

Series LFII Residential Sprinkler Design Guide

Table of Contents

SECTIONS

<i>General</i>	1
<i>Design — Background</i>	1
<i>Design — Hydraulics</i>	2
<i>Design — Sprinkler Location</i>	3
<i>Design — Beam Ceilings</i>	16
<i>Installation</i>	18
<i>Care and Maintenance</i>	18
<i>Limited Warranty</i>	18

TABLES

<i>Series LFII Residential Sprinklers</i>	1
<i>Rise over Run Conversion To Degrees of Slope</i>	3

FIGURES

<i>Spacing Under Horizontal Ceilings (Parts 1 and 2)</i>	4-5
<i>Spacing Under Sloped Ceilings (Parts 1 thru 7)</i>	6-11
<i>Spacing To Avoid Obstructions</i>	12
<i>Positioning Of Sprinklers With Respect To Obstructions Along Walls</i>	13
<i>Proximity To Heat Sources (Parts 1 and 2)</i>	14-15
<i>Beam Ceilings</i>	16-18

SPRINKLER/MODEL IDENTIFICATION NUMBER	TYPE	TECHNICAL DATA SHEET NUMBER
TY2234	Pendent and Recessed Pendent, K=4.9	TFP400
TY4234	Pendent, Recessed, and Concealed Pendent, K=6.9	TFP408
TY1334	Horizontal Sidewall and Recessed Horizontal, K=4.2	TFP410
TY3334	Horizontal Sidewall and Recessed Horizontal, K=5.6	TFP415
TY2284	Flush Pendent, K=4.2	TFP420
TY2384	Flush Horizontal Sidewall, K=4.2	TFP425
TY2596	Concealed Pendent Flat Plate, K=4.2	TFP440
TY3596	Concealed Pendent Flat Plate, K=4.9	TFP442
TY2234	Concealed Pendent Domed Plate, K=4.9	TFP450

TABLE A, SERIES LFII RESIDENTIAL SPRINKLERS

General

Tyco Fire Products' (TFP) Residential Sprinklers are fast response automatic sprinklers. They are to be used only in wet pipe residential sprinkler systems for one- and two-family dwellings and mobile homes per NFPA 13D; wet pipe residential sprinkler systems for residential occupancies up to and including four stories in height per NFPA 13R; or, wet pipe sprinkler systems for the residential portions of any occupancy per NFPA 13.

This document provides design guidance for the Series LFII Residential Sprinklers outlined in Table A.

Residential fire sprinkler systems

should only be designed and installed by those competent and completely familiar with automatic sprinkler system design, installation procedures, and techniques. Several criteria may apply to a given installation and usage of each sprinkler. Consequently, the sprinkler system designer is recommended to review and develop a working understanding of the complete list of criteria prior to initiating the design of a residential fire sprinkler system.

WARNINGS

The Series LFII Residential Sprinklers described herein must be installed and maintained in compliance with this document, as well as with the applicable standards of the National Fire Pro-

tection Association, in addition to the standards of any other authorities having jurisdiction. **Failure to do so may impair the performance of these devices.**

The owner is responsible for maintaining their fire protection system and devices in proper operating condition. The installing contractor or sprinkler manufacturer should be contacted with any questions.

Design — Background

The design criteria for Residential Sprinklers begins with the Third Edition of Underwriters Laboratories Inc. UL 1626 dated July 10, 2001 — “Standard for Residential Sprinklers for Fire Protection Service”. All TFP Residential Sprinklers are tested and listed under UL 1626 with specific published spacings, flows, and pressures for each residential sprinkler identified by its sprinkler/model identification number and as detailed in the Technical Data Sheets referenced in Table A.

One of the most notable revisions incorporated into the Third Edition of UL 1626 is the new minimum flow rates that are effective for product manufactured after July 12, 2002, which is intended for installation in new systems. When establishing a flow rate for UL Listing, the manufacturer must use a minimum required discharge that correlates to a 0.05 gpm/ft². Due to wall wetting requirements, the understanding is that the density applied at the floor will be less than 0.05 gpm/ft². Also, the understanding in some cases is that the UL Listed flow rate may be greater than the calculated 0.05 gpm/ft² to be able to successfully pass the UL 1626 fire tests. Increased flow rates for sidewall type sprinklers is common.

The design criteria for residential sprinklers contained in the current NFPA Standards must be followed except as modified by the individual UL 1626 listing information provided in the Technical Data Sheets referenced in Table A and this design guide.

NOTE

The approval of all residential sprinkler designs and installations must be made by the Authority Having Jurisdiction (AHJ) for compliance with all governmental codes and standards.

Design — Hydraulics

NFPA13D. The number of design sprinklers shall include all sprinklers within a compartment up to a maximum of two sprinklers where specific UL Listed flows are provided. The minimum required sprinkler flow rate for systems designed to NFPA 13D are given in the Technical Data Sheets referenced in Table A, as a function of temperature rating and the maximum allowable coverage areas. *For actual coverage areas less than or between those indicated in the Technical Data Sheets referenced in Table A, it is necessary to use the minimum required flow for the next largest coverage area.*

Example No. 1: Assuming the use of a pendent sprinkler, the actual coverage area being protected is 14 ft. x 16 ft. In this case the minimum flow requirement for a 16 ft. x 16 ft. coverage area must be used.

Example No. 2: Assuming the use of a pendent sprinkler, the actual coverage area being protected is 17 ft. x 17 ft. In this case the minimum flow requirement for a 18 ft. x 18 ft. coverage area must be used.

