Second Revision No. 15-NFPA 13D-2017 [Chapter 2]

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,* 2019 edition.

NFPA 70®, *National Electrical Code®*, 2017 edition.

NFPA 72®, *National Fire Alarm and Signaling Code,* 2019 edition.

NFPA 220, *Standard on Types of Building Construction,* 2018 edition.

NFPA 750, *Standard on Water Mist Fire Protection Systems,* 2019 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*, 2015.

ASME B16.3, *Malleable Iron Threaded Fittings, Classes 150 and 300*, ~~2011~~ 2016 .

ASME B16.4, *Gray Iron Threaded Fittings*, Classes 125 and 250, ~~2011~~ 2016 .

ASME B16.5, *Pipe Flanges and Flanged Fittings, NPS 1/2 through NPS 24 Metric/Inch Standard*, 2013.

ASME B16.9, *Factory-Made Wrought Buttwelding Fittings*, 2012.

ASME B16.11, *Forged Fittings, Socket-Welding and Threaded*, ~~2011~~ 2016 .

ANSI/ASME B16.15, *Cast ~~Bronze~~ Copper Alloy Threaded Fittings: Classes 125 and 250* , 2013.

ASME B16.18, *Cast Copper Alloy Solder Joint Pressure Fittings*, 2012.

ASME B16.22, *Wrought Copper and Copper Alloy Solder Joint Pressure Fittings*, 2013.

ASME B16.25, *Buttwelding Ends*, 2012.

ASME B36.10M, *Welded and Seamless Wrought Steel Pipe*, 2015.

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*, 2012.

ASTM A135/A135M, *Standard Specification for Electric-Resistance-Welded Steel Pipe*, ~~2012~~ 2009 (2014) .

ASTM A234/A234M, *Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service*, ~~2013 e1.~~ 2016.

ASTM A795/A795M, *Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use*, 2013.

ASTM B32, *Standard Specification for Solder Metal*, 2008 (2014) .

ASTM B43, *Standard Specification for Seamless Red Brass Pipe, Standard Sizes* , 2015.

ASTM B75/B75M, *Standard Specification for Seamless Copper Tube*, 2011.

ASTM B88, *Standard Specification for Seamless Copper Water Tube*, ~~2014~~ 2016 .

ASTM B251, *Standard Specification for General Requirements for Wrought Seamless Copper and Copper-Alloy Tube*, 2010.

ASTM B813, *Standard Specification for Liquid and Paste Fluxes for Soldering Applications 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*, 2015.

ASTM F438, *Standard Specification for Socket-Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40*, 2015.

ASTM F439, *Standard Specification for Socket-Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80*, 2013.

ASTM F442/F442M, *Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR)*, 2013 e1.

ASTM F876, *Standard Specification for Crosslinked Polyethylene (PEX) Tubing*, ~~2015~~ 2015a .

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*, 2011.

2.3.4 Other Publications.

Merriam-Webster's Collegiate Dictionary, 11th edition, Merriam-Webster, Inc., Springfield, MA, 2003.

2.4 References for Extracts in Mandatory Sections.

NFPA 13R, *Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies,* 2019 edition.

NFPA 5000®, Building Construction and Safety Code®, 2018 edition.

Submitter Information Verification

Submitter Full Name: Chad
Organization: [Not Specified]
Street Address:
City:
State:

Zip:

Submittal Date: Sat Jun 24 21:42:46 EDT 2017

Committee Statement

Committee Statement: Editorial.

Response Message:

Second Revision No. 1-NFPA 13D-2017 [Section No. 7.4.5]

7.4.5*

Where sprinkler piping is exposed to the sprinkler protected area, it shall be supported with metal hangers or hangers ~~listed for this application~~ made of the same material as the structure .

A.7.4.5

Wood attached or fastened to the structure used as part of a trapeze hanger is considered an extension of the structure and is considered acceptable to hang sprinkler piping.

Submitter Information Verification

Submitter Full Name: Chad
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Wed Jun 21 08:31:21 EDT 2017

Committee Statement

Committee Statement: This proposal will clarify misconceptions about hanging pipe from a wooden structure. AHJ's have been disallowing this as they consider a wood trapeze to be a nonmetallic hanger.

This language will also address the concerns of the correlating committee (see CN-1)

Annex note submitted as separate PC

A.7.4.5

Wood used as part of a trapeze hanger is considered an extension of the structure and is considered acceptable to hang sprinkler piping.

Response Message:

Public Comment No. 15-NFPA 13D-2017 [Section No. 7.4.5]

Public Comment No. 16-NFPA 13D-2017 [New Section after A.7.4.4]

Public Comment No. 2-NFPA 13D-2017 [Global Input]

Public Comment No. 3-NFPA 13D-2017 [Global Input]

Second Revision No. 2-NFPA 13D-2017 [Section No. 8.1.3.1.2]

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.

A.8.1.3.1.2

See A.10.2.4.

