

NFPA® 13D

Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes

2025 Edition



NFPA, 1 Batterymarch Park, Quincy, MA 02269-9101
An International Codes and Standards Organization

Documents
Document Sharing Hub

IMPORTANT NOTICES AND DISCLAIMERS CONCERNING NFPA® STANDARDS

NFPA® codes, standards, recommended practices, and guides (“NFPA Standards”), of which the document contained herein is one, are developed through a consensus standards development process approved by the American National Standards Institute. This process brings together volunteers representing varied viewpoints and interests to achieve consensus on fire and other safety issues. While the NFPA administers the process and establishes rules to promote fairness in the development of consensus, it does not independently test, evaluate, or verify the accuracy of any information or the soundness of any judgments contained in NFPA Standards.

The NFPA disclaims liability for any personal injury, property, or other damages of any nature whatsoever, whether special, indirect, consequential or compensatory, directly or indirectly resulting from the publication, use of, or reliance on NFPA Standards. The NFPA also makes no guaranty or warranty as to the accuracy or completeness of any information published herein.

In issuing and making NFPA Standards available, the NFPA is not undertaking to render professional or other services for or on behalf of any person or entity. Nor is the NFPA undertaking to perform any duty owed by any person or entity to someone else. Anyone using this document should rely on his or her own independent judgment or, as appropriate, seek the advice of a competent professional in determining the exercise of reasonable care in any given circumstances.

The NFPA has no power, nor does it undertake, to police or enforce compliance with the contents of NFPA Standards. Nor does the NFPA list, certify, test, or inspect products, designs, or installations for compliance with this document. Any certification or other statement of compliance with the requirements of this document shall not be attributable to the NFPA and is solely the responsibility of the certifier or maker of the statement.

REVISION SYMBOLS IDENTIFYING CHANGES FROM THE PREVIOUS EDITION

Text revisions are shaded. A **Δ** before a section number indicates that words within that section were deleted and a **Δ** to the left of a table or figure number indicates a revision to an existing table or figure. When a chapter was heavily revised, the entire chapter is marked throughout with the **Δ** symbol. Where one or more sections were deleted, a **•** is placed between the remaining sections. Chapters, annexes, sections, figures, and tables that are new are indicated with an **N**.

Note that these indicators are a guide. Rearrangement of sections may not be captured in the markup, but users can view complete revision details in the First and Second Draft Reports located in the archived revision information section of each code at www.nfpa.org/docinfo. Any subsequent changes from the NFPA Technical Meeting, Tentative Interim Amendments, and Errata are also located there.

REMINDER: UPDATING OF NFPA STANDARDS

Users of NFPA codes, standards, recommended practices, and guides (“NFPA Standards”) should be aware that these documents may be superseded at any time by the issuance of a new edition, may be amended with the issuance of Tentative Interim Amendments (TIAs), or be corrected by Errata. It is intended that through regular revisions and amendments, participants in the NFPA standards development process consider the then-current and available information on incidents, materials, technologies, innovations, and methods as these develop over time and that NFPA Standards reflect this consideration. Therefore, any previous edition of this document no longer represents the current NFPA Standard on the subject matter addressed. NFPA encourages the use of the most current edition of any NFPA Standard [as it may be amended by TIA(s) or Errata] to take advantage of current experience and understanding. An official NFPA Standard at any point in time consists of the current edition of the document, including any issued TIAs and Errata then in effect.

To determine whether an NFPA Standard has been amended through the issuance of TIAs or corrected by Errata, visit the “Codes & Standards” section at www.nfpa.org.

ADDITIONAL IMPORTANT NOTICES AND DISCLAIMERS CONCERNING NFPA® STANDARDS

Updating of NFPA Standards

Users of NFPA codes, standards, recommended practices, and guides (“NFPA Standards”) should be aware that these documents may be superseded at any time by the issuance of a new edition, may be amended with the issuance of Tentative Interim Amendments (TIAs), or be corrected by Errata. It is intended that through regular revisions and amendments, participants in the NFPA standards development process consider the then-current and available information on incidents, materials, technologies, innovations, and methods as these develop over time and that NFPA Standards reflect this consideration. Therefore, any previous edition of this document no longer represents the current NFPA Standard on the subject matter addressed. NFPA encourages the use of the most current edition of any NFPA Standard [as it may be amended by TIA(s) or Errata] to take advantage of current experience and understanding. An official NFPA Standard at any point in time consists of the current edition of the document, including any issued TIAs and Errata then in effect.

To determine whether an NFPA Standard has been amended through the issuance of TIAs or corrected by Errata, visit the “Codes & Standards” section at www.nfpa.org.

Interpretations of NFPA Standards

A statement, written or oral, that is not processed in accordance with Section 6 of the Regulations Governing the Development of NFPA Standards shall not be considered the official position of NFPA or any of its Committees and shall not be considered to be, nor be relied upon as, a Formal Interpretation.

Patents

The NFPA does not take any position with respect to the validity of any patent rights referenced in, related to, or asserted in connection with an NFPA Standard. The users of NFPA Standards bear the sole responsibility for determining the validity of any such patent rights, as well as the risk of infringement of such rights, and the NFPA disclaims liability for the infringement of any patent resulting from the use of or reliance on NFPA Standards.

NFPA adheres to the policy of the American National Standards Institute (ANSI) regarding the inclusion of patents in American National Standards (“the ANSI Patent Policy”), and hereby gives the following notice pursuant to that policy:

NOTICE: The user’s attention is called to the possibility that compliance with an NFPA Standard may require use of an invention covered by patent rights. NFPA takes no position as to the validity of any such patent rights or as to whether such patent rights constitute or include essential patent claims under the ANSI Patent Policy. If, in connection with the ANSI Patent Policy, a patent holder has filed a statement of willingness to grant licenses under these rights on reasonable and nondiscriminatory terms and conditions to applicants desiring to obtain such a license, copies of such filed statements can be obtained, on request, from NFPA. For further information, contact the NFPA at the address listed below.

Law and Regulations

Users of NFPA Standards should consult applicable federal, state, and local laws and regulations. NFPA does not, by the publication of its codes, standards, recommended practices, and guides, intend to urge action that is not in compliance with applicable laws, and these documents may not be construed as doing so.

Copyrights

NFPA Standards are copyrighted. They are made available for a wide variety of both public and private uses. These include both use, by reference, in laws and regulations, and use in private self-regulation, standardization, and the promotion of safe practices and methods. By making these documents available for use and adoption by public authorities and private users, the NFPA does not waive any rights in copyright to these documents.

Use of NFPA Standards for regulatory purposes should be accomplished through adoption by reference. The term “adoption by reference” means the citing of title, edition, and publishing information only. Any deletions, additions, and changes desired by the adopting authority should be noted separately in the adopting instrument. In order to assist NFPA in following the uses made of its documents, adopting authorities are requested to notify the NFPA (Attention: Secretary, Standards Council) in writing of such use. For technical assistance and questions concerning adoption of NFPA Standards, contact NFPA at the address below.

For Further Information

All questions or other communications relating to NFPA Standards and all requests for information on NFPA procedures governing its codes and standards development process, including information on the procedures for requesting Formal Interpretations, for proposing Tentative Interim Amendments, and for proposing revisions to NFPA standards during regular revision cycles, should be sent to NFPA headquarters, addressed to the attention of the Secretary, Standards Council, NFPA, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101; email: stds_admin@nfpa.org.

For more information about NFPA, visit the NFPA website at www.nfpa.org. All NFPA codes and standards can be viewed at no cost at www.nfpa.org/docinfo.

Copyright © 2024 National Fire Protection Association®. All Rights Reserved.

NFPA® 13D

Standard for the

Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes

2025 Edition

This edition of NFPA 13D, *Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes*, was prepared by the Technical Committee on Residential Sprinkler Systems and released by the Correlating Committee on Automatic Sprinkler Systems. It was issued by the Standards Council on April 22, 2024, with an effective date of May 12, 2024, and supersedes all previous editions.

This edition of NFPA 13D was approved as an American National Standard on May 12, 2024.

Origin and Development of NFPA 13D

Recognizing the need to reduce the annual life loss from fire in residential occupancies (about 50 percent of total loss of life by fire), the Committee on Automatic Sprinklers appointed a subcommittee in May 1973 to prepare the *Standard on the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Mobile Homes*. The subcommittee was composed of members of the Committee on Automatic Sprinklers and other technically competent experts. The standard was submitted and adopted at the NFPA Annual Meeting in Chicago, Illinois, on May 12–16, 1975.

The 1980 edition was a complete rewrite of the 1975 edition, including SI units where appropriate. The 1980 edition incorporated the results of the residential sprinkler test program administered by the National Fire Protection Association and funded by a research grant from the United States Fire Administration. Factory Mutual Research Corporation and the Los Angeles City Fire Department conducted the dwelling tests. Factory Mutual Research Corporation, McNeary Insurance Consulting Services, and the Charlotte, North Carolina, Fire Department conducted the mobile home tests.

After gaining practical experience using the 1980 edition, modifications to the standard, including removal of design parameters for dry pipe systems, were made in the 1984 edition.

The 1989 and 1991 editions established criteria for the use of antifreeze systems as well as some of the installation criteria associated with specially listed piping materials.

The 1994 edition provided expanded information on nonmetallic pipe and introduced a new design option that reduced water storage requirements for limited area dwellings.

The 1996 edition of the standard included expanded information on the use and placement of residential sprinklers near heat sources. For the first time since 1941, the use of ½ in. (12.7 mm) piping material was permitted again for sprinkler systems under specific conditions. Several appendix figures were also added to address methods for protecting pipe from freezing in unheated attics.

The 1999 edition revised criteria for certain types of multipurpose piping systems and added requirements to mitigate the effect of water softeners and filters on system performance. Information on the application of solvent cement for nonmetallic piping systems was provided, and the exception for omitting sprinkler coverage in attics and crawl spaces was modified.

The 2002 edition incorporated revisions to update the standard to comply with the 2000 edition of the *Manual of Style for NFPA Technical Committee Documents*. These revisions included editorially rewording any exceptions as requirements. The 2002 edition also included changes that established a minimum design discharge density. The requirements for multipurpose systems were changed to require a bypass valve for installations with water softeners or water filtration equipment installed

and to update the requirements for network systems. The chapter specifically addressing limited area dwelling systems was no longer included in the standard.

The 2007 edition included new spacing and obstruction rules addressing sloped ceilings, ceiling pockets, ceiling fans, and kitchen cabinets. Also new to this edition were installation, design, and acceptance requirements for pumps. The acceptability of insulation as a method of freeze protection and the acceptability of wells as a water source were clarified for this edition. New requirements for listed dry pipe/preaction residential sprinkler systems, as well as clarified requirements for multipurpose combined and networked sprinkler systems, were incorporated. Finally, specific obstruction rules were added for residential sprinklers.

In the 2010 edition, new requirements were added for a prescriptive pipe sizing method as an alternative to the hydraulic calculation method. The standard added the term *townhouses* to the definition of *dwelling* to clarify that townhouses that meet the definition of *dwelling* can be protected by an NFPA 13D system. Finally, annex material was added to provide clear guidance for the owner on how to properly inspect, test, and maintain the system.

The 2013 edition of NFPA 13D included a restructuring to make the document easier to use. Four new chapters were added, breaking out freeze protection, acceptance testing, maintenance, and discharge criteria into their own chapters. This edition has also seen modification to the definitions of *multipurpose* and *stand-alone systems*, along with a new definition for *passive purge systems*. New language addressing the number of heads to be calculated for certain sloped and beamed ceiling configurations was added based on a Fire Protection Research Foundation report. The antifreeze requirements were updated through a series of TIAs that were developed based on FPRF testing.

Several significant revisions were made during the development of the 2016 edition. A new figure addressed positioning of sprinklers to avoid obstructions where there are sloped ceilings. Clarification was added that once a sprinkler is removed from a fitting or welded outlet it should not be reinstalled if torque was applied to the sprinkler itself. A new sketch showed an insulation practice using tenting in an attic or concealed space. One of the largest changes to the 2016 edition of NFPA 13D was the review of all metric conversions. Historically the document had used an "exact" conversion process, but in the 2016 edition an approximate conversion process was used. The intent of this change was to make the document more usable outside the United States.