NFPA13R. The number of design sprinklers shall include all sprinklers within a compartment up to a maximum of four sprinklers where specific UL Listed flows are provided. The minimum required sprinkler flow rate for systems designed to NFPA 13R are given in the Technical Data Sheets referenced in Table A, as a function of temperature rating and the maximum allowable coverage areas. *For actual coverage areas less than or between those indicated in the Technical Data Sheets referenced in Table A, it is necessary to use the minimum required flow for the next largest coverage area.*

Example No. 1: Assuming the use of a pendent sprinkler, the actual coverage area being protected is 14 ft. x 16 ft. In this case the minimum flow requirement for a 16 ft. x 16 ft. coverage area must be used.

Example No. 2: Assuming the use of a pendent sprinkler, the actual coverage area being protected is 17 ft. x 17 ft. In this case the minimum flow requirement for a 18 ft. x 18 ft. coverage area must be used.

NFPA 13. The number of design sprinklers is to be the the four most hydraulically demanding sprinklers. The minimum required discharge from each of the four sprinklers is to be the greater of the following:

- The flow rates given in the Technical Data Sheets referenced in Table A for NFPA 13D and 13R as a function of temperature rating and the maximum allowable coverage area. *For actual coverage areas less than or between those indicated in the Technical Data Sheets referenced in Table A, it is necessary to use the minimum required flow for the next largest coverage area.*
- A minimum discharge of 0.1 gpm/sq. ft. over the “design area” comprised of the four most hydraulically demanding sprinklers for the actual coverage areas being protected by the four sprinklers. *The greatest dimension of the actual coverage area cannot be any greater than the maximum coverage areas indicated in the Technical Data Sheets referenced in Table A.*

Example No.1: A corridor being protected is 8 ft. wide; consequently, an actual coverage area of 8 ft. x 20 ft. is being contemplated. Based on using the LFII (TY2234) Pendent Residential Pendent Sprinkler, the flow rate provided in TFP400 for a 20 ft x 20 ft. coverage area is 20 GPM. However based on minimum discharge of 0.1 gpm/sq. ft. the flow rate would be 16 GPM. In this case a minimum flow rate of 20 GPM for this design sprinkler must be utilized.

Example No.2: A long narrow room being protected is 12 ft. wide; consequently, an actual coverage area of 12 ft. x 20 ft. is being contemplated. Based on using the LFII (TY2234) Pendent Residential Pendent Sprinkler, the flow rate provided in TFP400 for a 20 ft x 20 ft. coverage area is 20 GPM. However based on minimum discharge of 0.1 gpm/sq. ft. the flow rate would be 24 GPM. In this case a minimum flow rate of 24 GPM for this design sprinkler must be utilized.

Compartment. A compartment is a space that is completely enclosed by walls and a ceiling. The compartment enclosure may have openings to an adjoining space, provided the openings have a minimum lintel depth of 8 inches from the ceiling.

Sloped Ceilings. For systems designed to NFPA 13, 13D, or 13R and where specific UL Listed flows have not been provided for sloped ceilings, consult with the local Authority Having Jurisdiction with regard to the number of “design sprinklers” for sloped ceilings having a slope greater than a 2 inch rise for a 12 inch run.

RISE, INCHES	12							60°	56°	53°	50°	46°	45°	
	11							58°	54°	51°	48°	45°	42°	
	10							59°	55°	51°	48°	45°	42°	40°
	9							56°	52°	48°	45°	42°	39°	37°
	8					58°	53°	49°	45°	42°	39°	36°	34°	
	7				60°	54°	49°	45°	41°	38°	35°	32°	30°	
	6				56°	50°	45°	41°	37°	34°	31°	29°	27°	
	5			59°	51°	45°	40°	36°	32°	29°	27°	24°	23°	
	4			63°	45°	39°	34°	30°	27°	24°	22°	20°	18°	
	3		56°	45°	37°	31°	27°	23°	21°	18°	17°	15°	14°	
	2		45°	34°	27°	22°	18°	16°	14°	13°	11°	10°	9°	
	1	45°	27°	18°	14°	11°	9°	8°	7°	6°	6°	5°	5°	
		1	2	3	4	5	6	7	8	9	10	11	12	

RUN, INCHES

TABLE B
RISE OVER RUN CONVERSION TO DEGREES OF SLOPE

Design — Sprinkler Location

When locating Residential Sprinklers, Sprinkler Spacing, Obstruction To Water Distribution, Heat Sensitivity, Preventing Cold Soldering, and Proximity To A Heat Source must all be considered.

Table B provides a conversion of “Rise Over Run” that is a conventional method of defining slope in architectural drawings to “Degrees Of Slope” as used in this guideline.

Sprinkler Spacing Under Horizontal Ceilings (Up to 9 degrees of slope). Residential sprinklers are utilized for various maximum spacings in accordance with minimum flows and pressures. Typical coverage areas for pendent sprinklers are 12 ft. x 12 ft. up to 20 ft. x 20 ft., and typical coverage areas for horizontal sidewall sprinklers are 12 ft. x 12 ft. up to 16 ft. x 20 ft. Refer to the Technical Data Sheets referenced in Table A for coverage areas, and refer to **Figure 1 for Spacing Rules Under Horizontal Ceilings**. Understanding the intended area of coverage while using this guide is critical.

Always remember that the spacing of

sprinklers under horizontal ceilings with slopes greater than 0 degrees (i.e., non-level) is measured along the slope when determining distance off of walls and between sprinklers.