For situations not meeting the conditions of 8.1.3.1.1 , sprinkler coverage should be determined in consultation with the manufacturer and the authority having jurisdiction as appropriate for the conditions.

Submitter Information Verification

Submitter Full Name: Chad
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Wed Jun 21 08:38:52 EDT 2017

Committee Statement

Committee Statement: For situations outside the listing of sprinklers, consultation with the manufacturer and the AHJ should be performed. Section 1.4.1 and 4.5 currently require that documentation be submitted to the AHJ to establish equivalency.

Response Message:

Public Comment No. 22-NFPA 13D-2017 [Section No. 8.1.3.1.2]

Second Revision No. 13-NFPA 13D-2017 [New Section after 8.2.1.2]

8.2.1.3

Concealed sprinklers shall be permitted to be installed in beams up to 4 in. (100 mm) in depth.

Submitter Information Verification

Submitter Full Name: Chad
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jun 22 15:57:03 EDT 2017

Committee Statement

Committee Statement: Following discussions at the first draft meeting on the installation of residential pendent sprinklers below beams, the question was raised if this would also apply to concealed sprinklers. Upon review of existing test data, a recommendation was made to limit concealed sprinklers installed under beams to no greater than 4 inches in depth. This language would clarify that the previous section would not apply to concealed sprinklers.

Response Message:

Second Revision No. 14-NFPA 13D-2017 [Section No. 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, 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~~, including flush-type 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) .

Figure 8.2.1.2(a) Position of Sprinkler Under a Beam.

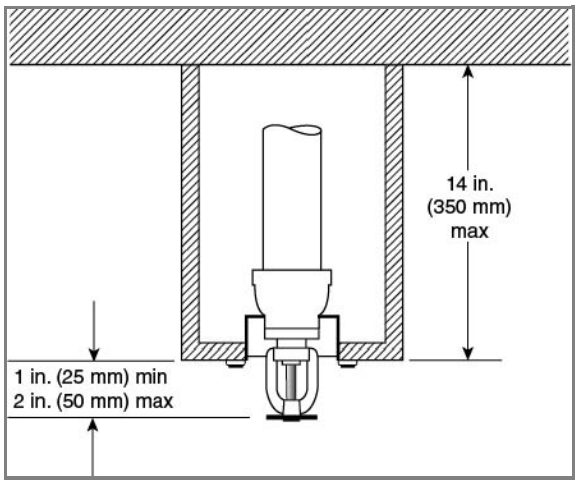
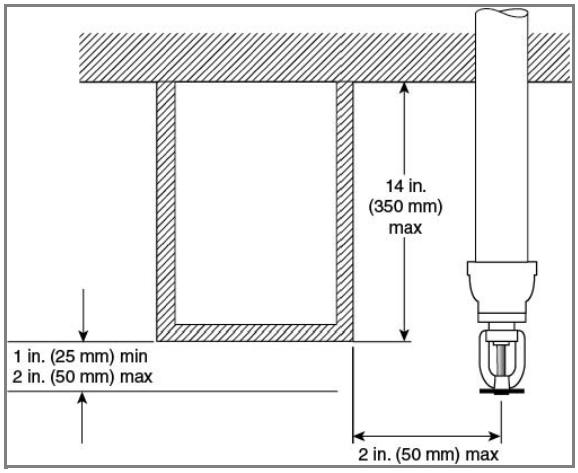


Figure 8.2.1.2(b) Position of Sprinkler Adjacent to a Beam.



A.8.2.1.2

Concealed sprinklers should not be considered flush-type sprinklers.

Supplemental Information

File Name	Description	Approved
Figures_8.2.1.2.pdf	New Figure 8.2.1.2(1) and Figure 8.2.1.2(2)--for staff use	

Submitter Information Verification

Submitter Full Name: Chad
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jun 22 15:59:52 EDT 2017

Committee Statement

Committee Statement: This comment is in support of FR 32 and seeks to add two figures to illustrate the requirements for installing sprinklers under and adjacent to beams,

Note this section and new figures have also been to submitted to NFPA 13 and the figures submitted to NFPA 13R. See attached figures, Figure 8.2.1.2(1) and Figure 8.2.1.2(2).

Response Message:

Public Comment No. 18-NFPA 13D-2017 [Section No. 8.2.1.2]

Second Revision No. 16-NFPA 13D-2017 [Section No. 8.2.5.5.3]

8.2.5.5.3

Where sidewall sprinklers are more than 3 ft (0.91 m) above the top of cabinets, the sprinkler shall be permitted to be installed on the wall above the cabinets where the cabinets are no greater than 12 in. (~~900 mm~~ 300 mm) from the wall.

Submitter Information Verification

Submitter Full Name: Chad Duffy
Organization: National Fire Protection Assoc
Street Address:
City:
State:
Zip:
Submittal Date: Mon Jul 24 14:24:01 EDT 2017

Committee Statement

Committee Statement: Editorial revision.
Response Message:

Second Revision No. 8-NFPA 13D-2017 [Section No. 8.3.1]

8.3.1

Sprinklers shall be installed in all areas except where omission is permitted by 8.3.2 through ~~8.3.8~~ 8.3.9 .