The 2019 edition added beam rules for sprinklers installed under and adjacent to beams (with new figures), requirements for closets where ventless clothes dryers are installed, and requirements where pressure-reducing and pressure-regulating valves are installed. A section has been added to Chapter 12 to address inactive systems in structures left vacant for a period of time. Requirements for the use of well pumps as a water supply have been clarified. In addition, images have been added to clarify sprinkler location and clearances needed around fireplaces.

The 2022 edition revised the scope adding townhouses. Criteria for the protection of pipe or tube from mechanical damage was added to Chapter 5 and multipurpose and passive purge systems to Chapter 7. The criteria for sprinklers under or adjacent to beams was revised adding concealed sprinklers, and the obstruction tables were modified for ease of use. Further clarifications were made to the sections in Chapter 8 addressing fuel fired equipment and the need for sprinkler protection. A new section on tiny homes was added to Chapter 8. The method for determining when system components are subject to freezing and need protection was modified; it now requires the use of current temperature data. A new annex on the incentives for residential fire sprinkler use and advantages for builders, developers, and communities was added.

The 2025 edition revises the conversion factors table in Chapter 1 to align with NFPA 13, NFPA 13R, NFPA 24, and NFPA 291. A definition for "ceiling pocket" is added. Revisions have been made to Chapter 7 to differentiate LED-style lights from other light sources as a heat source and to allow for drain piping to terminate at a drain valve. In Chapter 8, guidance is provided for installation of a sidewall sprinkler beneath a sloped ceiling, clarification is provided on closets with no doors, and location criteria is provided when installing a sprinkler above fuel-fired equipment. A new worksheet is provided in Chapter 10 which provides guidance on how to perform the prescriptive pipe sizing calculations. In the annex of Chapter 12, the list of items for the building owner or manager that should be performed during an inspection has been updated to include exercising valves and visibly inspecting accessible sprinklers, pipe, and hangers.

Correlating Committee on Automatic Sprinkler Systems

William E. Koffel, *Chair*

Koffel Associates, Inc., MD [SE]

Roland A. Asp, National Fire Sprinkler Association, Inc., MD [M]
Rep. National Fire Sprinkler Association

Jose R. Baz, JRB Associates Group Inc., FL [M]
Rep. NFPA Latin American Section

Kerry M. Bell, UL LLC, IL [RT]

Tracey D. Bellamy, Telgian Corporation, GA [U]
Rep. The Home Depot

Chase A. Browning, Medford Fire Department, OR [E]

Steven W. Dellasanta, JENSEN HUGHES, RI [SE]

John August Denhardt, American Fire Sprinkler Association (AFSA), TX [IM]
Rep. American Fire Sprinkler Association

Russell P. Fleming, Northeast Fire Suppression Associates, LLC, NH [SE]

Alex Hoffman, Viking Fire Protection Inc., Canada [IM]
Rep. Canadian Automatic Sprinkler Association

Sultan M. Javeri, SC Engineering, France [IM]

Charles W. Ketner, National Automatic Sprinkler Fitters LU 669, MD [L]

Rep. United Assn. of Journeymen & Apprentices of the Plumbing & Pipe Fitting Industry

James D. Lake, Viking Corporation, MI [M]

John A. LeBlanc, FM Global, MA [I]

Kenneth W. Linder, Swiss Re, FL [I]

David O. Lowrey, City of Boulder Fire Rescue, CO [E]

Bryan Edwin Matthews, Liberty Mutual Group, NY [I]

Garner A. Palenske, Wiss, Janney, Elstner Associates, Inc., CA [SE]

Lawrence Richard Phillips, US Department of the Navy, VA [E]

Adam Seghi, Coda Risk Analysis, TX [I]

Joseph Su, National Research Council of Canada, Canada [RT]

J. Michael Thompson, GHD/The Protection Engineering Group, PC, VA [SE]

Alternates

Ralph E. Bless, Jr., Telgian Corporation, GA [U]
(Alt. to Tracey D. Bellamy)

Bruce H. Clarke, American International Group, Inc. (AIG), SC [I]
(Alt. to Adam Seghi)

David B. Fuller, FM Approvals, RI [I]
(Alt. to John A. LeBlanc)

Kevin Ryan Hall, American Fire Sprinkler Association (AFSA), MD [IM]
(Alt. to John August Denhardt)

Jeffrey E. Harper, JENSEN HUGHES, IL [SE]
(Alt. to Steven W. Dellasanta)

Jeff Hebenstreit, UL LLC, IL [RT]
(Alt. to Kerry M. Bell)

Jeffrey M. Hugo, National Fire Sprinkler Association, Inc., MI [M]
(Alt. to Roland A. Asp)

Matthew Osburn, Canadian Automatic Sprinkler Association (CASA), Canada [IM]
(Alt. to Alex Hoffman)

Donato A. Pirro, Electro Sistemas De Panama, S.A., Panama [M]
(Alt. to Jose R. Baz)

Matthew T. Smith, GHD, Inc., MD [SE]
(Alt. to J. Michael Thompson)

Jeffrey J. Van Rhyn, Jr., Local 669 JATC, NV [L]
(Alt. to Charles W. Ketner)

Nonvoting

Robert G. Caputo, American Fire Sprinkler Association (AFSA), TX [IM]
Rep. TC on Private Water Supply Piping Systems

Raymond A. Grill, Ray Grill Consulting PLLC, VA [SE]
Rep. TC on Sprinkler System Installation Criteria

Kenneth E. Isman, University of Maryland, MD [SE]
Rep. TC on Residential Sprinkler Systems

Thomas Goss, NFPA Staff Liaison

William B. Smith, Code Consultants, Inc., MO [SE]
Rep. TC on Sprinkler System Discharge Criteria

John J. Walsh, UA Joint Apprenticeship Committee Local 669, MD [O]
Rep. United Assn. of Journeymen & Apprentices of the Plumbing & Pipe Fitting Industry
(Member Emeritus)

Chad Duffy, NFPA Co-Staff Liaison

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

NOTE: Membership on a committee shall not in and of itself constitute an endorsement of the Association or any document developed by the committee on which the member serves.

Committee Scope: This Committee shall have overall responsibility for documents that pertain to the criteria for the design and installation of automatic, open and foam-water sprinkler systems including the character and adequacy of water supplies, and the selection of sprinklers, piping, valves, and all materials and accessories. This Committee does not cover the installation of tanks and towers, nor the installation, maintenance, and use of central station, proprietary, auxiliary, and local signaling systems for watchmen, fire alarm, supervisory service, nor the design of fire department hose connections.

Technical Committee on Residential Sprinkler Systems

Kenneth E. Isman, *Chair*
University of Maryland, MD [SE]

Roland A. Asp, National Fire Sprinkler Association, Inc., MD [M]
Kerry M. Bell, UL LLC, IL [RT]
Fred Benn, Advanced Automatic Sprinkler, Inc., CA [IM]
Jonathan C. Bittenbender, REHAU Incorporated, VA [M]
Chase A. Browning, Medford Fire Department, OR [E]
Daniel Buuck, National Association of Home Builders (NAHB), DC [U]
Bradford T. Cronin, Strategic Code Solutions LLC, MA [E]
 Rep. Rhode Island Association of Fire Marshals
John August Denhardt, American Fire Sprinkler Association (AFSA), TX [IM]
 Rep. American Fire Sprinkler Association
Jeffrey Feid, State Farm Insurance Company, IL [I]
Forest Hampton, Lubrizol Advanced Materials, Inc., OH [M]
David A. Nickelson, Uponor, MN [M]
Michael O'Brian, Brighton Area Fire Authority, MI [E]
 Rep. International Association of Fire Chiefs
Wade Palazini, JENSEN HUGHES, RI [SE]
Darren Palmieri, The Viking Corporation, MI [M]
Maurice M. Pilette, Mechanical Designs Ltd., MA [SE]

Milosh T. Puchovsky, Worcester Polytechnic Institute, MA [SE]
Peter T. Schwab, Wayne Automatic Fire Sprinklers, Inc., FL [IM]
George W. Stanley, Wiginton Fire Protection Engineering, Inc., FL [IM]
Brandon Telford, Reliable Automatic Sprinkler, DE [M]
 Rep. National Fire Sprinkler Association
Martin C. W. Trim, Barrett Engineered Pumps, CA [SE]
 Rep. American Society of Plumbing Engineers
Nikunj Vakani, Vipond, Inc., Canada [IM]
 Rep. Canadian Automatic Sprinkler Association
Jeffrey J. Van Rhyn, Jr., Local 669 JATC, NV [L]
 Rep. United Assn. of Journeymen & Apprentices of the Plumbing & Pipe Fitting Industry
John F. Viola, JFV Engineering, LLC, MA [IM]
 Rep. American Fire Sprinkler Association
Ronald N. Webb, S.A. Comunale Company, Inc., OH [IM]
 Rep. National Fire Sprinkler Association
John William Wilkus, US Army Corps of Engineers, KS [U]
Hong-Zeng Yu, FM Global, MA [I]

Alternates

Jon R. Ackley, Dalmatian Fire, IN [IM]
 (Alt. to Ronald N. Webb)
Bryan Berkley, Viking Group, Inc., DE [M]
 (Alt. to Darren Palmieri)
Robert S. Blach, Menlo Park Fire Protection District, CA [E]
 (Alt. to Michael O'Brian)
Samuel S. Dannaway, Coffman Engineers, HI [SE]
 (Alt. to Martin C. W. Trim)
Robert L. Dufault, Newport Fire Department, RI [E]
 (Voting Alt.)
Mark E. Fessenden, Johnson Controls, WI [M]
 (Voting Alt.)
Yogish Gopala, FM Global, MA [I]
 (Alt. to Hong-Zeng Yu)
Kevin Ryan Hall, American Fire Sprinkler Association (AFSA), MD [IM]
 (Alt. to John F. Viola)
Jeff Hebenstreit, UL LLC, IL [RT]
 (Alt. to Kerry M. Bell)
Simon Peter Koorie, Victaulic, PA [M]
 (Alt. to Brandon Telford)
Brent Kotula, Uponor, MN [M]
 (Alt. to David A. Nickelson)

David O. Lowrey, City of Boulder Fire Rescue, CO [E]
 (Alt. to Chase A. Browning)
Daniel J. Mathias, Absolute Fire Protection, Inc., MD [IM]
 (Alt. to John August Denhardt)
Dan Mendoza, Advanced Automatic Sprinkler, CA [IM]
 (Alt. to Fred Benn)
Steven Orłowski, Sundowne Building Code Consultants, LLC, VA [U]
 (Alt. to Daniel Buuck)
Matthew Osburn, Canadian Automatic Sprinkler Association (CASA), Canada [IM]
 (Alt. to Nikunj Vakani)
Ryan Lee Peterson, Wayne Automatic Fire Sprinklers, Inc., FL [IM]
 (Alt. to Peter T. Schwab)
William Scott Roberts, Quick Response Fire Protection, NJ [M]
 (Alt. to Roland A. Asp)
Ernesto Rodriguez, Jr., Wiginton Fire Protection Engineering, Inc., FL [IM]
 (Alt. to George W. Stanley)
Ralph D Young, Sprinkler Fitters Local 669, NY [L]
 (Alt. to Jeffrey J. Van Rhyn, Jr.)

Nonvoting

Chen-Hsiang Su, US Consumer Product Safety Commission (CPSC), MD [C]

Rohit "Rik" Khanna, US Consumer Product Safety Commission (CPSC), MD [C]

Thomas Goss, NFPA Staff Liaison

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

NOTE: Membership on a committee shall not in and of itself constitute an endorsement of the Association or any document developed by the committee on which the member serves.

Committee Scope: This Committee shall have primary responsibility for documents on the design and installation of automatic sprinkler systems in dwellings and residential occupancies up to and including four stories in height, including the character and adequacy of water supplies, and the selection of sprinklers, piping, valves, and all materials and accessories. In addition, this Committee shall have primary responsibility of inspection, testing, and maintenance requirements for sprinkler systems installed in one-and two-family dwellings and manufactured homes.