Sprinkler Spacing Under Sloped Ceilings (10 to a 60 degrees of slope). Residential sprinklers are utilized for various maximum spacings in accordance with minimum flows and pressures. Typical coverage areas for pendent sprinklers are 12 ft. x 12 ft. up to 20 ft. x 20 ft., and typical coverage areas for horizontal sidewall sprinklers are 12 ft. x 12 ft. up to 16 ft. x 20 ft. Refer to the Technical Data Sheets referenced in Table A for coverage areas, and refer to **Figure 2 for Spacing Rules Under Sloped Ceilings**. Understanding the intended area of coverage while using this guide is critical.

Always remember that the spacing of sprinklers under sloped ceilings is measured along the slope when determining distance off of walls and between sprinklers.

Obstruction To Water Distribution. Location with respect to obstructions to water distribution are addressed by Figure 3. If a sprinkler water distribution pattern is obstructed, the obstruction is to be considered the maximum distance of coverage for a given sprinkler and additional sprinklers beyond the obstruction will be necessary.

Because of the varied nature of residential type construction, there will be some compartment designs that cannot be fully sprinklered in accordance with the recommendations of NFPA 13, 13D, or 13R. In the event of this condition, consult with the Authority Having Jurisdiction.

Appendix material in NFPA 13D and 13R references the evaluation of certain small areas.

Small areas created by architectural features such as planter box windows, bay windows, and similar features can be evaluated as follows:

(a) Where no additional floor space area is created by the architectural feature, no additional sprinkler protection is required.

(b) Where additional floor space is created by an architectural feature, no additional sprinkler protection is required, provided all of the following conditions are met:

- The floor area does not exceed 18 sq. ft.
- The floor area is not greater than 2 ft. in depth at the deepest point of the architectural feature to the plane of the primary wall where measured along the finished floor.
- The floor is not greater than 9 ft. in length where measured along the plane of the primary wall.

Measurement from the the deepest point of the architectural feature to the sprinkler should not exceed the maximum listed spacing of the sprinkler. The hydraulic design is not required to consider the area created by the architectural feature.

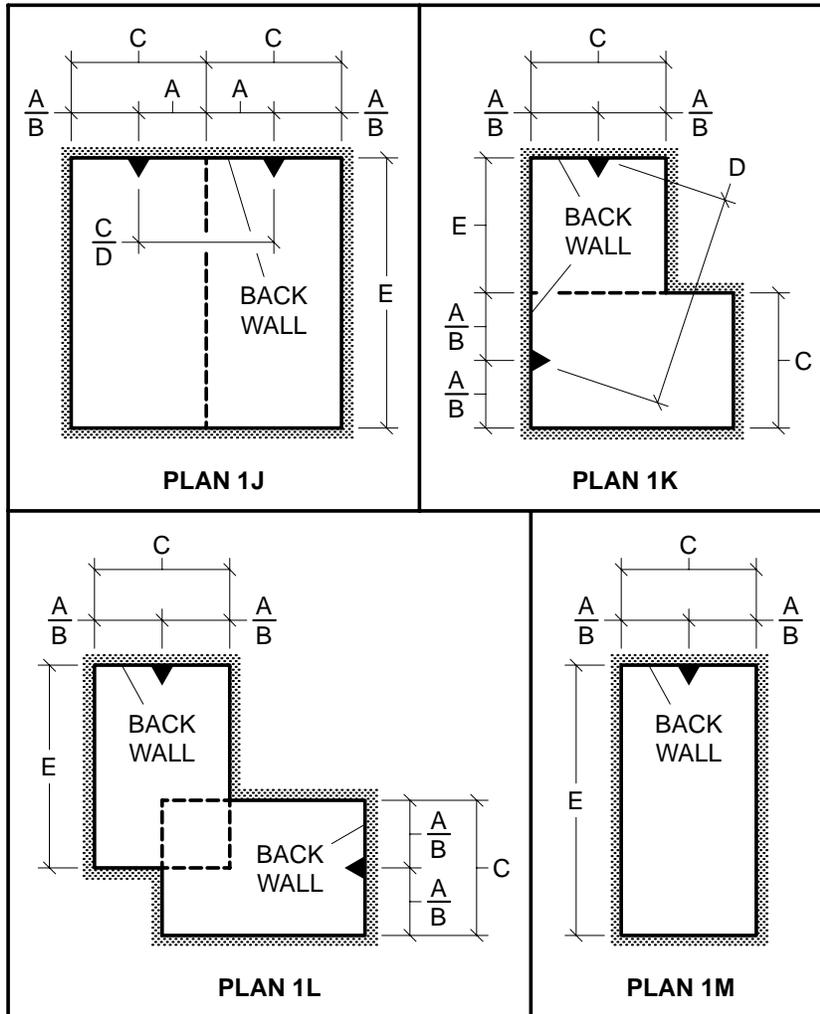
Figure 4 provides guidance for positioning of pendent and horizontal sidewall sprinklers with respect to obstructions along a wall, and in the case of pendent sprinklers the positioning of sprinklers on both sides of a continuous obstruction located at the ceiling. Consideration must be given to the size of the obstruction, as well as the allowable deflector-to ceiling distance.

Heat Sensitivity. Sensitivity to heat is critical for prompt operation of a residential sprinkler for a fire condition. The Technical Data Sheets referenced in Table A provide the allowable sprinkler deflector-to-ceiling distances.

Residential sprinklers are to be installed beneath smooth flat ceilings as defined by NFPA 13.