Submitter Information Verification

Submitter Full Name: Chad
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jun 22 09:54:28 EDT 2017

Committee Statement

Committee Statement: 8.3.1 has been revised due to the addition of new section 8.3.5 and renumbering of subsequent text.
Response Message:

Second Revision No. 7-NFPA 13D-2017 [New Section after 8.3.4]

8.3.5

Sprinklers shall not be required within an attached enclosed swimming pool or tennis court rooms where provided with a minimum of one exit door exiting directly to the exterior.

Submitter Information Verification

Submitter Full Name: Chad
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jun 22 09:52:01 EDT 2017

Committee Statement

Committee Statement: Limited fuel loading if any. Ceiling configurations generally unique, to include high ceilings, peaks, slopes, skylights ,etc. making it difficult to position and space sprinklers in accordance with listing requirements. Not listed (data) as areas of origin within annex table A.1.2.(a). Pool water and or tennis court floors usually not associated as source of ignition, ref: Annex table A.1.2 (c). These room areas are not anticipated to be used for sleeping purposes. Other sections of 8.3 permit sprinkler omissions with greater fuel loadings than what would be anticipated within these areas. Renumber the following sections accordingly.

Response Message:

Second Revision No. 4-NFPA 13D-2017 [Section No. 12.3.6.1]

12.3.6.1*

In a detached dwelling or a manufactured home the sprinkler system shall be permitted to be put in an inactive state for any of the following reasons:

(1) After a manufactured home has been installed and tested in the factory and is being prepared for shipment

(2) When a manufactured home is being stored for future occupancy

(3) When the detached dwelling is unoccupied during renovation work, with notification and approval of the AHJ

(4) When the detached dwelling is unoccupied for an extended period of time, with notification and approval of the AHJ

A.12.3.6.1

The primary purpose of this standard is protection against injury and life loss. There are many instances when an installed system needs to be taken out of service such as for shipping or storage of a manufactured home, when extensive renovation or remodeling work is going on in the home, or when the home will be unoccupied for an extended period of time such as when a summer home is closed up for winter. This section provides guidance for taking an installed system out of service when there is little or no risk of injury or life loss. This guidance is especially needed when the detached dwelling or manufactured home is subject to freezing temperatures. Once the home is to be occupied again, the system should be tested for leaks and the system and components inspected and tested before being restored to service.

Submitter Information Verification

Submitter Full Name: Chad
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Wed Jun 21 10:21:26 EDT 2017

Committee Statement

Committee Statement: This note clarifies that it is acceptable to turn the system off when there will not be occupants for extended periods of time.
Response Message:

Public Comment No. 12-NFPA 13D-2017 [Section No. 12.3.6.1]

Second Revision No. 9-NFPA 13D-2017 [Section No. A.6.2]

A.6.2

The connection to city mains for fire protection is often subject to local regulation of metering and backflow prevention requirements. Preferred and acceptable water supply arrangements are shown in Figure A.6.2(a) through Figure A.6.2(e). Where it is necessary to use a meter between the city water main and the sprinkler system supply, an acceptable arrangement as shown in Figure A.6.2(c) and Figure A.6.2(d) can be used. Under these circumstances, the flow characteristics of the meter are to be included in the hydraulic calculation of the system *[see Table 10.4.4(a)]*. Where a tank is used for both domestic and fire protection purposes, a low water alarm that actuates when the water level falls below 110 percent of the minimum quantity specified in 6.1.2 should be provided.

The effect of pressure-reducing valves on the system should be considered in the hydraulic calculation procedures.

Figure A.6.2(a), Figure A.6.2(c), or Figure A.6.2(d) are acceptable methods for getting the water supply into the unit for a stand-alone sprinkler system (one that does not also provide direct connections to the cold water fixtures) because the common supply pipe for the domestic system and the sprinkler system between the water supply and the dwelling unit has a single control valve that shuts the sprinkler system, which helps to ensure that people who have running water to their domestic fixtures also have fire protection. This serves as a form of supervision for the control valve and can be used to make sure that the valve stays open in place of other, more expensive options such as tamper switches with a monitoring service.

Some water utilities ~~insist on~~ choose to install separate taps and supply pipes from the water supply to the dwelling unit for fire sprinkler systems as shown in Figure A.6.2(d), due to ~~concerns about shutting off the water supply for nonpayment of bills and the desire not to shut off fire protection if this ever occurs~~ the preference to not shut off water to piping that includes fire supply as well as domestic water supply. While these types of arrangements are acceptable, they might not be cost efficient and should be ~~discouraged~~ evaluated due to the extra cost burden this places on the building owner. ~~It is extremely rare that the water utilities would actually shut off water for nonpayment, and even if they do they are creating a situation in which the dwelling would be unfit for occupation.~~

Single services should be acceptable as NFPA 13D is a life safety standard. This means that the purpose of the standard is to protect human life and not to necessarily protect property. In the event that the domestic water supply is shut off, plumbing code dictates that the home is uninhabitable and thus should be vacated. If there are no occupants within the home then there are no life safety concerns.