Contents

Chapter 1 Administration	13D- 7	7.3 Pressure Gauges.	13D- 14
1.1 Scope.	13D- 7	7.4 Piping Support.	13D- 15
1.2 Purpose.	13D- 7	7.5 Sprinklers.	13D- 15
1.3 Retroactivity.	13D- 7	7.6 Alarms.	13D- 16
1.4 Equivalency.	13D- 7	7.7 Attics.	13D- 16
1.5 Units.	13D- 7	7.8 Multipurpose and Passive Purge Systems.	13D- 16
1.6 New Technology.	13D- 8		
Chapter 2 Referenced Publications	13D- 8	Chapter 8 Sprinkler Position and Location	13D- 16
2.1 General.	13D- 8	8.1 Design Criteria.	13D- 16
2.2 NFPA Publications.	13D- 8	8.2 Position of Sprinklers.	13D- 17
2.3 Other Publications.	13D- 8	8.3 Location of Sprinklers.	13D- 23
2.4 References for Extracts in Mandatory Sections.	13D- 9		
Chapter 3 Definitions	13D- 9	Chapter 9 Protection from Freezing	13D- 23
3.1 General.	13D- 9	9.1 System Types.	13D- 23
3.2 NFPA Official Definitions.	13D- 9	9.2 Antifreeze Systems.	13D- 24
3.3 General Definitions.	13D- 10	9.3 Dry Pipe and Preaction Systems.	13D- 24
Chapter 4 General Requirements	13D- 11	Chapter 10 Discharge and Hydraulic Calculations	13D- 25
4.1 Sprinkler Temperature Ratings.	13D- 11	10.1 Design Discharge.	13D- 25
4.2 Tube.	13D- 11	10.2 Number of Design Sprinklers.	13D- 25
4.3 Listed or Labeled.	13D- 11	10.3 Piping Configurations.	13D- 26
4.4 Documentation.	13D- 11	10.4 Pipe Sizing.	13D- 26
4.5 Qualifications.	13D- 11	Chapter 11 System Acceptance	13D- 36
Chapter 5 System Components	13D- 11	11.1 General.	13D- 36
5.1 General.	13D- 11	11.2 Acceptance Tests.	13D- 36
5.2 Aboveground Pipe and Equipment.	13D- 11	Chapter 12 Inspection, Testing, and Maintenance	13D- 36
5.3 Water Supply Pipe and Fittings.	13D- 13	12.1 General.	13D- 36
5.4 Pre-Engineered Systems.	13D- 13	12.2 Inspections and Tests.	13D- 36
		12.3 Maintenance.	13D- 36
Chapter 6 Water Supply	13D- 13	Annex A Explanatory Material	13D- 37
6.1 General Provisions.	13D- 13	Annex B Incentives for Residential Fire Sprinkler Use — Advantages for Builders, Developers, and Communities	13D- 64
6.2 Water Supply Sources.	13D- 13		
6.3 Multipurpose Piping System.	13D- 14	Annex C Inspection and Testing at Time of Sale.	13D- 69
6.4 Manufactured Home Water Supply.	13D- 14	Annex D Informational References	13D- 69
6.5 Common Supply Pipes.	13D- 14	Index	13D- 71
Chapter 7 Installation	13D- 14		
7.1 Valves.	13D- 14		
7.2 Drains and Test Connections.	13D- 14		

NFPA 13D

Standard for the

Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes

2025 Edition

IMPORTANT NOTE: This NFPA document is made available for use subject to important notices and legal disclaimers. These notices and disclaimers appear in all publications containing this document and may be found under the heading “Important Notices and Disclaimers Concerning NFPA Standards.” They can also be viewed at www.nfpa.org/disclaimers or obtained on request from NFPA.

UPDATES, ALERTS, AND FUTURE EDITIONS: New editions of NFPA codes, standards, recommended practices, and guides (i.e., NFPA Standards) are released on scheduled revision cycles. This edition may be superseded by a later one, or it may be amended outside of its scheduled revision cycle through the issuance of Tentative Interim Amendments (TIAs). An official NFPA Standard at any point in time consists of the current edition of the document, together with all TIAs and Errata in effect. To verify that this document is the current edition or to determine if it has been amended by TIAs or Errata, please consult the National Fire Codes® Subscription Service or the “List of NFPA Codes & Standards” at www.nfpa.org/docinfo. In addition to TIAs and Errata, the document information pages also include the option to sign up for alerts for individual documents and to be involved in the development of the next edition.

NOTICE: An asterisk (*) following the number or letter designating a paragraph indicates that explanatory material on the paragraph can be found in Annex A.

A reference in brackets [] following a section or paragraph indicates material that has been extracted from another NFPA document. Extracted text may be edited for consistency and style and may include the revision of internal paragraph references and other references as appropriate. Requests for interpretations or revisions of extracted text shall be sent to the technical committee responsible for the source document.

Information on referenced and extracted publications can be found in Chapter 2 and Annex D.

Chapter 1 Administration

1.1* Scope.

1.1.1 This standard shall cover the design, installation, and maintenance of automatic sprinkler systems for protection against the fire hazards in one- and two-family dwellings, manufactured homes, and townhouses.

1.1.2 This standard shall not provide requirements for the design or installation of water mist fire protection systems, which are not considered fire sprinkler systems and are addressed by NFPA 750.

1.1.3 This standard shall be based on the concept that the sprinkler system is designed to protect against a fire originating from a single ignition location.

1.2* Purpose.

1.2.1 The purpose of this standard shall be to provide a sprinkler system that aids in the detection and control of residential fires and thus provides improved protection against injury and life loss.

1.2.2 A sprinkler system shall be designed and installed in accordance with this standard to prevent flashover (total involvement) in the room of fire origin, where sprinklered, and to improve the chance for occupants to escape or be evacuated.

1.3 Retroactivity. The provisions of this standard reflect a consensus of what is necessary to provide an acceptable degree of protection from the hazards addressed in this standard at the time the standard was issued.

1.3.1 Unless otherwise specified, the provisions of this standard shall not apply to facilities, equipment, structures, or installations that existed or were approved for construction or installation prior to the effective date of the standard. Where specified, the provisions of this standard shall be retroactive.

1.3.2 In those cases where the authority having jurisdiction determines that the existing situation presents an unacceptable degree of risk, the authority having jurisdiction shall be permitted to apply retroactively any portions of this standard deemed appropriate.

1.3.3 The retroactive requirements of this standard shall be permitted to be modified if their application clearly would be impractical in the judgment of the authority having jurisdiction, and only where it is clearly evident that a reasonable degree of safety is provided.

1.4* Equivalency. Nothing in this standard shall prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety over those prescribed by this standard.

1.4.1 Technical documentation shall be submitted to the authority having jurisdiction to demonstrate equivalency.

1.4.2 The system, method, or device shall be approved for the intended purpose by the authority having jurisdiction.

1.5 Units.

1.5.1* Metric units of measurement in this standard shall be in accordance with the modernized metric system known as the International System of Units (SI).

1.5.2 The liter and bar units shall be permitted to be used in this standard.

1.5.3 These units with conversion factors shall be used as listed in Table 1.5.3.

1.5.4* Where a value for measurement as specified in this standard is followed by an equivalent value in other units, the first stated value shall be regarded as the requirement.

1.5.5 The equivalent value for a measurement in SI shall be converted by multiplying the value by the conversion factor and then rounding the result to the appropriate number of significant digits.

Table 1.5.3 Metric Conversion Factors

	Name of Unit	Unit Symbol	Conversion Factor
Length	Millimeter	mm	1 in. = 25 mm
	Meter	m	1 ft = 0.3048 m
Area	Square millimeter	mm ²	1 in. ² = 645.2 mm ²
	Square meter	m ²	1 ft ² = 0.0929 m ²
Volume	Cubic millimeter	mm ³	1 in. ³ = 16,387 mm ³
	Cubic meter	m ³	1 ft ³ = 0.02832 m ³
Fluid capacity	Liter	L	1 fl oz = 0.02957 L
	Liter	L	1 gal = 3.785 L
Flow	Liter per minute	L/min	1 gpm = 3.7848 L/min
Pressure	Bar	bar	1 psi = 0.0689 bar
Discharge density	Millimeter/minute	mm/min	1 gpm/ft ² = 40.746 mm/min
	Liter/minute/m ²	(L/min)/m ²	1 gpm/ft ² = 40.746 (L/min)/m ²
K-factor	K-factor	L/min/(bar) ²	1 gpm/(psi) ² = 14.285 L/min/(bar) ²
Weight	Kilogram	kg	1 lb = 0.4536 kg
Density	Kilogram/cubic meter	kg/m ³	1 lb/ft ³ = 16.02 kg/m ³
Temperature	Fahrenheit	°F	F° = 9/5 × C° + 32
	Celsius	°C	C° = 5/9 (F° - 32)
Velocity	Kilometer per hour	km/h	1 mph = 1.609 km/h
	Meter per second	m/sec	1 fps = 0.3048 m/sec
Pound force	Newton	N	1 lb force = 4.44822 N
Stress	Kilonewton per square meter	kN/m ²	1 lbf/ft ² = 0.047880 kN/m ²
	Megapascal	MPa	1 lbf/in. ² = 0.006895 MPa
Gauge (sheet steel)	Millimeter	mm	12 gauge = 2.8 mm
			14 gauge = 1.98 mm
			16 gauge = 1.57 mm
			22 gauge = 0.78 mm
			24 gauge = 0.63 mm

Note: For additional conversions and information, see ASTM SI 10, *IEEE/ASTM SI 10 American National Standard for Metric Practice*.

1.6 New Technology.

1.6.1 Nothing in this standard shall be intended to restrict new technologies or alternate arrangements, provided the level of safety prescribed by this standard is not lowered.

1.6.2 Materials or devices not specifically designated by this standard shall be utilized in complete accord with all conditions, requirements, and limitations of their listings.

Chapter 2 Referenced Publications

2.1 General. The documents or portions thereof listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document.

2.2 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 13, *Standard for the Installation of Sprinkler Systems*, 2025 edition.

NFPA 70®, *National Electrical Code*®, 2023 edition.

NFPA 72®, *National Fire Alarm and Signaling Code*®, 2025 edition.

NFPA 220, *Standard on Types of Building Construction*, 2024 edition.

NFPA 750, *Standard on Water Mist Fire Protection Systems*, 2023 edition.

2.3 Other Publications.

2.3.1 ASME Publications. American Society of Mechanical Engineers, Two Park Avenue, New York, NY 10016-5990.

ASME B16.1, *Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250*, 2020.

ASME B16.3, *Malleable Iron Threaded Fittings: Classes 150 and 300*, 2021.

ASME B16.4, *Gray Iron Threaded Fittings: Classes 125 and 250*, 2021.

ASME B16.5, *Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard*, 2020.

ASME B16.9, *Factory-Made Wrought Buttwelding Fittings*, 2018.

ASME B16.11, *Forged Fittings, Socket-Welding and Threaded*, 2021.

ASME B16.15, *Cast Copper Alloy Threaded Fittings: Classes 125 and 250*, 2018.

ASME B16.18, *Cast Copper Alloy Solder-Joint Pressure Fittings*, 2021.

ASME B16.22, *Wrought Copper and Copper Alloy Solder Joint Pressure Fittings*, 2021.

ASME B16.25, *Buttwelding Ends*, 2017.

ASME B36.10M, *Welded and Seamless Wrought Steel Pipe*, 2018.

2.3.2 ASTM Publications. ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

ASTM A53/A53M, *Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless*, 2022.

ASTM A135/A135M, *Standard Specification for Electric-Resistance-Welded Steel Pipe*, 2021.

ASTM A234/A234M, *Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service*, 2023.

ASTM A795/A795M, *Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use*, 2021.

ASTM B32, *Standard Specification for Solder Metal*, 2020.

ASTM B43, *Standard Specification for Seamless Red Brass Pipe, Standard Sizes*, 2020.

ASTM B75/B75M, *Standard Specification for Seamless Copper Tube*, 2020.

ASTM B88, *Standard Specification for Seamless Copper Water Tube*, 2022.