NOTE

Special consideration, such as increasing the number of design sprinklers being hydraulically calculated,



- A - UP TO ONE HALF THE MAXIMUM SPRINKLER SPACING (SEE TECHNICAL DATA SHEETS REFERENCED IN TABLE A) FOR THE COVERAGE AREA BEING HYDRAULICALLY CALCULATED.
- B - MINIMUM 4".
- C - UP TO THE MAXIMUM SPRINKLER WIDTH (SEE TECHNICAL DATA SHEETS REFERENCED IN TABLE A) FOR THE COVERAGE AREA BEING HYDRAULICALLY CALCULATED.
- D - MINIMUM 8'-0".
- E - UP TO THE MAXIMUM SPRINKLER LENGTH (SEE TECHNICAL DATA SHEETS REFERENCED IN TABLE A) FOR THE COVERAGE AREA BEING HYDRAULICALLY CALCULATED.
- ▼ SIDEWALL SPRINKLER.

NOTE

Sidewall sprinklers, where installed under a ceiling with a slope greater than 0 degrees to 9 degrees, must be located per one of the following:

- Locate the sprinklers at the high point of the slope and positioned to discharge down the slope.
- Locate the sprinklers along the slope and positioned to discharge across the slope.

**FIGURE 1 — PART 1 of 2
SPRINKLER SPACING UNDER HORIZONTAL CEILINGS
— SIDEWALL SPRINKLER —**

must be given to installations where continuous obstructions to heat flow are present (e.g., beams, lintels, etc.).

Under a sloped ceiling, the residential sprinkler(s) located at the highest elevation must not be located more than 3 feet measured vertically down from the peak.

Preventing Cold Solder. A minimum distance between residential sprinklers to prevent cold soldering (i.e., the wetting from an operated sprinkler onto an unoperated sprinkler that could prevent its potential to operate if needed) must be maintained.

Under horizontal ceilings, the mini-

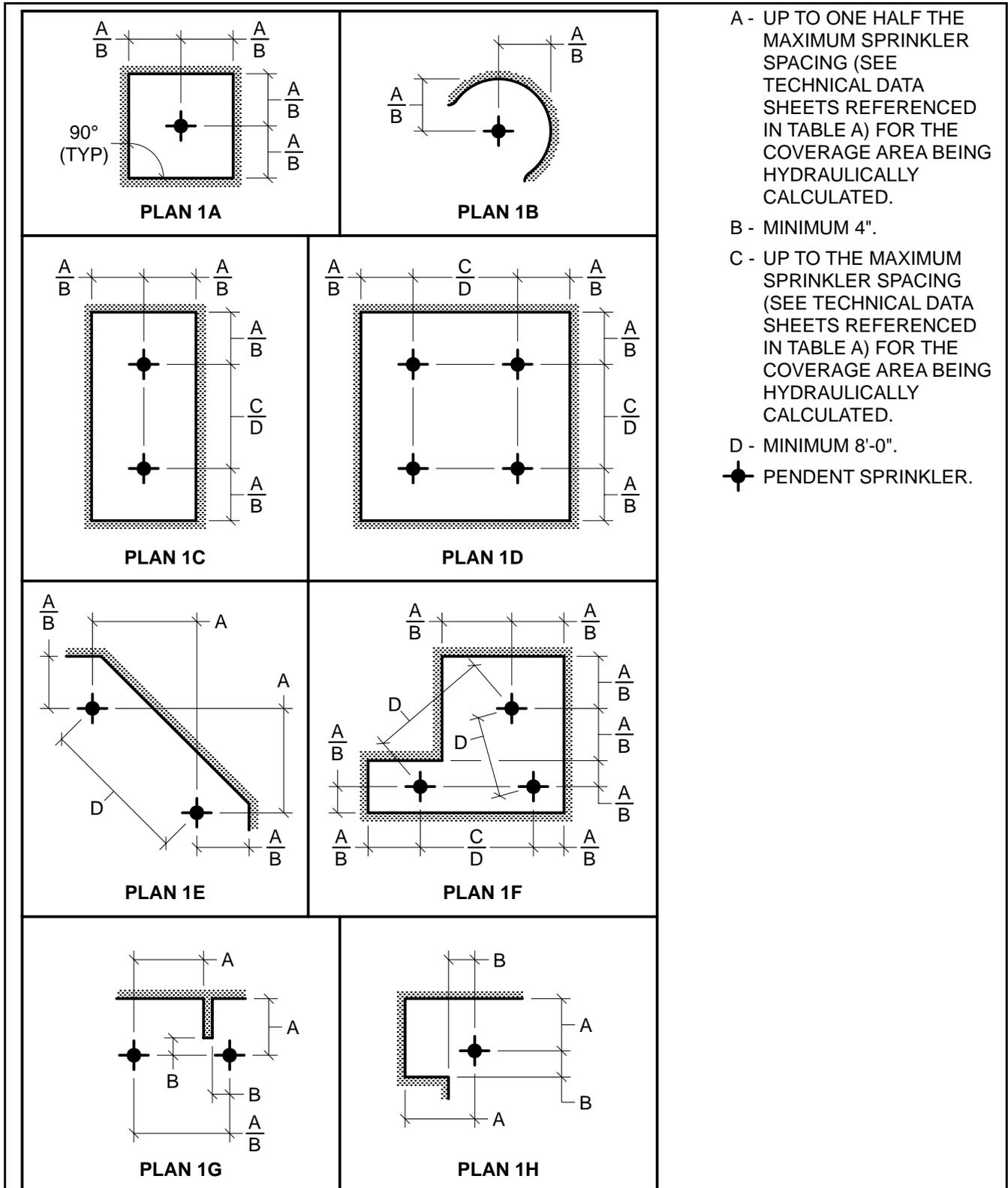
mum distance between residential sprinklers to prevent cold soldering is 8 feet.