Additionally, having a single service connection provides some assurance that the water supply to the sprinkler system is operational.

Figure A.6.2(a) Minimum Requirements for a Stand-Alone System.

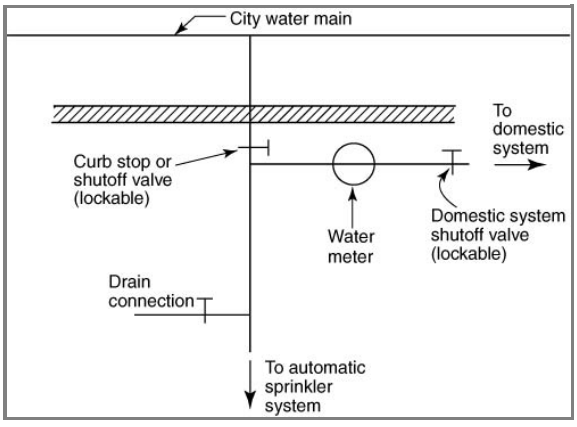


Figure A.6.2(b) Acceptable Arrangement for Stand-Alone Piping Systems — Option 1.

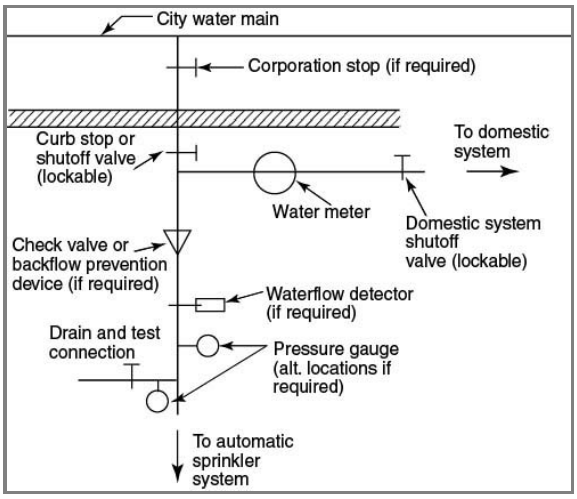


Figure A.6.2(c) Acceptable Arrangement for Stand-Alone Piping System — Option 2.

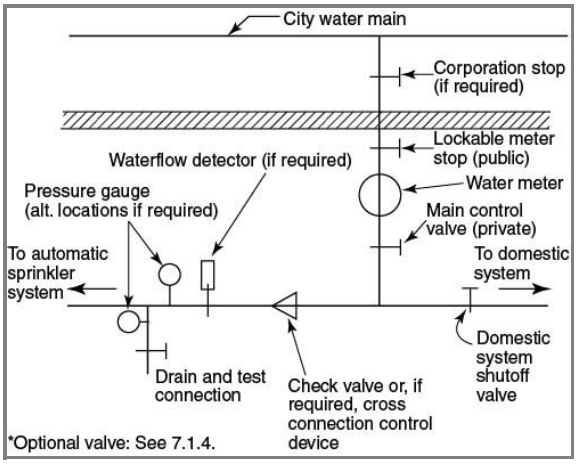


Figure A.6.2(d) Acceptable Arrangement for Stand-Alone Piping Systems — Option 3.

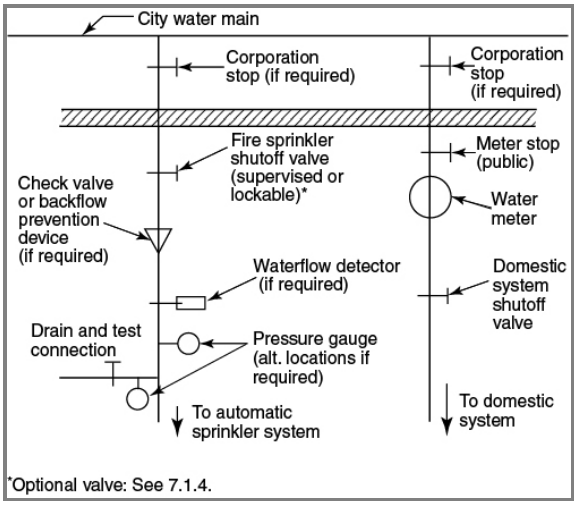
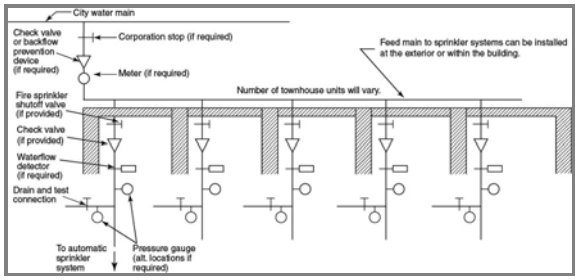


Figure A.6.2(e) Acceptable Arrangement for Townhouse Stand-Alone Piping Systems.