ASTM B251/B251M, *Standard Specification for General Requirements for Wrought Seamless Copper and Copper-Alloy Tube*, 2017.

ASTM B813, *Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper-Alloy Tube*, 2016.

ASTM B828, *Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings*, 2016.

ASTM F437, *Standard Specification for Threaded Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80*, 2021.

ASTM F438, *Standard Specification for Socket-Type Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40*, 2017.

ASTM F439, *Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80*, 2019.

ASTM F442/F442M, *Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR)*, 2020.

ASTM F876, *Standard Specification for Crosslinked Polyethylene (PEX) Tubing*, 2022.

ASTM SI 10, *IEEE/ASTM SI 10 American National Standard for Metric Practice*, 2016.

2.3.3 AWS Publications. American Welding Society, 8669 NW 36 Street, #130, Miami, FL 33166-6672.

AWS A5.8M/A5.8, *Specification for Filler Metals for Brazing and Braze Welding*, 2019.

2.3.4 Other Publications.

Merriam-Webster's Collegiate Dictionary, 11th edition, Merriam-Webster, Inc., Springfield, MA, 2020.

2.4 References for Extracts in Mandatory Sections.

NFPA 13, *Standard for the Installation of Sprinkler Systems*, 2025 edition.

NFPA 13R, *Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies*, 2025 edition.

NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances*, 2025 edition.

Chapter 3 Definitions

3.1 General.

3.1.1 The definitions contained in this chapter shall apply to the terms used in this standard.

3.1.2 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.

3.1.3 *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 Labeled. Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

3.2.4* 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.

3.2.5 Shall. Indicates a mandatory requirement.

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

3.2.7 Standard. An NFPA standard, the main text of which contains only mandatory provisions using the word "shall" to

indicate requirements and that 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 NFPA manuals of style. When used in a generic sense, such as in the phrases “standards development process” or “standards development activities,” the term “standards” includes all NFPA standards, including codes, standards, recommended practices, and guides.

3.3 General Definitions.

Δ **3.3.1* 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. [13, 2025]

N **3.3.2* Ceiling Pocket.** An architectural ceiling feature that consists of a bounded area of ceiling located at a higher elevation than the attached lower ceiling. [13, 2025]

3.3.3 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 a single wall does not exceed 8 ft (2.4 m) in width. 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. [13, 2025]

3.3.4 Design Discharge. The rate of water discharged by an automatic sprinkler expressed in gpm (L/min).

3.3.5 Dwelling. Any detached building, or any part of a townhouse, back-to-back townhouse, or stacked townhouse structure that is separated from the remainder of the townhouse structure with fire resistance rated assemblies in accordance with local building code, that contains no more than two dwelling units intended to be used, rented, leased, let, or hired out to be occupied or that are occupied for habitation purposes.

3.3.6 Dwelling Unit. One or more rooms, arranged for the use of one or more individuals living together, as in a single housekeeping unit, that normally have cooking, living, sanitary, and sleeping facilities.

3.3.7* Manufactured Home. A structure, transportable in one or more sections, which, in the traveling mode, is 8 body-ft (2.4 m) or more in width or 40 body-ft (12 m) or more in length or, when erected on site, is 320 ft² (30 m²) or more and which is built on a permanent chassis and designed to be used as a dwelling, with or without a permanent foundation, when connected to the required utilities, and includes plumbing, heating, air-conditioning, and electrical systems contained therein; except that such terms include any structure that meets all the requirements of this paragraph except the size requirements and with respect to which the manufacturer voluntarily files a certification required by the regulatory agency. Calculations used to determine the number of square feet in a structure are based on the structure's exterior dimensions, measured at the largest horizontal projections when erected on site. These dimensions include all expandable rooms, cabinets, and other projections containing interior space, but do not include bay windows.

3.3.8* 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. [13, 2025]

3.3.9 Pressure.

3.3.9.1 Supply Pressure. The pressure within the supply (e.g., city or private supply water source).

3.3.9.2 System Pressure. The pressure within the system (e.g., above the control valve).

3.3.9.3 System Working Pressure. The maximum anticipated static (nonflowing) or flowing pressure applied to sprinkler system components exclusive of surge pressures.

3.3.10 Pump. A mechanical device that transfers or raises, or transfers and raises, the pressure of a fluid (water).

Δ **3.3.11* Shadow Area.** The floor area within the protection area of a sprinkler created by the portion of sprinkler discharge that is blocked by a wall, partition, or other obstruction. [13, 2025]

3.3.12 Sprinkler.

3.3.12.1 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. [13, 2025]

3.3.12.2 Residential Sprinkler. A type of fast-response sprinkler having a thermal element with an RTI of 50 (meters-seconds)^{1/2} 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. [13, 2025]

3.3.13 Sprinkler Systems.

3.3.13.1 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. [13, 2025]

3.3.13.2 Dry Pipe Sprinkler System. A sprinkler system employing automatic sprinklers that are attached to a piping system containing air, nitrogen, or other approved gas 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 sprinkler. [13, 2025]

3.3.13.3* Multipurpose Piping Sprinkler System. A piping system intended to serve both domestic needs in excess of a single fixture and fire protection needs from one common piping system throughout the dwelling unit(s).

3.3.13.4* Network Sprinkler System. A type of multipurpose system utilizing a common piping system supplying domestic fixtures and fire sprinklers where each sprinkler is supplied by a minimum of three separate paths.

3.3.13.5* Passive Purge Sprinkler System. A type of sprinkler system that serves a single toilet in addition to the fire sprinklers.

3.3.13.6 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.

3.3.13.7 Pre-Engineered Sprinkler System. A packaged sprinkler system including all components connected to the water supply and designed to be installed according to pretested limitations.

Δ 3.3.13.8 Sprinkler System. A system that is commonly activated by heat from a fire and discharges water over the fire area, that consists of an integrated network of piping designed in accordance with fire protection engineering standards, and that includes a supply source, a water control valve, a waterflow alarm (where required), and a drain. 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. [13, 2025]

3.3.13.9* Stand-Alone Sprinkler System. A sprinkler system where the aboveground piping serves only fire sprinklers.

3.3.13.10 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. [13, 2025]

3.3.14 Townhouse. A one-family dwelling constructed in attached groups of three or more units as defined in the local building code.

3.3.15 Valve.

3.3.15.1 Check Valve. A valve that allows flow in one direction only. [24, 2025]

3.3.15.2* Control Valve. A valve capable of stopping the flow of water to water-based fire protection systems and devices. [13, 2025]

3.3.16 Waterflow Alarm. A sounding device activated by a waterflow detector or alarm check valve.

3.3.17 Waterflow Detector. An electric signaling indicator or alarm check valve actuated by water flow in one direction only.

Chapter 4 General Requirements

4.1 Sprinkler Temperature Ratings.

4.1.1 Sprinklers having a temperature rating of 135°F to 170°F (57°C to 77°C) shall be classified as ordinary temperature-rated sprinklers.

4.1.2 Sprinklers having a temperature rating of 175°F to 225°F (79°C to 107°C) shall be classified as intermediate temperature-rated sprinklers.

4.1.3 Sprinklers having a temperature rating of 250°F to 300°F (121°C to 149°C) shall be classified as high temperature-rated sprinklers.

4.2 Tube. Wherever the word *pipe* is used in this standard, it shall also mean *tube*.

4.3 Listed or Labeled. Listed or labeled devices and materials shall be installed and used in accordance with the listing limitations and the manufacturers' instructions unless permitted by other sections of this document.

4.4* Documentation. Documentation shall be provided upon request to demonstrate that the water supply, listed devices, and sprinkler coverage comply with the requirements of this standard.

4.5 Qualifications. The layout, calculation, and installation of sprinkler systems installed in accordance with this standard shall only be performed by people knowledgeable and trained in such systems.

Chapter 5 System Components

5.1 General.

5.1.1* Only new sprinklers shall be installed in sprinkler systems.

5.1.1.1* Where a sprinkler is removed from a fitting or welded outlet, it shall not be reinstalled except as permitted by 5.1.1.1.1.

5.1.1.1.1 Dry sprinklers shall be permitted to be reinstalled when removed in accordance with the manufacturer's installation and maintenance instructions.

5.1.1.2 Spare sprinklers shall not be required to be provided.

5.1.2 Except as permitted by 5.1.2.1, devices and materials used in sprinkler systems shall be listed.

5.1.2.1 The following devices and components shall not be required to be listed:

- (1) Water supply pipe and fittings
- (2) Tanks
- (3) Expansion tanks and expansion chambers
- (4) Connections up to 5 ft (1.5 m) long between a tank and a pump
- (5) Pumps
- (6) Valves
- (7) Gauges
- (8) Waterflow detection and notification devices
- (9) Hangers
- (10) Backflow prevention devices approved by the water authority
- (11) Water meters

5.2 Aboveground Pipe and Equipment.

5.2.1 Listed residential sprinklers installed in systems complying with 5.2.2.3, 5.2.2.4, 5.2.5.3, or 5.2.5.4 shall be permitted to have a minimum pressure rating of 130 psi (9 bar).

5.2.2* Pipe or tube used in sprinkler systems shall be of the materials specified in Table 5.2.2 or shall be in accordance with 5.2.3.

5.2.2.1 The chemical properties, physical properties, and dimensions of pipe materials shall be at least equivalent to the standards cited in Table 5.2.2.

Table 5.2.2 Pipe or Tube Materials and Dimensions

Materials and Dimensions	Standard
Black and hot-dipped zinc-coated (galvanized) welded and seamless steel pipe for fire protection use	ASTM A795/ A795M
Pipe, steel, black and hot-dipped, zinc-coated, welded and seamless	ASTM A53/ A53M
Welded and seamless wrought steel pipe	ASME B36.10M
Electric-resistance-welded steel pipe	ASTM A135/ A135M
Seamless copper tube [copper tube (drawn, seamless)]	ASTM B75/ B75M
Seamless copper water tube	ASTM B88
Wrought seamless copper and copper-alloy tube	ASTM B251/ B251M
Liquid and paste fluxes for soldering applications of copper and copper-alloy tube	ASTM B813
Filler metals for brazing and braze welding (BCuP, copper-phosphorus, or copper-phosphorus-silver brazing filler metal)	AWS A5.8M/ A5.8
Solder metal [alloy grades containing less than 0.2 percent lead as identified in Section 1 of Table 5 of ASTM B32 and having a solidus temperature that exceeds 400°F (204°C)]	ASTM B32
Seamless red brass pipe	ASTM B43

5.2.2.2* Pipe used in sprinkler systems other than those addressed in 5.2.2.3 or 5.2.2.4 shall be designed to withstand a working pressure of not less than 175 psi (12.2 bar).

5.2.2.3 Nonmetallic pipe used in multipurpose piping systems and passive purge systems not equipped with a fire department connection shall be designed to withstand a working pressure of not less than 130 psi (9 bar) at 120°F (49°C).

5.2.2.4 Nonmetallic pipe used in wet pipe sprinkler systems not equipped with a fire department connection and provided with a pressure-reducing valve set no higher than 80 psi (5.5 bar) shall be designed to withstand a working pressure of not less than 130 psi (9 bar) at 120°F (49°C) and 100 psi (6.9 bar) at 180°F (82°C).

5.2.2.4.1 If the maximum static pressure from the water supply is less than or equal to 80 psi (5.5 bar), pipe designed to withstand a working pressure of not less than 130 psi (9 bar) at 120°F (49°C) and 100 psi (6.9 bar) at 180°F (82°C) shall be permitted to be used without a pressure-reducing valve.

5.2.2.4.2 If a pressure-reducing valve is used to comply with 5.2.2.4, an automatic means of pressure relief shall be installed on the sprinkler system side of the pressure-reducing valve.

5.2.3 Types of pipe other than those specified in Table 5.2.2 shall be permitted to be used where listed for sprinkler system use.

5.2.3.1 Pipe differing from those specified in Table 5.2.2 shall be installed in accordance with their listings and the manufacturers' installation instructions.

5.2.3.2* Chlorinated polyvinyl chloride (CPVC) pipe and crosslinked polyethylene (PEX) pipe shall comply with the portions of the American Society for Testing and Materials (ASTM) standards specified in Table 5.2.3.2 that apply to fire protection service.