Sloped ceilings, however, present more of a cause for concern for cold soldering, since the elevation of one sprinkler may be higher than another, resulting in a different distribution pattern than that of a horizontal ceiling condition. Figure 2 for Spacing Rules Under Sloped Ceilings addresses the minimum acceptable distance under various sloped ceiling conditions that will take into account the prevention of cold soldering.

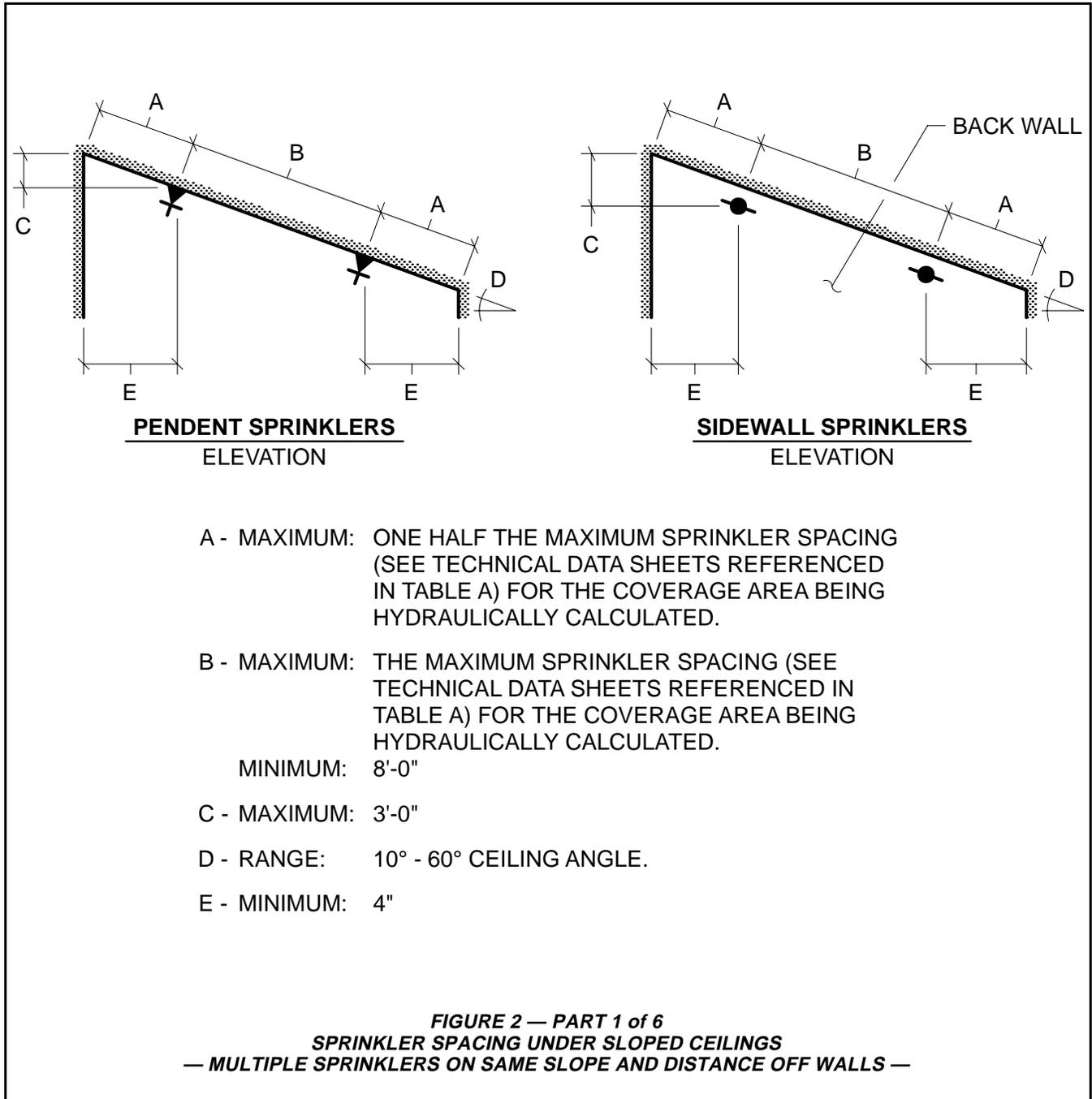
One solution to prevent cold soldering

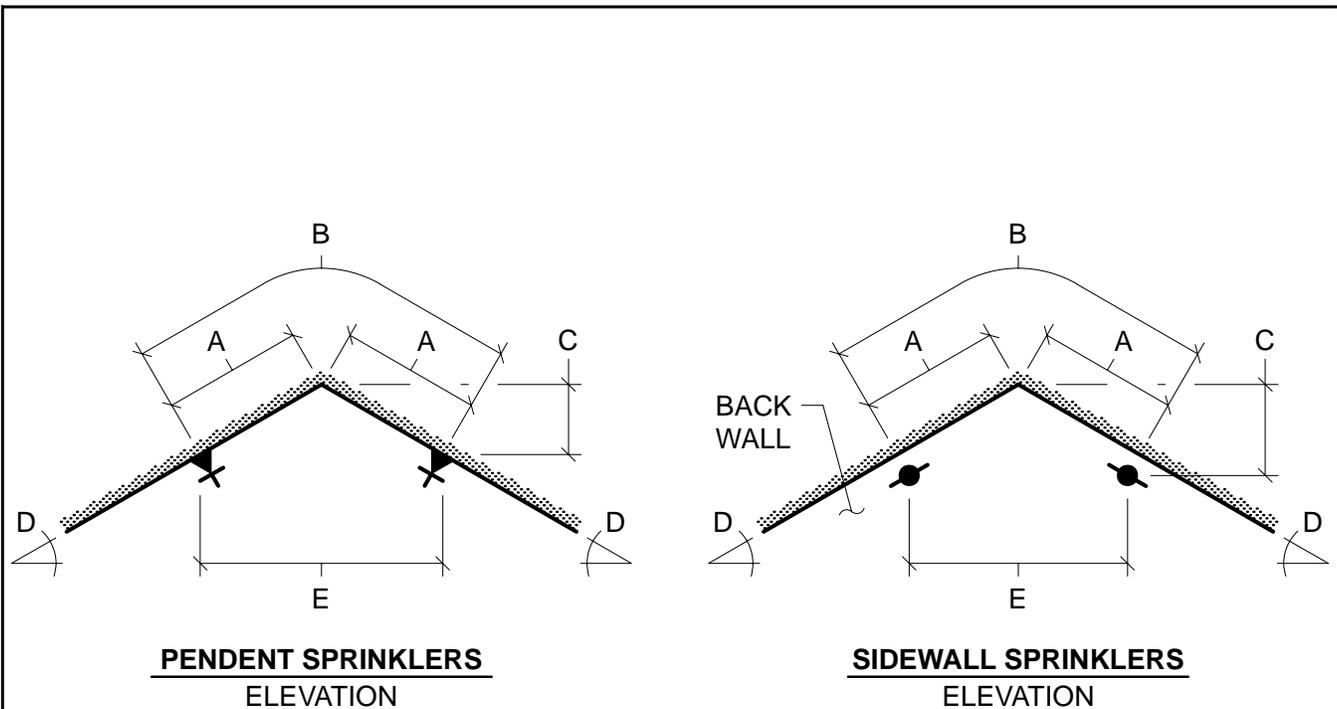
is to stagger the sprinklers so that the distance between two sprinklers is increased. In some case, baffles can be located midway between two closely located sprinklers to prevent cold soldering.