Supplemental Information

File Name	Description	Approved
NFPA_13D_Fig_A_6_2_e_Model_1_.pdf	Revised Figure A.6.2(e)--for staff use	

Submitter Information Verification

Submitter Full Name: Chad
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jun 22 10:29:27 EDT 2017

Committee Statement

Committee Statement: Figure has been modified to remove the connection line shown on the inside and a note has been added to clarify that the supply can be either inside or outside of the structure. See revised attached Figure. The text has been modified to take into account concerns raised by the water utility industry.

Response Message:

Public Comment No. 14-NFPA 13D-2017 [Section No. A.6.2]

Second Revision No. 10-NFPA 13D-2017 [Section No. A.6.2.3]

A.6.2.3

~~The best method for getting the water supply into the unit for a stand-alone sprinkler system (one that does not also provide direct connections to the cold water fixtures) is to have a common pipe for the domestic system and the sprinkler system between the water supply and the dwelling unit. Once inside the dwelling unit, the pipes can be split to provide the individual domestic and sprinkler systems. In this arrangement, a single control valve on the combined pipe (prior to the split) as shown in Figure A.6.2(a) being the only control valve that shuts the sprinkler system is preferred because it ensures that people who have running water to their domestic fixtures also have fire protection. This serves as a form of supervision for the control valve and can be used to make sure that the valve stays open in place of other, more expensive options such as tamper switches with monitoring service.~~

~~Some water utilities insist on separate taps and supply pipes from the water supply to the dwelling unit for fire sprinkler systems due to concerns about shutting off the water supply for nonpayment of bills and the desire not to shut off fire protection if this ever occurs. While this type of arrangement is acceptable *[see Figure A.6.2(b)]* , it is not cost efficient and should be discouraged due to the extra burden this places on the building owner. The concern over shutting off the water for nonpayment of bills is a nonissue for a number of reasons. First, the water utilities rarely actually shut off water for nonpayment. Second, if they do shut off water for nonpayment, they are creating violations of all sorts of health and safety codes, allowing people to live in a home without running water. Concern over the fire protection for those individuals when they are violating all kinds of other health codes is disingenuous. More likely, the water utility will not shut off the water and will follow other legal avenues to collect on unpaid bills such as liens on property. Millions of people should not have to pay hundreds of millions of dollars to install separate water taps and lines for the few services that might get shut off.~~ In a situation where a two-family dwelling or townhouse has a common water supply, there must be a way to isolate the sprinkler system in one unit without having to enter another unit. Where each unit has its own shutoff valve and one unit suffers a fire event and cannot be occupied, the damaged unit can be isolated and other units can remain occupied because they have functioning sprinkler systems.

Submitter Information Verification

Submitter Full Name: Chad
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jun 22 10:48:09 EDT 2017

Committee Statement

Committee Statement: Currently this section is an almost word-for-word copy of the previous section. It doesn't seem as though the language needs to be repeated. The language on page 64 of the 13D/13R handbook in the handbook (Ask the AHJ) would be more appropriate to clarify this section.

Response Message:

Second Revision No. 5-NFPA 13D-2017 [Section No. A.7.5.6.3(3)]

A.7.5.6.3(3)

See Figure A.7.5.6.3(3)(a), ~~and~~ Figure A.7.5.6.3(3)(b), Figure A.7.5.6.3(3)(c) , and Figure A.7.5.6.3(3)(d) .

Figure A.7.5.6.3(3)(a) Recessed Fireplace — Ordinary Temperature Sprinkler Location .

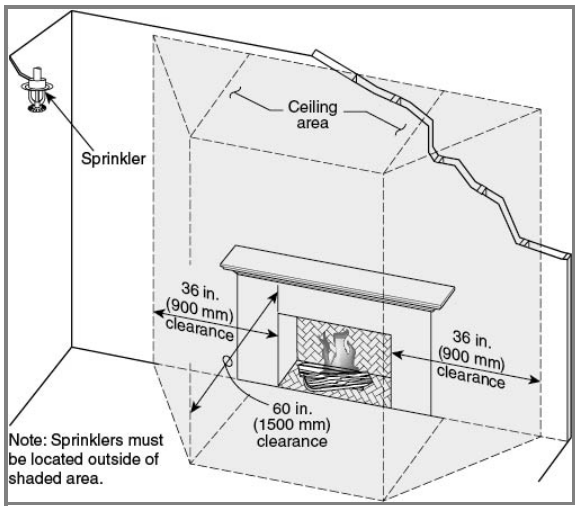


Figure A.7.5.6.3(3)(b) ~~Open Fireplace~~ Recessed Fireplace — Intermediate Temperature Sprinkler Location .