Table 5.2.3.2 Specifically Listed Pipe or Tube Materials and Dimensions

Materials and Dimensions	Standard
<i>Nonmetallic Piping:</i>	
Chlorinated poly(vinyl chloride) (CPVC) plastic pipe (SDR-PR)	ASTM F442/ F442M
Crosslinked polyethylene (PEX) tubing	ASTM F876

5.2.3.3 Where pipe other than steel is run horizontally or vertically through wood or metal studs, the following provisions shall apply:

- (1) Steel shield plates shall be provided where the face of the piping is less than 1.25 in. (32 mm) from the nearest edge of the member.
- (2) Steel shield plates shall have a minimum thickness of 0.0575 in. (1.463 mm) (No. 16 gauge).
- (3) Steel shield plates shall cover the area of the pipe where the member is notched or bored.

5.2.4 Schedule 10 steel pipe shall be permitted to be joined with mechanical groove couplings approved for service.

5.2.4.1 Where mechanical groove couplings are used to join pipe, grooves shall be rolled on the pipe by an approved groove-rolling machine.

5.2.5 Fittings used in sprinkler systems shall be of the materials listed in Table 5.2.5 or shall be in accordance with 5.2.9.

5.2.5.1 The chemical properties, physical properties, and dimensions of fitting materials shall be at least equivalent to the standards cited in Table 5.2.5.

5.2.5.2 Fittings used in sprinkler systems other than those addressed in 5.2.5.3 or 5.2.5.4 shall be designed to withstand a working pressure of not less than 175 psi (12.1 bar).

5.2.5.3 Nonmetallic fittings used in multipurpose piping systems and passive purge systems not equipped with a fire

Table 5.2.5 Fitting Materials and Dimensions

Materials and Dimensions	Standard
<i>Cast Iron:</i>	
Gray iron threaded fittings, Classes 125 and 250	ASME B16.4
Gray iron pipe flanges and flanged fittings, Classes 25, 125, and 250	ASME B16.1
<i>Malleable Iron:</i>	
Malleable iron threaded fittings, Classes 150 and 300	ASME B16.3
<i>Steel:</i>	
Factory-made wrought butt welding fittings	ASME B16.9
Butt welding ends	ASME B16.25
Piping fittings of wrought carbon steel and alloy steel for moderate and high temperature service	ASTM A234/ A234M
Pipe flanges and flanged fittings, NPS 1/2 through NPS 24 metric/inch standard	ASME B16.5
Forged fittings, socket-welding and threaded	ASME B16.11
<i>Copper:</i>	
Wrought copper and copper alloy solder joint pressure fittings	ASME B16.22
Cast copper alloy solder joint pressure fittings	ASME B16.18
Cast copper alloy threaded fittings: Classes 125 and 250	ASME B16.15

department connection shall be designed to withstand a working pressure of not less than 130 psi (9 bar) at 120°F (49°C).

5.2.5.4 Nonmetallic fittings used in wet pipe sprinkler systems not equipped with a fire department connection and provided with a pressure-reducing valve set no higher than 80 psi (5.5 bar) shall be designed to withstand a working pressure of not less than 130 psi (9 bar) at 120°F (49°C) and 100 psi (6.9 bar) at 180°F (82°C).

5.2.5.4.1 If the maximum static pressure from the water supply is less than or equal to 80 psi (5.5 bar), fittings designed to withstand a working pressure of not less than 130 psi (9 bar) at 120°F (49°C) and 100 psi (6.9 bar) at 180°F (82.2°C) shall be permitted to be used without a pressure-reducing valve.

5.2.5.4.2 If a pressure-reducing valve is used to comply with 5.2.5.4, an automatic means of pressure relief shall be installed on the sprinkler system side of the pressure-reducing valve.

5.2.6 Joints for the connection of copper tube shall be brazed on dry pipe and preaction systems.

5.2.7 Joints for the connection of copper tube for wet pipe systems and antifreeze systems shall be solder joints or be brazed.

5.2.8 Solder joints, where permitted, shall be fabricated in accordance with the methods and procedures listed in ASTM B828, *Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings*.

5.2.9 Types of fittings other than those specified in Table 5.2.5 shall be permitted to be used where listed for sprinkler system use.

5.2.9.1 Fittings differing from those specified in Table 5.2.5 shall be installed in accordance with their listings and the manufacturers' installation instructions.

5.2.9.2* CPVC fittings shall comply with the portions of the ASTM standards specified in Table 5.2.9.2 that apply to fire protection service.

Table 5.2.9.2 Specifically Listed Fittings Materials and Dimensions

Materials and Dimensions	Standard
Threaded chlorinated poly(vinyl chloride) (CVPC) plastic pipe fittings, Schedule 80	ASTM F437
Socket-type chlorinated poly(vinyl chloride) (CPVC) plastic pipe fittings, Schedule 40	ASTM F438
Socket-type chlorinated poly(vinyl chloride) (CPVC) plastic pipe fittings, Schedule 80	ASTM F439

5.2.10 Other joining methods investigated for suitability in automatic sprinkler installations and listed for this service shall be permitted.

5.3* Water Supply Pipe and Fittings. Any type of pipe or tube acceptable under the applicable plumbing code for above-ground or underground supply pipe shall be acceptable as a supply for these portions of a fire sprinkler system when installed as follows and in accordance with manufacturer's recommendations:

- (1) Between the point of connection and the water supply source

- (2) Between a remote system riser and the dwelling or home

5.4 Pre-Engineered Systems. Where listed pre-engineered systems are installed, they shall be installed within the limitations that have been established by the testing laboratories.

Chapter 6 Water Supply

6.1 General Provisions.

6.1.1 Every automatic sprinkler system shall have at least one automatic water supply.

6.1.2 Where stored water is used as the sole source of supply, the minimum quantity shall equal the water demand rate times 10 minutes unless permitted otherwise by 6.1.3.

6.1.3 Where stored water is used as the sole source of supply, the minimum quantity shall be permitted to equal the highest calculated water demand rate times 7 minutes where dwelling units meet the following criteria:

- (1) One story in height
- (2) Less than 2000 ft² (185 m²) in area

6.1.4 The stored water requirement of 6.1.2 or 6.1.3 shall be permitted to be a combination of the water in the well, including the refill rate, plus the water in the holding tank if such tank can supply the sprinkler system.

6.1.5 The stored water supply requirement of 6.1.2 or 6.1.3 shall be permitted to be a combination of the water in the storage tank and the refill rate when the refilling method is automatic.

6.1.6 The automatic means requirement of 6.1.5 shall be permitted to be a float valve or similar device.

6.2* Water Supply Sources. The following water supply sources shall be considered to be acceptable by this standard:

- (1) A connection to a reliable waterworks system with or without an automatically operated pump
- (2) An elevated tank
- (3) A pressure tank designed to American Society of Mechanical Engineers (ASME) standards for a pressure vessel with a reliable pressure source
- (4) A stored water source with an automatically operated pump
- (5) A well with a pump of sufficient capacity and pressure to meet the sprinkler system demand

6.2.1 Where a pump is the source of pressure for the water supply for a fire sprinkler system but is not a portion of the domestic water system, the following shall be met:

- (1) A test connection shall be provided downstream of the pump that creates a flow of water equal to the smallest sprinkler K-factor on the system.
- (2) Pump motors using ac power shall be rated for 240 V and wired in accordance with the NEC (*NFPA 70*).
- (3) Any disconnecting means for the pump shall be approved.
- (4) The pump shall be located not less than 1½ in. off the floor.

6.2.2 Where a pump and tank is the source of supply for a fire sprinkler system but is not a portion of the domestic water system, the requirements of 6.2.1 and the following shall be met:

- (1) The test connection shall return water to the tank.
- (2) A method for refilling the tank shall be piped to the tank.
- (3) A method of determining the water level in the tank shall be provided without having to open the tank.

6.2.3* Where more than one dwelling unit is served by the same water supply pipe, each dwelling unit shall have an individual control valve that serves the fire sprinkler system in that dwelling unit and the owner shall have access to the valve that controls the sprinkler system in their unit.

6.2.3.1 The control valve shall be permitted to serve the domestic water supply.

6.2.3.2 In the situation addressed by 6.2.3, no valve controlling the sprinkler system in a unit shall be located in another unit.

6.2.3.3* Where a well pump is the source of supply for both the fire sprinkler system and the domestic water system 6.1.4 and Section 6.5 shall apply.

6.3* Multipurpose Piping System.

6.3.1 A multipurpose piping system shall be installed in accordance with 6.3.2 through 6.3.4.

6.3.2 Multipurpose piping systems shall be approved by the local plumbing or health authority.

6.3.3 All piping in the system supplying sprinklers shall be listed and conform to the piping specifications of this standard.

6.3.3.1 Piping connected to the system that supplies only plumbing fixtures shall comply with local plumbing and health authority requirements but is not required to be listed.

6.3.4 A warning sign, with minimum $\frac{1}{4}$ in. (6 mm) letters, shall be affixed adjacent to the main shutoff valve and shall state the following:

WARNING: The water system for this home supplies fire sprinklers that require certain flows and pressures to fight a fire.

Devices that restrict the flow or decrease the pressure or automatically shut off the water to the fire sprinkler system, such as water softeners, filtration systems, and automatic shutoff valves, shall not be added to this system without a review of the fire sprinkler system by a fire protection specialist. Do not remove this sign.

6.4 Manufactured Home Water Supply. For sprinklered buildings manufactured off site, the minimum flow and pressure needed to satisfy the system design criteria on the system side of the meter shall be specified on a data plate by the manufacturer.

6.5 Common Supply Pipes.

6.5.1 Where common supply pipes serve both fire sprinkler and domestic use, they shall comply with 6.5.2 and 6.5.3.

6.5.2* In common water supply connections serving more than one dwelling unit, 5 gpm (20 L/min) shall be added to the sprinkler system demand to determine the size of common piping and the size of the total water supply requirements

where no provision is made to prevent flow into the domestic water system upon operation of a sprinkler.

6.5.3 Where water treatment and filtration are installed, one of the following conditions shall be met:

- (1) The flow restriction and pressure loss through the water treatment equipment shall be taken into account in the hydraulic calculations.
- (2) An automatic bypass shall be installed around the water treatment equipment that directs all water directly to the system.

Chapter 7 Installation

7.1 Valves.

7.1.1 A single control valve arranged to shut off both the domestic system and the sprinkler system shall be installed unless a separate shutoff valve for the sprinkler system is installed in accordance with 7.1.2.

7.1.2 The sprinkler system piping shall not have separate control valves installed unless supervised by one of the following methods:

- (1) Central station, proprietary, or remote station alarm service
- (2) Local alarm service that causes the sounding of an audible signal at a constantly attended location
- (3) Valves that are locked open

7.1.3 A separate shutoff valve shall be installed for the domestic water supply in installations other than those complying with Section 6.3.

7.1.4 If provided, a backflow prevention assembly that includes a shutoff valve shall be considered a control valve, and an additional control valve shall not be required.

7.2 Drains and Test Connections.

7.2.1* Each sprinkler system shall have a minimum $\frac{1}{2}$ in. (15 mm) drain on the system side of the control valve.

7.2.2 A valve shall be installed in the drain piping.

N 7.2.2.1* The drain piping shall be permitted to terminate at the drain valve.

7.2.3 A drain shall be installed for each trapped portion of a dry system that is subject to freezing temperatures.

7.2.4* Where waterflow alarms are provided, test connections shall be installed at locations that allow flow testing of water supplies, connections, and alarm mechanisms.

7.2.5 The test connections, where provided, shall contain a K-factor equal to or smaller than the smallest sprinkler K-factor installed in the system.

7.2.6* Where a pressure-reducing or pressure-regulating valve is installed on a stand-alone system, a test connection with a K-factor at least as large as the smallest sprinkler K-factor on the system shall be installed downstream of the device.

7.3 Pressure Gauges.

7.3.1 Where a dry system is installed, a pressure gauge shall be installed to indicate system air pressure.

7.3.2 Where a pressure tank is used for the water supply, a pressure gauge shall be installed to indicate tank pressure.

7.3.3 Where a pressure-regulating device is installed on a stand-alone system, a pressure gauge shall be installed downstream of the device.