Proximity To A Heat Source. Sprinklers must be located so as to prevent an inadvertent operation due to exposure of normal heat sources. Location with respect to exposure of heat sources other than fire that may cause an inadvertent operation of a residential sprinkler is addressed by Figure 5.



**FIGURE 1 — PART 2 of 2
 SPRINKLER SPACING UNDER HORIZONTAL CEILINGS
 — PENDENT SPRINKLERS —**





A - MAXIMUM: ONE HALF THE MAXIMUM SPRINKLER SPACING (SEE TECHNICAL DATA SHEETS REFERENCED IN TABLE A) FOR THE COVERAGE AREA BEING HYDRAULICALLY CALCULATED.

B - MAXIMUM: THE MAXIMUM SPRINKLER SPACING (SEE TECHNICAL DATA SHEETS REFERENCED IN TABLE A) FOR THE COVERAGE AREA BEING HYDRAULICALLY CALCULATED.

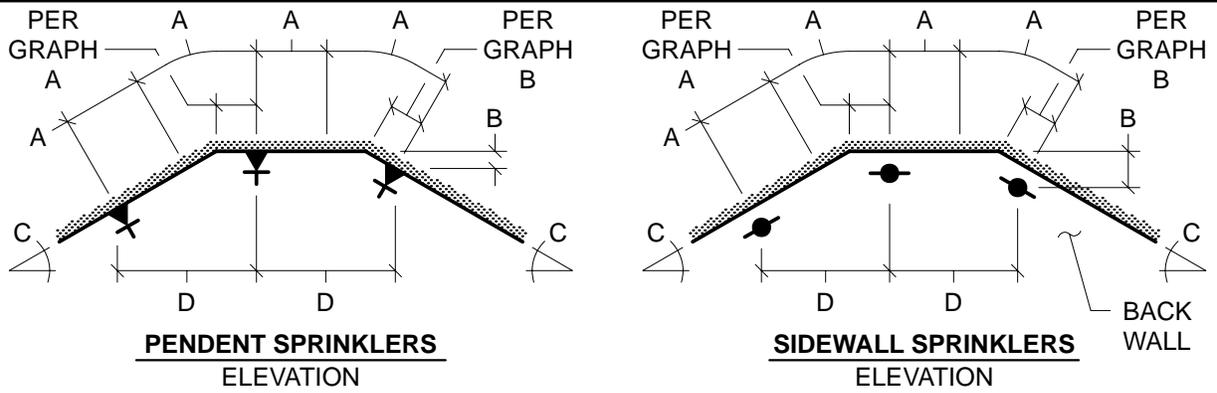
MINIMUM: 8'-0"

C - MAXIMUM: 3'-0"

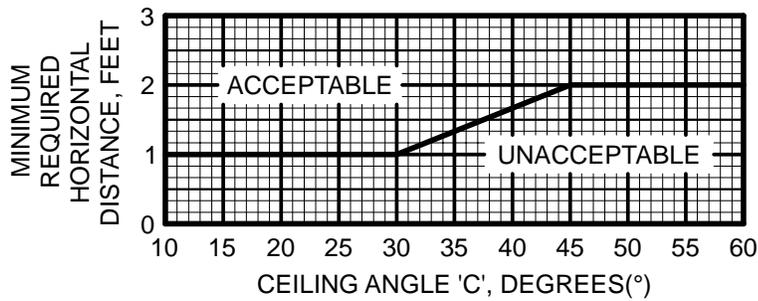
D - RANGE: 10° - 60° CEILING ANGLE.

