.

**3.7.1\* Obstructed Construction.** Panel construction and other construction where beams, trusses, or other members impede heat flow or water distribution in a manner that materially affects the ability of sprinklers to control or suppress a fire.

**3.7.2\* Unobstructed Construction.** Construction where beams, trusses, or other members do not impede heat flow or water distribution in a manner that materially affects the ability of sprinklers to control or suppress a fire. Unobstructed construction has horizontal structural members that are not solid, where the openings are at least 70 percent of the cross-section area and the depth of the member does not exceed the least dimension of the openings, or all construction types where the spacing of structural members exceeds 7½ ft (2.3 m) on center.

### 3.8 Private Water Supply Piping Definitions.

#### 3.8.1 General Definitions from NFPA 24.

**3.8.1.1 Appurtenance.** An accessory or attachment that enables the private fire service main to perform its intended function. [24, 2013]

**3.8.1.2 Corrosion-Resistant Piping.** Piping that has the property of being able to withstand deterioration of its surface or its properties when exposed to its environment. [24, 2013]

**3.8.1.3 Corrosion-Retardant Material.** A lining or coating material that when applied to piping or appurtenances has the property of reducing or slowing the deterioration of the object's surface or properties when exposed to its environment. [24, 2013]

**3.8.1.4 Fire Department Connection.** A connection through which the fire department can pump supplemental water into the sprinkler system, standpipe, or other system, furnishing water for fire extinguishment to supplement existing water supplies. [24, 2013]

**3.8.1.5 Fire Pump.** A pump that is a provider of liquid flow and pressure dedicated to fire protection. [20, 2013]

**3.8.1.6 Hose House.** An enclosure located over or adjacent to a hydrant or other water supply designed to contain the necessary hose nozzles, hose wrenches, gaskets, and spanners to be used in fire fighting in conjunction with and to provide aid to the local fire department. [24, 2013]

**3.8.1.7 Hydrant Butt.** The hose connection outlet of a hydrant. [24, 2013]

**3.8.1.8 Hydraulically Calculated Water Demand Flow Rate.** The waterflow rate for a system or hose stream that has been calculated using accepted engineering practices. [24, 2013]

#### 3.8.1.9 Pressure.

**3.8.1.9.1 Residual Pressure.** The pressure that exists in the distribution system, measured at the residual hydrant at the time the flow readings are taken at the flow hydrants. [24, 2013]

**3.8.1.9.2 Static Pressure.** The pressure that exists at a given point under normal distribution system conditions measured at the residual hydrant with no hydrants flowing. [24, 2013]

**3.8.1.10 Pressure Regulating Device.** A device designed for the purpose of reducing, regulating, controlling, or restricting water pressure. [24, 2013]

**3.8.1.11\* Private Fire Service Main.** Private fire service main, as used in this standard, is that pipe and its appurtenances on private property (1) between a source of water and the base of the system riser for water-based fire protection systems, (2) between a source of water and inlets to foam-making systems, (3) between a source of water and the base elbow of private hydrants or monitor nozzles, and (4) used as fire pump suction and discharge piping, (5) beginning at the inlet side of the check valve on a gravity or pressure tank. [24, 2013]

**3.8.1.12 Pumper Outlet.** The hydrant outlet intended for use by fire departments for taking supply from the hydrant for pumpers. [24, 2013]

**3.8.1.13 Rated Capacity.** The flow available from a hydrant at the designated residual pressure (rated pressure) either measured or calculated. [24, 2013]

**3.8.1.14 Test.**

**3.8.1.14.1 Flow Test.** A test performed by the flow and measurement of water from one hydrant and the static and residual pressures from an adjacent hydrant for the purpose of determining the available water supply at that location. [24, 2013]

**3.8.1.14.2 Flushing Test.** A test of a piping system using high velocity flows to remove debris from the piping system prior to it being placed in service. [24, 2013]