7.4 Piping Support.

7.4.1 Listed pipe shall be supported in accordance with any listing limitations.

7.4.2 Pipe that is not listed, and listed pipe with listing limitations that do not include piping support requirements, shall be supported from structural members using support methods comparable to those required by applicable local plumbing codes.

7.4.3 Piping laid on open joists or rafters shall be supported in a manner that prevents lateral movement.

7.4.4* Sprinkler piping shall be supported in a manner that prevents the movement of piping upon sprinkler operation.

7.4.5* Where sprinkler piping is exposed to the sprinkler protected area, it shall be supported with metal hangers or hangers made of the same material as the structure.

7.5 Sprinklers.

7.5.1 Listed residential sprinklers shall be used unless another type is permitted by 7.5.3, 7.5.4, or 7.5.5. (See A.10.2.)

7.5.2 Residential sprinklers shall not be used on systems other than wet pipe systems unless specifically listed for use on that particular type of system.

7.5.3 The following listed sprinklers shall be permitted to be extended into unheated areas not intended for living purposes:

- (1) Residential dry pendent
- (2) Residential dry sidewall
- (3) Quick-response standard spray dry pendent
- (4) Quick-response standard spray dry sidewall

7.5.4 Quick-response sprinklers shall be permitted to be used in mechanical closets.

7.5.5* Quick-response spray sprinklers shall be permitted to be used in saunas and steam rooms in accordance with 7.5.6.3(4).

7.5.6 Temperature Ratings.

7.5.6.1 Sprinklers installed where maximum ambient ceiling temperatures do not exceed 100°F (38°C) shall be ordinary temperature-rated or intermediate-temperature rated sprinklers throughout unless modified by the requirements of 7.5.6.3.

7.5.6.2 Sprinklers installed where maximum ambient ceiling temperatures are between 101°F and 150°F (38°C and 65°C) shall be intermediate temperature-rated sprinklers unless modified by 7.5.6.3.

7.5.6.3* The following practices shall be observed when installing residential sprinklers unless higher expected ambient temperatures require a higher temperature rating:

- (1) Sprinklers under glass or plastic skylights exposed to direct rays of the sun shall be of intermediate temperature classification.
- (2) Sprinklers in an unventilated concealed space under an uninsulated roof or in an unventilated attic shall be of intermediate temperature classification.
- (3)* Sprinklers installed near specific heat sources that are identified in Table 7.5.6.3 shall be of the temperature rating indicated in Table 7.5.6.3 unless sprinklers are listed for positioning closer to the heat source.
- (4) Sprinklers installed in saunas and steam rooms where the maximum ambient ceiling temperatures are between 151°F and 225°F (66°C to 107°C) shall be high temperature-rated spray sprinklers.
- (5) Sprinklers in closets containing ventless clothes dryers shall be of the intermediate temperature classification or higher.

7.5.7* Painting and Ornamental Finishes. Sprinklers shall not be painted or enameled unless applied by the manufacturer and the sprinkler has been listed with such finishes.

▲ Table 7.5.6.3 Minimum Distances for Ordinary and Intermediate Temperature Residential Sprinklers

Heat Source	From Edge of Source to Ordinary Temperature Sprinkler		From Edge of Source to Intermediate Temperature Sprinkler	
	in.	mm	in.	mm
Side of open or recessed fireplace	36	900	12	300
Front of recessed fireplace	60	1500	36	900
Coal- or wood-burning stove	42	1050	12	300
Kitchen range	18	450	9	225
Wall oven	18	450	9	225
Hot air flues	18	450	9	225
Uninsulated heat ducts	18	450	9	225
Uninsulated hot water pipes	12	300	6	150
Side of ceiling- or wall-mounted hot air diffusers	24	600	12	300
Front of wall-mounted hot air diffusers	36	900	18	450
Hot water heater or furnace	6	150	3	75
Light fixture except LED				
0 W–250 W	6	150	3	75
250 W–499 W	12	300	6	150

Shaded text = Revisions. ▲ = Text deletions and figure/table revisions. • = Section deletions. N = New material



7.5.8 Escutcheon Plates. Where nonmetallic sprinkler ceiling plates (escutcheons) or recessed escutcheons (metallic or nonmetallic) are used, they shall be listed based on testing of the assembly as a residential sprinkler.

7.5.9 Solvent Cement. Where solvent cement is used as the pipe and fittings bonding agent, sprinklers shall not be installed in the fittings prior to the fittings being cemented in place.

7.6* Alarms. Local waterflow alarms shall be provided on all sprinkler systems in homes not equipped with smoke alarms or smoke detectors in accordance with *NFPA 72*.

7.7 Attics. When nonmetallic piping is installed in attics, adequate insulation shall be provided on the attic side of the piping to avoid exposure of the piping to temperatures in excess of the pipe's rated temperature.

7.8 Multipurpose and Passive Purge Systems.

7.8.1 Where common supply pipes serve both fire sprinkler and domestic uses, a point of connection shall be provided for the domestic connection.

7.8.2 Where the fire sprinkler system and the domestic system are separate, the point of connection shall be permitted to be at any location complying with Sections 6.2, 6.3, or 6.5.

7.8.3 For passive purge systems, the fire sprinkler system installer shall provide a minimum $\frac{1}{2}$ in. (13 mm) NPT capped or plugged connection at the compartment where the passive purge fixture will be installed.

7.8.4 Other means and locations of connections shall be permitted when coordinated with the domestic installer and approved by the authority having jurisdiction.

Chapter 8 Sprinkler Position and Location

8.1 Design Criteria.

8.1.1 Sloped Ceilings.

8.1.1.1 Where the ceiling is sloped, the maximum S dimension shall be measured along the slope of the ceiling to the next sprinkler or wall, as shown in Figure 8.1.1.1.

8.1.1.2 The sprinklers shall maintain the minimum listed spacing, but no less than 8 ft (2.4 m), measured in the plan view from one sprinkler to another, as shown in Figure 8.1.1.1.

8.1.1.3 Where the ceiling is sloped, a sprinkler shall be installed within 36 in. (900 mm) vertically of the peak as shown in Figure 8.1.1.1 or in accordance with the manufacturer's listing.

8.1.1.4 Where residential sidewall sprinklers are installed under a sloped ceiling with a slope exceeding 2 in 12, they shall be located in accordance with one of the following:

- (1) At the high point of the slope and positioned to discharge downward along the slope as shown in Figure 8.1.1.4(a)
- (2) Along slopes not exceeding 8 in 12 with the deflector installed parallel to the slope and positioned to discharge across the slope as shown in Figure 8.1.1.4(b)

8.1.2 Nonresidential Sprinklers. Sprinklers other than residential sprinklers shall be installed in accordance with the coverage criteria specified by *NFPA 13*.

8.1.3 Sprinkler Coverage.

8.1.3.1 Residential Sprinklers.

8.1.3.1.1 Sprinklers shall be installed in accordance with their listing where the type of ceiling configuration is referenced in the listing.

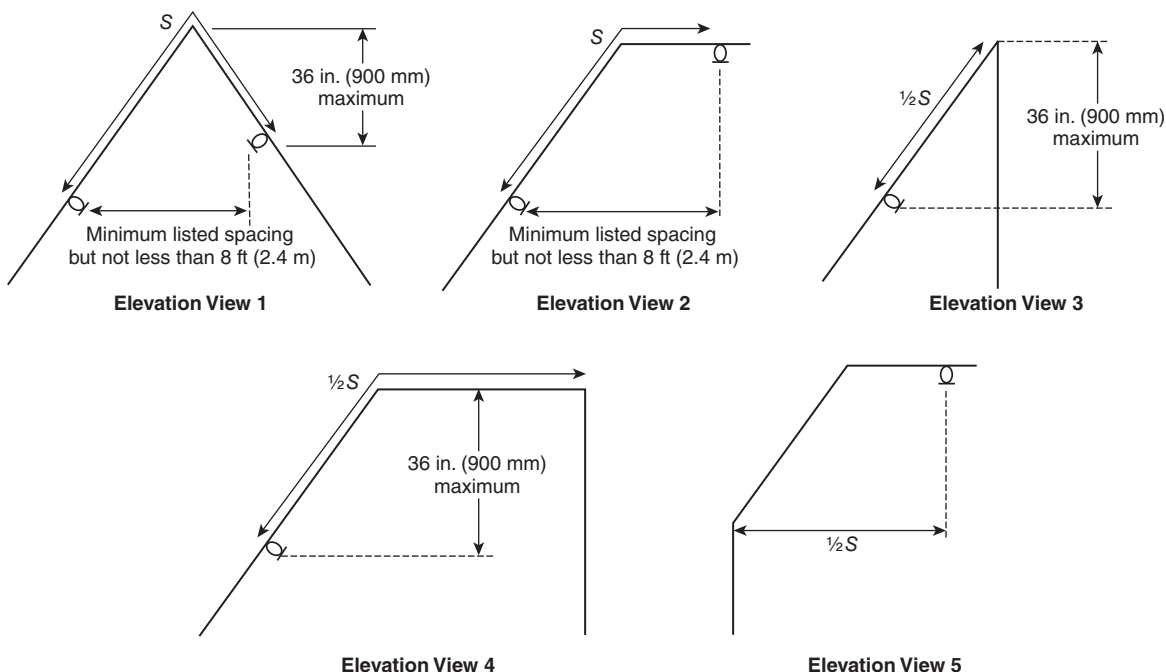
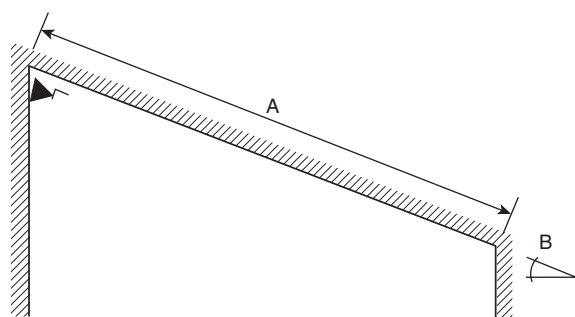


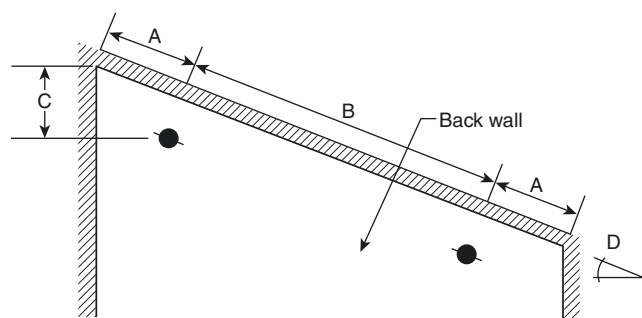
FIGURE 8.1.1.1 Measuring S Dimension.



**Sidewall Sprinklers
Elevation**

- A – Maximum: Up to the maximum sprinkler coverage area length for the coverage area being hydraulically calculated
- B – Slope: >2 in 12 to 8 in 12

N **FIGURE 8.1.1.4(a) Sidewall Sprinklers Positioned to Discharge Downward Along the Slope.**



**Sidewall Sprinklers
Elevation**

- A – Maximum: One half the maximum sprinkler coverage area length for the coverage area being hydraulically calculated
- B – Maximum: The maximum sprinkler coverage area length for the coverage area being hydraulically calculated
- Minimum: 8 ft 0 in. (2.4 m)
- C – Maximum: 3 ft 0 in. (0.9 m)
- D – Slope: >2 in 12 to 8 in 12

N **FIGURE 8.1.1.4(b) Sidewall Sprinklers Positioned Parallel to the Slope.**

8.1.3.1.2* Where construction features or other special conditions exist that are outside the scope of sprinkler listings, listed sprinklers shall be permitted to be installed beyond their listing limitations.

8.1.3.1.3 Where a physical barrier exists between the sprinklers that prevents each sprinkler from directly spraying on the other, there shall be no minimum distance between sprinklers.

8.1.4 Operating Pressure. The minimum operating pressure of any sprinkler shall be the higher of the minimum operating pressure specified by the listing or 7 psi (0.5 bar).