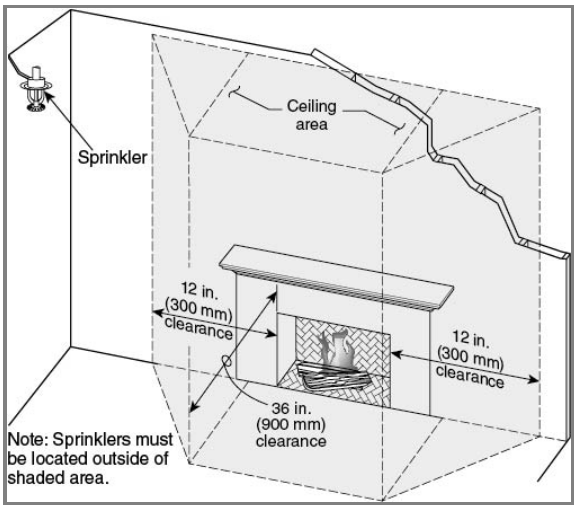


Figure A.7.5.6.3(3)(c) Open Fireplace — Ordinary Temperature Sprinkler Location.

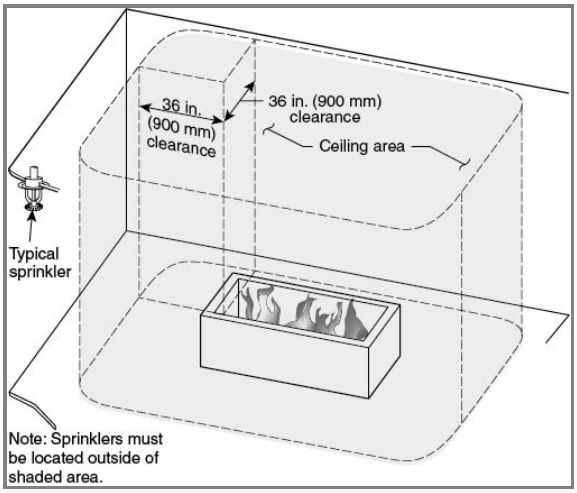
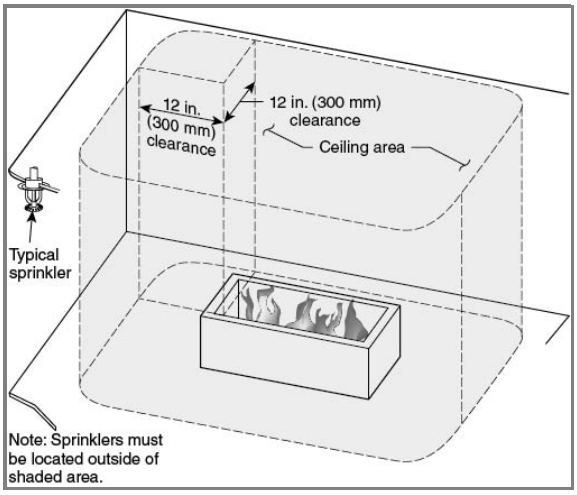


Figure A.7.5.6.3(3)(d) Open Fireplace — Intermediate Temperature Sprinkler Location.



Supplemental Information

File Name	Description	Approved
Figure_A.7.5.6.3_3_a_Recessed_Fireplace_Ordinary_Temperature_Sprinkler_Location.pdf	New Figures A.7.5.6.3(3)(a) through A.7.5.6.3(3)	

	(d)--for staff use
Figure_A.7.5.6.3_3_b_Recessed_Fireplace_Intermediate_Temperature_Sprinkler_Location.pdf	New Figures A.7.5.6.3(3)(a) through A.7.5.6.3(3) (d)--for staff use
Figure_A.7.5.6.3_3_c_Open_Fireplace_Ordinary_Temperature_Sprinkler_Location.png	New Figures A.7.5.6.3(3)(a) through A.7.5.6.3(3) (d)--for staff use
Figure_A.7.5.6.3_3_d_Open_Fireplace_Intermediate_Temperature_Sprinkler_Location.png	New Figures A.7.5.6.3(3)(a) through A.7.5.6.3(3) (d)--for staff use

Submitter Information Verification

Submitter Full Name: Chad
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Wed Jun 21 10:50:43 EDT 2017

Committee Statement

Committee Statement: Improved drawings have been submitted to illustrate the concept accepted in the First Revision. This should be correlated across NFPA 13 and NFPA 13R. See attached figures.