**3.8.1.14.3 Hydrostatic Test.** A test of a closed piping system and its attached appurtenances consisting of subjecting the piping to an increased internal pressure for a specified period of duration to verify system integrity and leak rates. [24, 2013]

**3.8.1.15 Valve.**

**3.8.1.15.1 Check Valve.** A valve that allows flow in one direction only. [24, 2013]

**3.8.1.15.2 Indicating Valve.** A valve that has components that show if the valve is open or closed. Examples are outside screw and yoke (OS&Y) gate valves and underground gate valves with indicator posts. [24, 2013]

### 3.8.2 Hydrant Definitions from NFPA 24.

**3.8.2.1 Hydrant.** An exterior valved connection to a water supply system that provides hose connections. [24, 2013]

**3.8.2.1.1 Dry Barrel Hydrant.** This is the most common type of hydrant; it has a control valve below the frost line between the footpiece and the barrel. [24, 2013]

**3.8.2.1.2 Flow Hydrant.** The hydrant that is used for the flow and flow measurement of water during a flow test. [24, 2013]

**3.8.2.1.3 Private Fire Hydrant.** A valved connection on a water supply system having one or more outlets and that is used to supply hose and fire department pumpers with water on private property. [24, 2013]

**3.8.2.1.4 Public Hydrant.** A valved connection on a water supply system having one or more outlets and that is used to supply hose and fire department pumpers with water. [24, 2013]

**3.8.2.1.5 Residual Hydrant.** The hydrant that is used for measuring static and residual pressures during a flow test. [24, 2013]

**3.8.2.1.6 Wet Barrel Hydrant.** A type of hydrant that sometimes is used where there is no danger of freezing weather. Each outlet on a wet barrel hydrant is provided with a valved outlet threaded for fire hose. [24, 2013]

### 3.9 Storage Definitions.

#### 3.9.1\* General.

**3.9.1.1\* Available Height for Storage.** The maximum height at which commodities can be stored above the floor and still maintain necessary clearance from structural members and the required clearance below sprinklers.

**3.9.1.2 Cartoned.** A method of storage consisting of corrugated cardboard or paperboard containers fully enclosing the commodity.

**3.9.1.3\* Carton Records Storage.** A Class III commodity consisting predominantly of paper records in cardboard cartons.

**3.9.1.4 Catwalk.** For the purposes of carton records storage, a storage aid consisting of either open metal grating or solid horizontal barriers supported from a rack storage system that is utilized as a walkway for access to storage at elevated levels. Catwalks are accessed using stairs and are not separate floors of a building.

**3.9.1.5 Clearance to Ceiling.** The distance from the top of storage to the ceiling above.

**3.9.1.6 Commodity.** The combination of products, packing material, and container that determines commodity classification.

**3.9.1.7 Compact Storage.** Storage on solid shelves not exceeding 36 in. (0.9 m) in total depth, arranged as part of a compact storage module, with no more than 30 in. (0.76 m) between shelves vertically and with no internal vertical flue spaces other than those between individual shelving sections.

**3.9.1.8 Compact Storage Module.** A type of shelving unit consisting of compact storage whereby the units move to allow for storage to be pushed together creating a storage unit with no flues or minimal spaces between units. Aisles are created by moving the shelving unit. Compact storage modules can be manual or electric in operation.

**3.9.1.9\* Compartmented.** The rigid separation of the products in a container by dividers that form a stable unit under fire conditions.

**3.9.1.10\* Container (Shipping, Master, or Outer Container).** A receptacle strong enough, by reason of material, design, and construction, to be shipped safely without further packaging.

**3.9.1.11\* Conventional Pallets.** A material-handling aid designed to support a unit load with openings to provide access for material-handling devices. (See Figure A.3.9.1.11.)

**3.9.1.12\* Encapsulation.** A method of packaging that either consists of a plastic sheet completely enclosing the sides and top of a pallet load containing a combustible commodity, a combustible package, or a group of combustible commodities or combustible packages, or consists of combustible commodities individually wrapped in plastic sheeting and stored exposed in a pallet load.