8.2 Position of Sprinklers.

8.2.1 Residential Pendent and Upright Sprinklers.

8.2.1.1 Pendent and upright sprinklers that have not been listed with specific deflector to ceiling distances shall be posi-

tioned so that the deflectors are within 1 in. to 4 in. (25 mm to 100 mm) from the ceiling unless otherwise permitted by 8.2.7 or 8.2.1.2.

8.2.1.2* Pendent-type residential sprinklers located under or adjacent to beams in accordance with 10.2.1 shall be installed in accordance with one of the following:

- (1) Pendent, recessed pendent, concealed, and flush-type pendent sprinklers shall be permitted to be installed directly under a beam having a maximum depth of 14 in. (350 mm) with the sprinkler deflector 1 in. to 2 in. (25 mm to 50 mm) below the beam, or in accordance with the manufacturer's instructions for recessed or flush sprinklers if the deflector is less than 1 in. (25 mm) below the beam, as shown in Figure 8.2.1.2(a).
- (2) Pendent sprinklers shall be permitted to be installed adjacent to beams where the vertical centerline of the sprinkler is no greater than 2 in. (50 mm) from the edge of the beam and with the sprinkler deflector 1 in. to 2 in. (25 mm to 50 mm) below the beam, or in accordance with the manufacturer's instructions for flush sprinklers if the deflector is less than 1 in. (25 mm) below the beam, as shown in Figure 8.2.1.2(b).

8.2.1.3 Pendent and upright sprinklers that have been listed with specific positioning criteria shall be positioned in accordance with their listing unless permitted otherwise by 8.2.7.

8.2.2 Residential Sidewall Sprinklers.

8.2.2.1 Sidewall sprinklers that have not been listed with specific positioning criteria shall be positioned so that the deflectors are within 4 in. to 6 in. (100 mm to 150 mm) from the ceiling.

8.2.2.2 Sidewall sprinklers that have been listed with specific positioning criteria shall be installed in accordance with their listing.

8.2.2.3 Residential horizontal sidewall sprinkler deflectors shall be located no more than 6 in. (150 mm) from the face of the wall or soffit on which they are mounted.

8.2.3 Nonresidential Sprinklers. Sprinklers other than residential sprinklers shall be positioned in accordance with the positioning criteria specified by NFPA 13.

8.2.4 Basements Without Ceilings. In basements where ceilings are not required for the protection of piping or where metallic pipe is installed, residential sprinklers shall be permitted to be positioned in a manner that anticipates future installation of a finished ceiling.

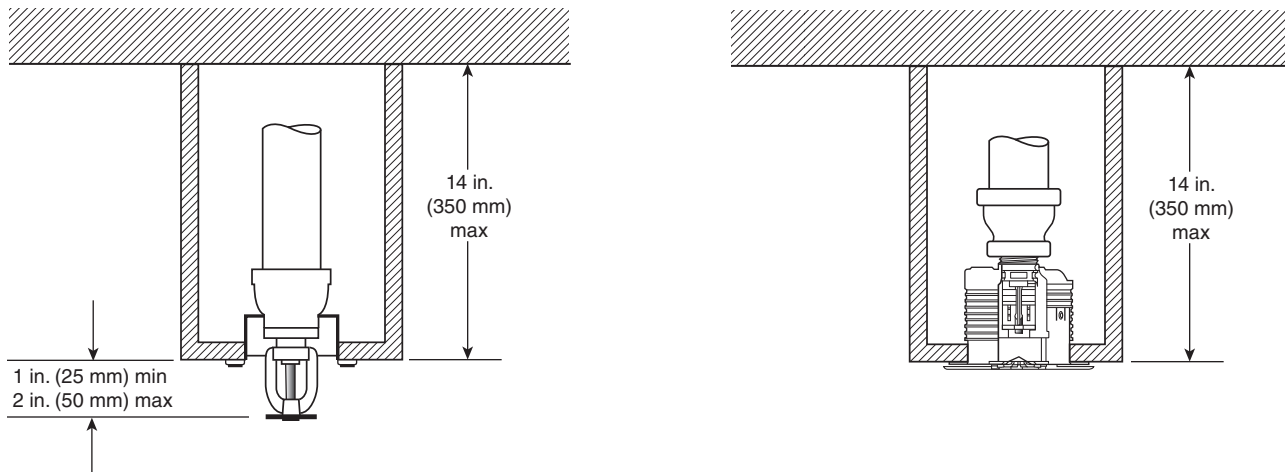
8.2.5* Obstructions to Residential Sprinklers.

8.2.5.1 Pendent Sprinklers.

8.2.5.1.1 Pendent sprinklers shall be located at least 36 in. (900 mm) away from obstructions such as ceiling fans and light fixtures unless the requirements of 8.2.5.3 are met.

8.2.5.1.2 The distance shall be measured from the center of the sprinkler to the center of the obstruction.

8.2.5.1.3 Where the sprinkler cannot be located 36 in. (900 mm) away from the obstruction (as measured from the center of the obstruction), an additional sprinkler shall be located on the other side of the obstruction.



▲ FIGURE 8.2.1.2(a) Position of Sprinkler Under a Beam.

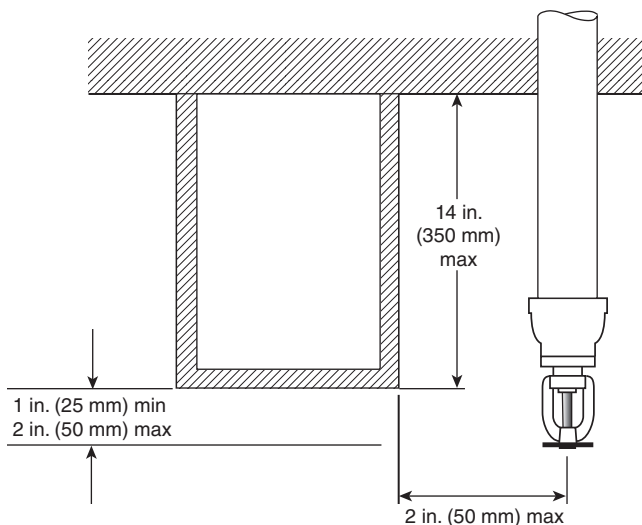


FIGURE 8.2.1.2(b) Position of Sprinkler Adjacent to a Beam.

8.2.5.1.4 Where the area of the fan blades encompass more than 50 percent of the area of the plan view, the sprinkler shall be installed in accordance with 8.2.5.3.

8.2.5.1.5 In hallways up to 6 ft (1.8 m) in width, sprinklers shall be permitted to be located adjacent to obstructions where the sprinkler is installed in the allowable obstruction zone as shown in Figure 8.2.5.1.5 and the closest edge of the obstruction is a minimum of 12 in. (300 mm) away from the centerline of the sprinkler.

8.2.5.2 Sidewall Sprinklers.

8.2.5.2.1 Sidewall sprinklers shall be located at least 5 ft (1.5 m) away from obstructions such as ceiling fans and light fixtures unless the requirements of 8.2.5.4 are met.

8.2.5.2.2 The distance shall be measured from the center of the sprinkler to the center of the obstruction.

8.2.5.2.3 Where the sprinkler cannot be located 5 ft (1.5 m) away from the obstruction (as measured to the center of the obstruction), an additional sprinkler shall be installed on the other side of the obstruction.

8.2.5.2.4 Where the area of the fan blades encompasses more than 50 percent of the area of the plan view, the sprinkler shall be installed in accordance with 8.2.5.4.

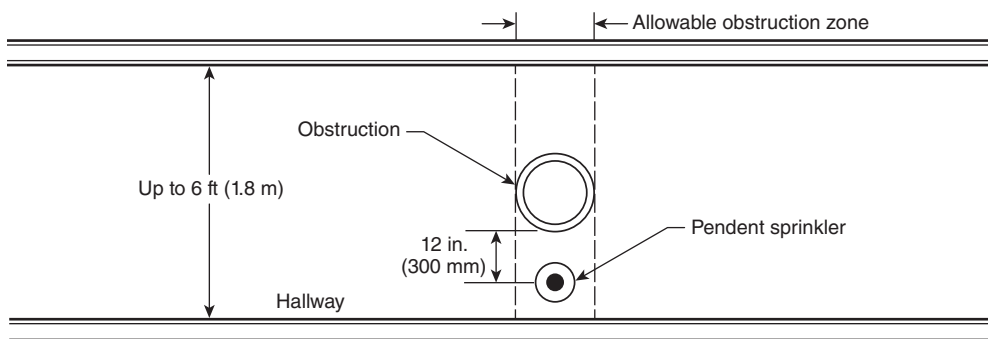


FIGURE 8.2.5.1.5 Obstruction in Hallway — Pendent Sprinkler

8.2.5.2.5 In hallways up to 6 ft (1.8 m) in width, sprinklers shall be permitted to be located adjacent to obstructions where the sprinkler is installed in the allowable obstruction zone as shown in Figure 8.2.5.2.5 and the closest edge of the obstruction is a minimum of 12 in. (300 mm) away from the deflector.

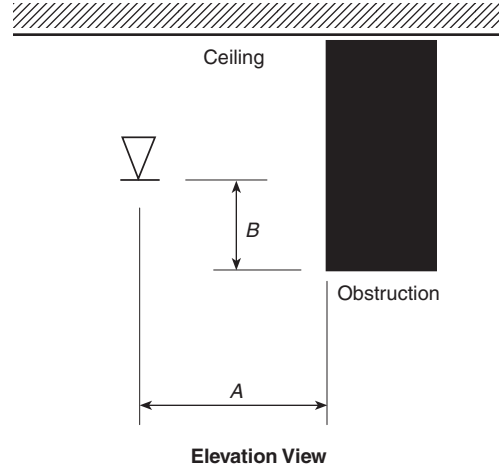
8.2.5.3 Continuous Obstructions to Pendent Sprinklers.

8.2.5.3.1 Sprinklers shall be positioned with respect to continuous obstructions in accordance with 8.2.5.3.2, 8.2.5.3.3, or 8.2.5.3.4.

8.2.5.3.2 Sprinklers shall be positioned with respect to continuous obstructions in accordance with Table 8.2.5.3.2 and Figure 8.2.5.3.2.

8.2.5.3.3 Sprinklers shall be positioned with respect to an obstruction against a wall in accordance with Figure 8.2.5.3.3(a), Figure 8.2.5.3.3(b), or Figure 8.2.5.3.3(c).

8.2.5.3.4 A sprinkler shall be installed on the other side of the obstruction.



▲ FIGURE 8.2.5.3.2 Positioning of Sprinkler to Avoid Obstruction to Discharge (Residential Upright and Pendent Sprinklers).