Response Message:

Public Comment No. 13-NFPA 13D-2017 [Section No. A.7.5.6.3(3)]

Second Revision No. 11-NFPA 13D-2017 [Section No. A.10.2]

A.10.2

All residential sprinklers have been investigated under a flat, smooth, 8 ft (2.4 m) high horizontal ceiling. Some residential sprinklers have been investigated and listed for use under specific ceiling configurations such as a horizontal beamed ceiling. The performance of residential sprinklers under flat, smooth, horizontal ceilings has been well documented throughout the life of NFPA 13D. Prior to 2010, several manufacturers of residential sprinklers had performed testing and received listings for residential sprinklers under certain slopes and in certain beam conditions. In 2010, the Fire Protection Research Foundation (FPRF) conducted a research project consisting of 76 FDS simulations and 12 full-scale fire tests. The results have been used to develop system design criteria in a generic manner to simplify the use of residential sprinklers. Some residential sprinkler listings still exist for situations beyond the scope of the generic design. See the FPRF report, "Analysis of the Performance of Residential Sprinkler Systems with Sloped or Sloped and Beamed Ceilings," dated July 2010, for more information.

Questions are frequently asked regarding the minimum two sprinkler design when certain sprinkler performance statistics have indicated that in a majority of the cases (with residential sprinklers) the fire is controlled or suppressed with a single sprinkler. While these statistics might or might not be accurate, the water supplies for the fire sprinkler systems under which these statistics were generated were designed for two or more sprinklers in the first place. When the fires occurred, the first sprinkler operated in excess of its individual design flow and pressure because the sprinkler system's water supply was strong enough to handle multiple sprinklers and only a single sprinkler opened. At these higher flows and pressures, the discharge from a single sprinkler was sufficient to limit or suppress the heat generated from the fire. This concept is called "hydraulic increase." Hydraulic increase can also occur when a water supply's capabilities during the fire event exceeded that required by the minimum design requirements of the standard. Since none of the data used to generate the previously mentioned statistics captured the capabilities of the water supply in relation to the design requirements, the impact of the hydraulic increase on the number of single sprinkler activations cannot be determined.

But if the minimum water supply requirement of the standard is reduced to only be capable of handling a single sprinkler, then there could be no hydraulic increase safety factor. When the first sprinkler opens, it will only get the flow and pressure that were originally designed for it, and the potential is significant for that to be insufficient to control the fire, given any obstructions and the layout of the space where the fire starts.

The National Institute for Standards and Technology (NIST), under a grant from the United States Fire Administration, studied this concept several years ago in the hopes of being able to propose a single-sprinkler flow for the 2007 edition of NFPA 13D (see NIST Report NIST GCR 05-875 prepared by Underwriters Laboratories with a publication date of February 2004). Unfortunately, the research did not support the design of a sprinkler system with only the flow for a single sprinkler, even under conditions of small rooms with flat, smooth ceilings. Without the hydraulic increase associated with the two-sprinkler design, the fire scenarios were too many where the first sprinkler to open would have insufficient flow to control the fire and then multiple sprinklers would open, causing the room to reach untenable conditions and the water supply to be overrun. These same fire scenarios were easily controlled by a sprinkler system designed for a two-sprinkler water supply from the start.

In addition to the NIST tests, the National Fire Sprinkler Association conducted a series of full-scale fire tests in simulated bedrooms that were 14 ft × 14 ft (4.2 m × 4.2 m) with an adjoining hallway, each with flat, smooth, 8 ft (2.4 m) high ceilings. The tests were performed to determine better rules for keeping sprinklers clear of obstructions like ceiling fans, but baseline tests were also performed without any obstructions at the ceiling. In nine out of the twelve tests, including the two baseline tests without obstructions at the ceiling, a sprinkler in the hall outside the room of fire origin opened first, followed by the sprinkler in the room of origin. Even though the room of origin met all of the rules of NFPA 13D as a compartment, a sprinkler outside of this room was opening first. All of these fires were controlled by the sprinklers, but if the water supply had only been sufficient for a single sprinkler, the sprinklers might not have been able to provide fire control.

For examples of selecting a compartment for consideration, see Figure A.10.2(a), ~~and~~ Figure A.10.2(b), and Figure A.10.2(c), which show examples of design configurations for compartments based on the presence of lintels to stop the flow of heat. In all three figures, the area under consideration for determining the number of design sprinklers is the living room. In Figure A.10.2(a), the living room is considered a compartment since the opening to the hall has an 8 in. (200 mm) lintel, the opening to the dining room has an 8 in. (200 mm) lintel, and all openings on that wall are limited to 8 ft (2.4 m). In Figure A.10.2(b), the living room and dining room are considered one compartment due to the lack of a lintel between the two spaces. The hall is a separate compartment since there is still an 8 in. (200 mm) lintel between the living room and hall. In Figure A.10.2(c), the living room, dining room, and hall are considered one compartment since there are no lintels separating those spaces.

Figure A.10.2(a) Sprinkler Design Areas for Typical Residential Occupancy — ~~Without Lintel~~ With Lintel Between Adjoining Spaces: Dining Room and Hall .