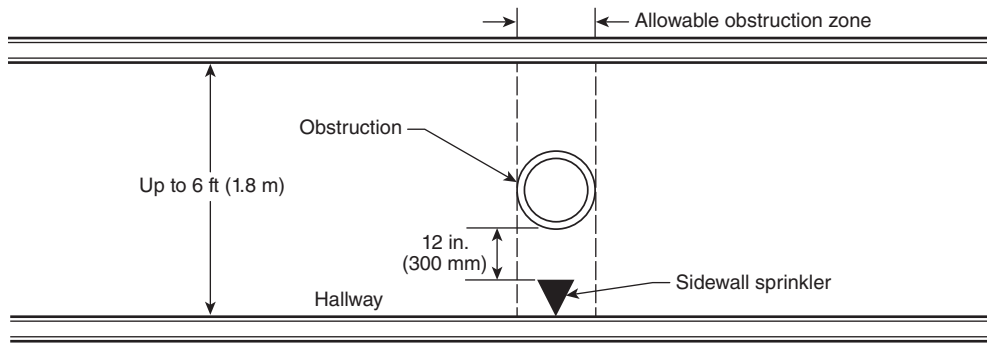
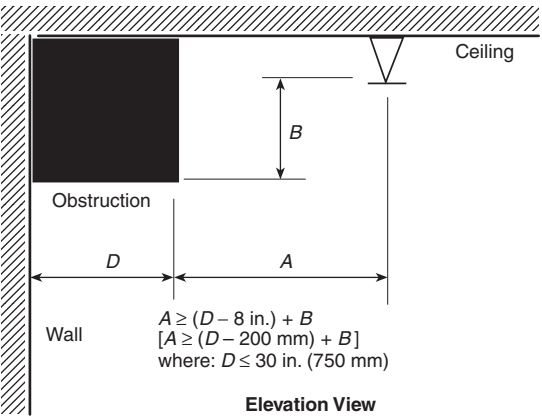


FIGURE 8.2.5.2.5 Obstruction in Hallway — Sidewall Sprinkler

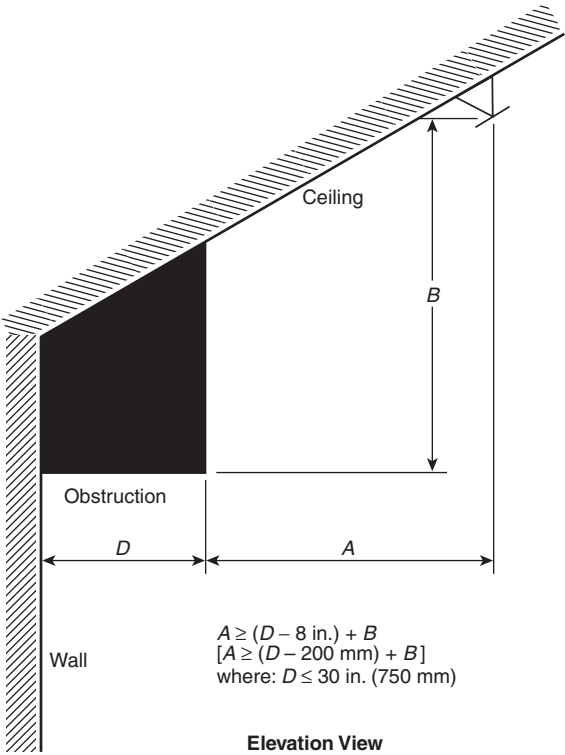
Table 8.2.5.3.2 Positioning of Sprinklers to Avoid Obstructions to Discharge (Residential Upright and Pendent)

Distance from Sprinklers to Side of Obstruction (A)		Allowable Distance of Deflector Above Bottom of Obstruction (B)	
ft	mm	in.	mm
Less than 1.5	Less than 450	0	0
1.5 or more	450 or more	1	25
3 or more	900 or more	3	75
4 or more	1200 or more	5	125
4.5 or more	1350 or more	7	175
6 or more	1800 or more	9	225
6.5 or more	1950 or more	11	275
7 or more	2100 or more	14	350
8 or more	2400 or more	15	375
8.5 or more	2600 or more	17	425
9 or more	2700 or more	19	475

Note: For A and B, refer to Figure 8.2.5.3.2.



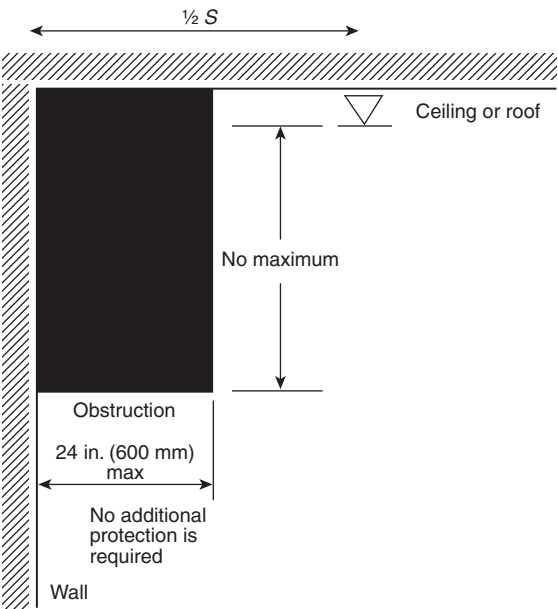
▲ FIGURE 8.2.5.3.3(a) Positioning of Sprinkler to Avoid Obstructions Against Walls — Scenario 1 (Residential Upright and Pendent Sprinklers).



▲ FIGURE 8.2.5.3.3(b) Positioning of Sprinkler to Avoid Obstructions Against Walls — Scenario 2 (Residential Upright and Pendent Sprinklers).

8.2.5.4 Continuous Obstructions to Sidewall Sprinklers.

- 8.2.5.4.1 Sprinklers shall be positioned with respect to continuous obstructions in accordance with 8.2.5.4.2 or 8.2.5.4.3.
- 8.2.5.4.2 Sprinklers shall be positioned with respect to continuous obstructions in accordance with Table 8.2.5.4.2(a), Figure 8.2.5.4.2(a), Table 8.2.5.4.2(b), Figure 8.2.5.4.2(b), Figure 8.2.5.4.2(c), and Figure 8.2.5.4.2(d).



▲ FIGURE 8.2.5.3.3(c) Positioning of Sprinklers to Avoid Obstructions Against Walls — Scenario 3 (Residential Upright and Pendent Sprinklers).

Table 8.2.5.4.2(a) Positioning of Sprinklers to Avoid Obstructions (Residential Sidewall Sprinklers)

Distance from Sidewall Sprinkler to Side of Obstruction (A)		Maximum Allowable Distance of Deflector Above Bottom of Obstruction (B)	
ft	mm	in.	mm
Less than 8	Less than 2400	0	0
8 or more	2400 or more	1	25
10 or more	3000 or more	2	50
11 or more	3300 or more	3	75
12 or more	3600 or more	4	100
13 or more	3900 or more	6	150
14 or more	4200 or more	7	175
15 or more	4500 or more	9	225
16 or more	4800 or more	11	275
17 or more	5100 or more	14	350

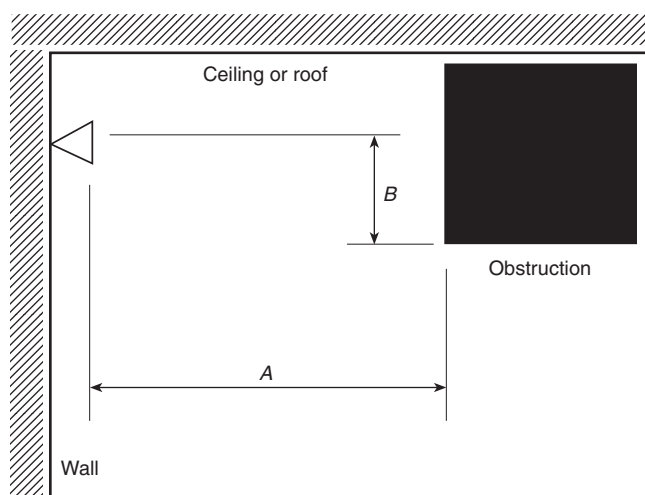
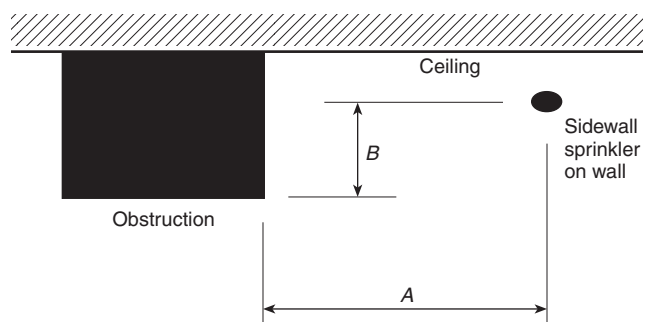
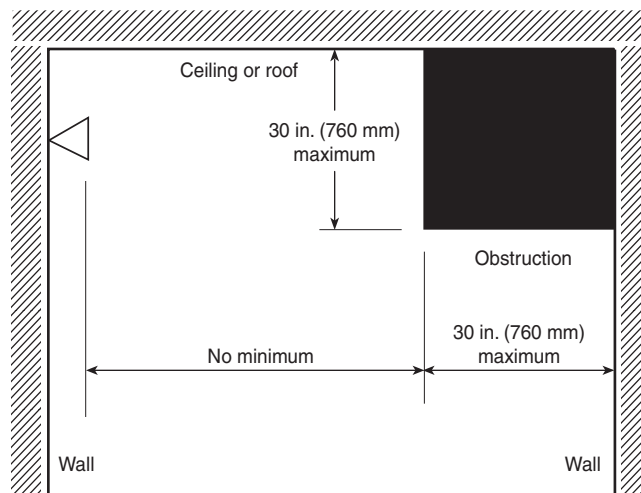
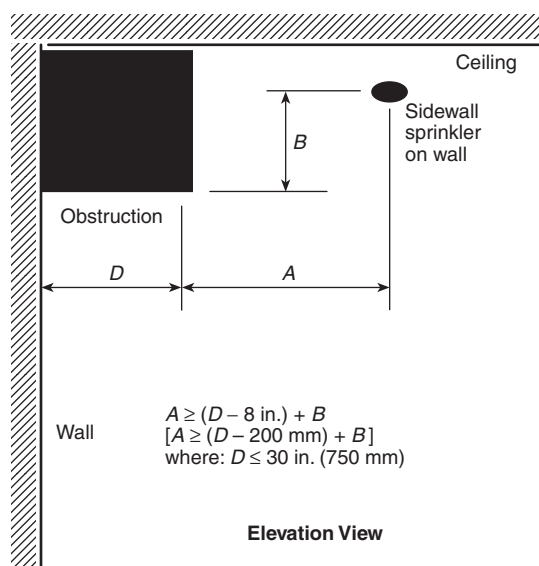
Note: For A and B, refer to Figure 8.2.5.4.2(a).

- 8.2.5.4.3 A sprinkler shall be installed on the other side of the obstruction.
- 8.2.5.5 Soffits and Wall Cabinets. Where soffits are used for the installation of sidewall sprinklers, the sprinklers and soffits shall be installed in accordance with 8.2.5.5.1, 8.2.5.5.2, or 8.2.5.5.3.
- 8.2.5.5.1 Where soffits exceed more than 8 in. (200 mm) in width or projection from the wall, sprinklers shall be installed under the soffit.

Table 8.2.5.4.2(b) Positioning of Sprinklers to Avoid Obstructions Along Wall (Residential Sidewall Sprinklers)

Distance from Sidewall Sprinkler to Side of Obstruction (A)		Maximum Allowable Distance of Deflector Above Bottom of Obstruction (B)	
ft	mm	in.	mm
Less than 1.5	Less than 450	0	0
1.5 or more	450 or more	1	25
3 or more	900 or more	3	75
4 or more	1200 or more	5	125
4.5 or more	1400 or more	7	175
6 or more	1800 or more	9	225
6.5 or more	2000 or more	11	275
7 to less than 7.5	2200 to less than 2300	14	350

Note: For A and B, refer to Figure 8.2.5.4.2(b).

**Elevation View****FIGURE 8.2.5.4.2(a) Positioning of Sprinkler to Avoid Obstruction (Residential Sidewall Sprinklers).****Elevation View****FIGURE 8.2.5.4.2(b) Positioning of Sprinkler to Avoid Obstruction Along Wall (Residential Sidewall Sprinklers).****Elevation View****FIGURE 8.2.5.4.2(c) Positioning of Sprinkler to Avoid Obstructions Against Walls — Scenario 1 (Residential Sidewall Sprinklers).****Elevation View****FIGURE 8.2.5.4.2(d) Positioning of Sprinkler to Avoid Obstructions Against Walls — Scenario 2 (Residential Sidewall Sprinklers).**

8.2.5.5.2 Sidewall sprinklers shall be permitted to be installed in the face of a soffit located directly over wall cabinets, without requiring additional sprinklers below the soffit or wall cabinets, where the soffit does not project horizontally more than 12 in. (300 mm) from the wall.

8.2.5.5.3 Where sidewall sprinklers are more than 3 ft (0.91 m) above the top of wall cabinets, the sprinkler shall be permitted to be installed on the wall above the cabinets where the cabinets are no greater than 12 in. (300 mm) from the wall.

8.2.5.6 Shadow areas in corridors up to 2 ft (0.61 m) in depth and up to 9 ft (2.7 m) in length behind sidewall sprinklers shall be permitted as shown in Figure 8.2.5.6.