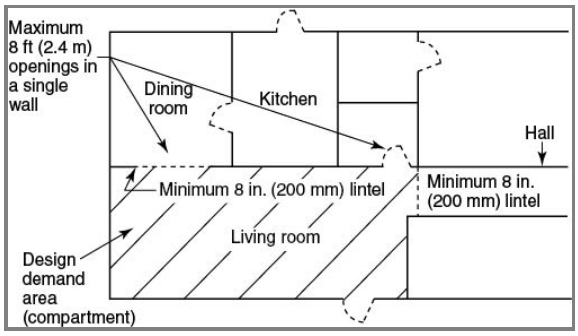


Figure A.10.2(b) Sprinkler Design Areas for Typical Residential Occupancy — Without Lintel Between Dining Room, With Lintel Between Hall .

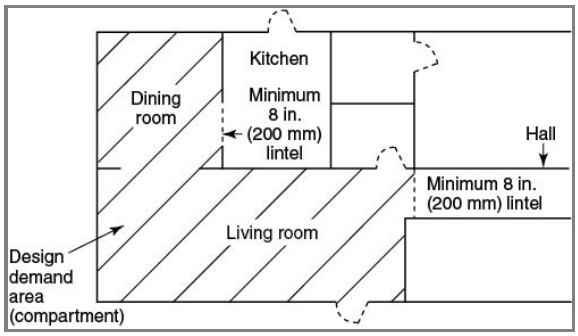
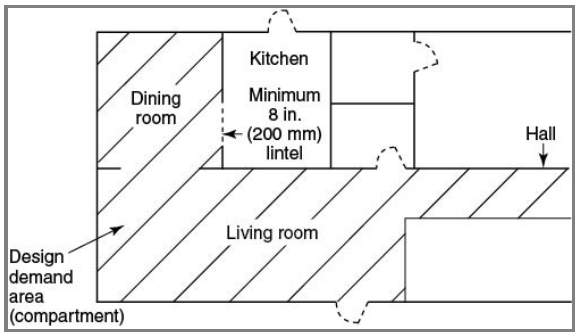


Figure A.10.2(c) Sprinkler Design Areas for Typical Residential Occupancy — Without Lintel Between Adjoining Spaces: Dining Room and Hall.



Supplemental Information

File Name	Description	Approved
NFPA_13D_Figure_A.10.2.pdf	New Figures A.10.2(a), A.10.2(b), and A.10.2(c)--for staff use	

Submitter Information Verification

Submitter Full Name: Chad
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jun 22 11:12:35 EDT 2017

Committee Statement

Committee Statement: The annex text has been modified to clarify the application of the rules regarding the definition of compartment. The existing figures have been modified and a new figure has been added. See attached figures.

Response Message:

Second Revision No. 12-NFPA 13D-2017 [Section No. A.12.3.6.2.1]

A.12.3.6.2.1

For drops less than 4 in. (100 mm) long, the branch line piping and the drops can both be installed in areas subject to freezing. Tests prove that if the branch line is empty of water and water is in a drop, when ice forms it will expand into the branch piping without harming the sprinkler or the system piping.

For horizontal sidewall sprinklers, the testing manifolds were comprised of 1 in. (25 mm) CPVC pipe and fittings, and the sprinklers were installed into 1 in. × ½ in. (25 mm × 15 mm) sprinkler adapter reducing elbows that were located 4 in. (100 mm) from the centerline of the branch line. For pendent sprinklers, the testing manifolds were comprised of 1 in. (25 mm) CPVC pipe and fittings, and the sprinklers were installed into a 1 in. × ½ in. (25 mm × 15 mm) sprinkler adapter fitting with a 4 in. (100 mm) long pipe nipple.

Submitter Information Verification

Submitter Full Name: Chad
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jun 22 11:40:02 EDT 2017

Committee Statement

Committee Statement: The 4 inch dimension in the standard could be misunderstood and needs to be clarified. Adding the dimensions provided by the test will give the user more information. Also, CPVC is not mentioned in either 12.3.6.2.1 or its Annex, and since the testing used CPVC, this should be noted.

Response Message:

Second Revision No. 6-NFPA 13D-2017 [Section No. B.1.2.1]

B.1.2.1 ASTM Publications.

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

ASTM A135, *Standard Specification for Electric-Resistance-Welded Steel Pipe*, 2006.

ASTM E84, *Standard Test Method for Surface Burning Characteristics of Building Materials*, ~~2009~~ 2016 .

ASTM F437, *Standard Specification for Threaded Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80*, 1996.

ASTM F438, *Standard Specification for Socket-Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40*, 1997.

ASTM F439, *Standard Specification for Socket-Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80*, 1997.

ASTM F442, *Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR)*, 1997.

ASTM F876, *Standard Specification for Crosslinked Polyethylene (PEX) Tubing*, 2008.

IEEE/ASTM SI 10, *Standard for Use of the International System of Units (SI): The Modern Metric System*, 1997.

Submitter Information Verification

Submitter Full Name: Chad
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Wed Jun 21 10:51:56 EDT 2017

Committee Statement

Committee Statement: date update
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Public Comment No. 11-NFPA 13D-2017 [Section No. B.1.2.1]