E - MINIMUM: 8'-0"

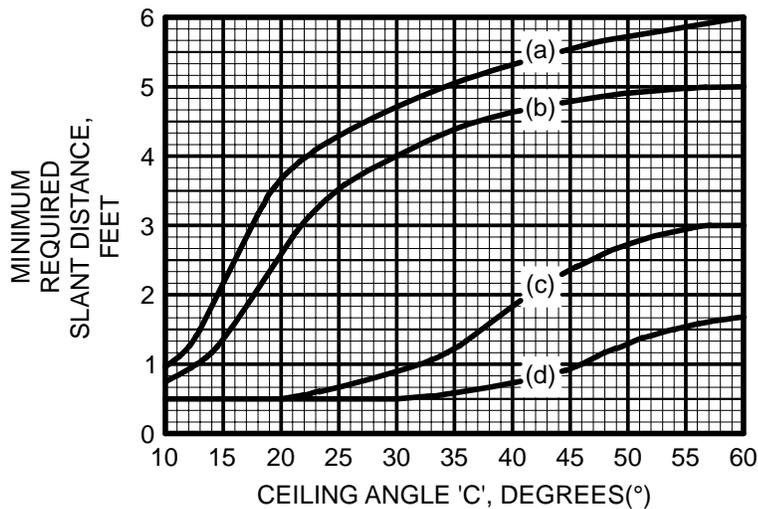
FIGURE 2 — PART 2 of 6
SPRINKLER SPACING UNDER SLOPED CEILINGS
— SYMMETRIC SPRINKLER LOCATIONS ON OPPOSING SLOPES —



- A - MAXIMUM: ONE HALF THE MAXIMUM SPRINKLER SPACING (SEE TECHNICAL DATA SHEETS REFERENCED IN TABLE A) FOR THE COVERAGE AREA BEING HYDRAULICALLY CALCULATED.
- B - MAXIMUM: 3'-0" WHEN THERE ARE NO SPRINKLERS ON THE LEVEL CEILING
- C - RANGE: 10° - 60° CEILING ANGLE.
- D - MINIMUM: 8'-0"



GRAPH A

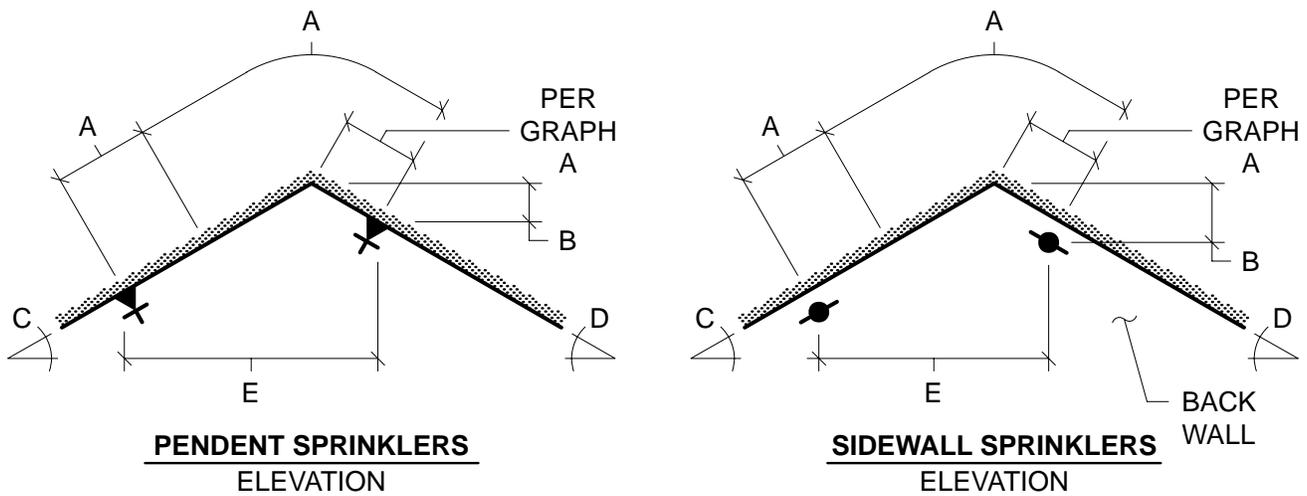


GRAPH B

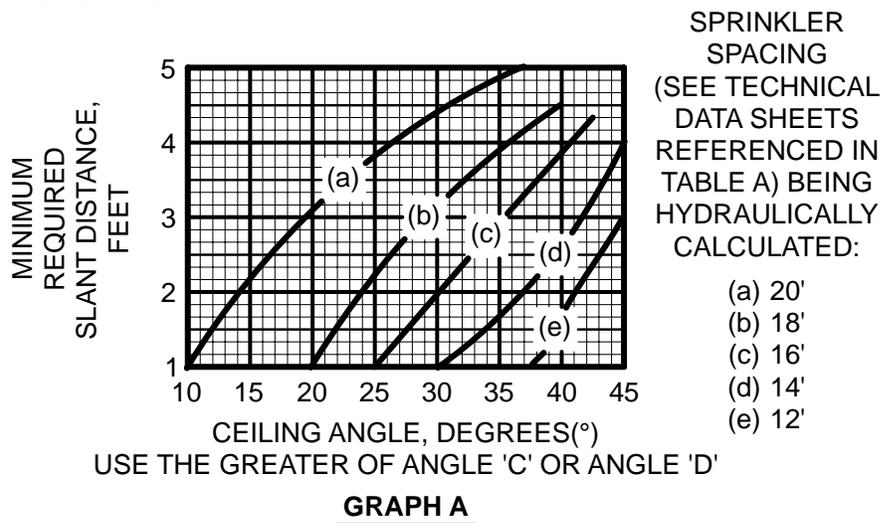
SPRINKLER SPACING (SEE TECHNICAL DATA SHEETS REFERENCED IN TABLE A) BEING HYDRAULICALLY CALCULATED:

- (a) 20'
- (b) 18'
- (c) 16'
- (d) 14'
- (d) 12'

**FIGURE 2 — PART 3 of 6
SPRINKLER SPACING UNDER SLOPED CEILINGS
SPRINKLERS LOCATED ON INTERSECTING HORIZONTAL AND SLOPE CEILINGS —**



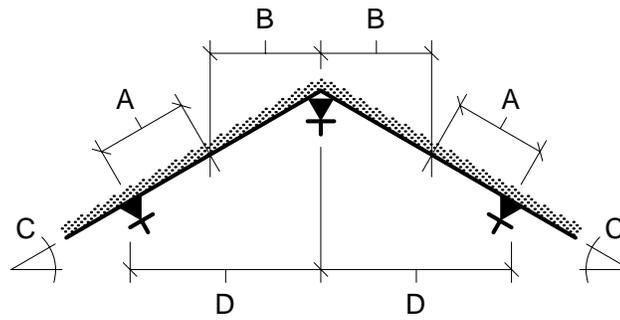
- A - MAXIMUM: ONE HALF THE MAXIMUM SPRINKLER SPACING (SEE TECHNICAL DATA SHEETS REFERENCED IN TABLE A) FOR THE COVERAGE AREA BEING HYDRAULICALLY CALCULATED.
- B - MAXIMUM: 3'-0"
- C - RANGE: 10° - 45° CEILING ANGLE.
- D - RANGE: 10° - 45° CEILING ANGLE.
- E - MINIMUM: 8'-0"



SPRINKLER SPACING
(SEE TECHNICAL DATA SHEETS REFERENCED IN TABLE A) BEING HYDRAULICALLY CALCULATED:

- (a) 20'
- (b) 18'
- (c) 16'
- (d) 14'
- (e) 12'

FIGURE 2 — PART 4 of 6
SPRINKLER SPACING UNDER SLOPED CEILINGS
— NON-SYMMETRIC SPRINKLER LOCATIONS ON OPPOSING SLOPES —



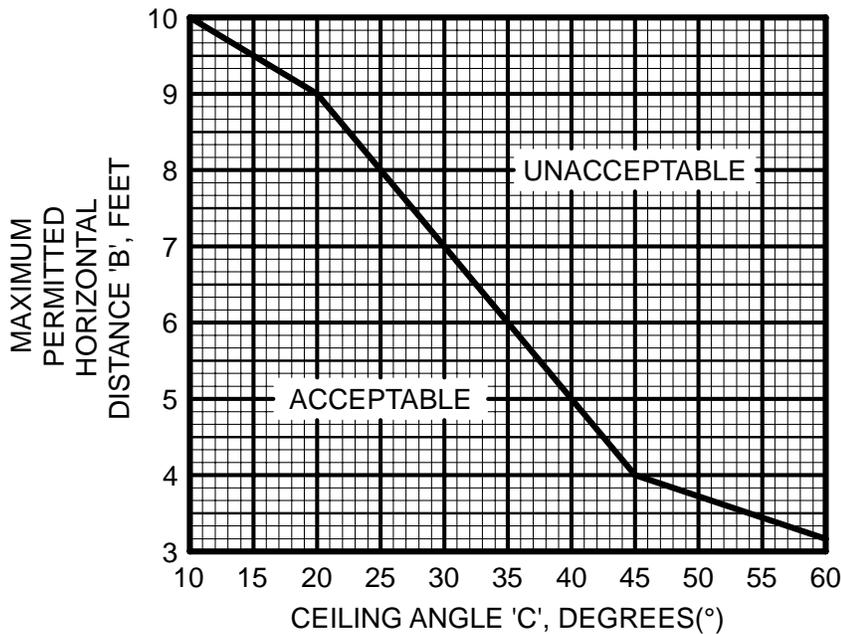
**PENDENT SPRINKLERS
ELEVATION**

A - MAXIMUM: ONE HALF THE MAXIMUM SPRINKLER SPACING (SEE TECHNICAL DATA SHEETS REFERENCED IN TABLE A) FOR THE COVERAGE AREA BEING HYDRAULICALLY CALCULATED.

B - MAXIMUM: UP TO ONE HALF THE MAXIMUM SPRINKLER SPACING (SEE TECHNICAL DATA SHEETS REFERENCED IN TABLE A) FOR THE COVERAGE AREA BEING HYDRAULICALLY CALCULATED OR AS RESTRICTED BY GRAPH A.

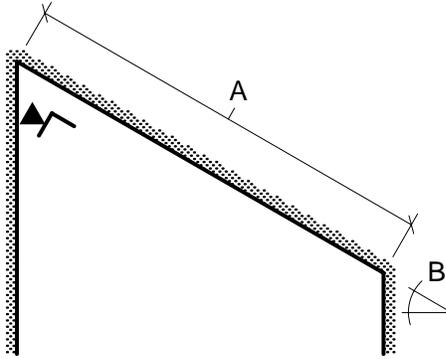
C - RANGE: 10° - 60° CEILING ANGLE.

D - MINIMUM: 8'-0"



GRAPH A

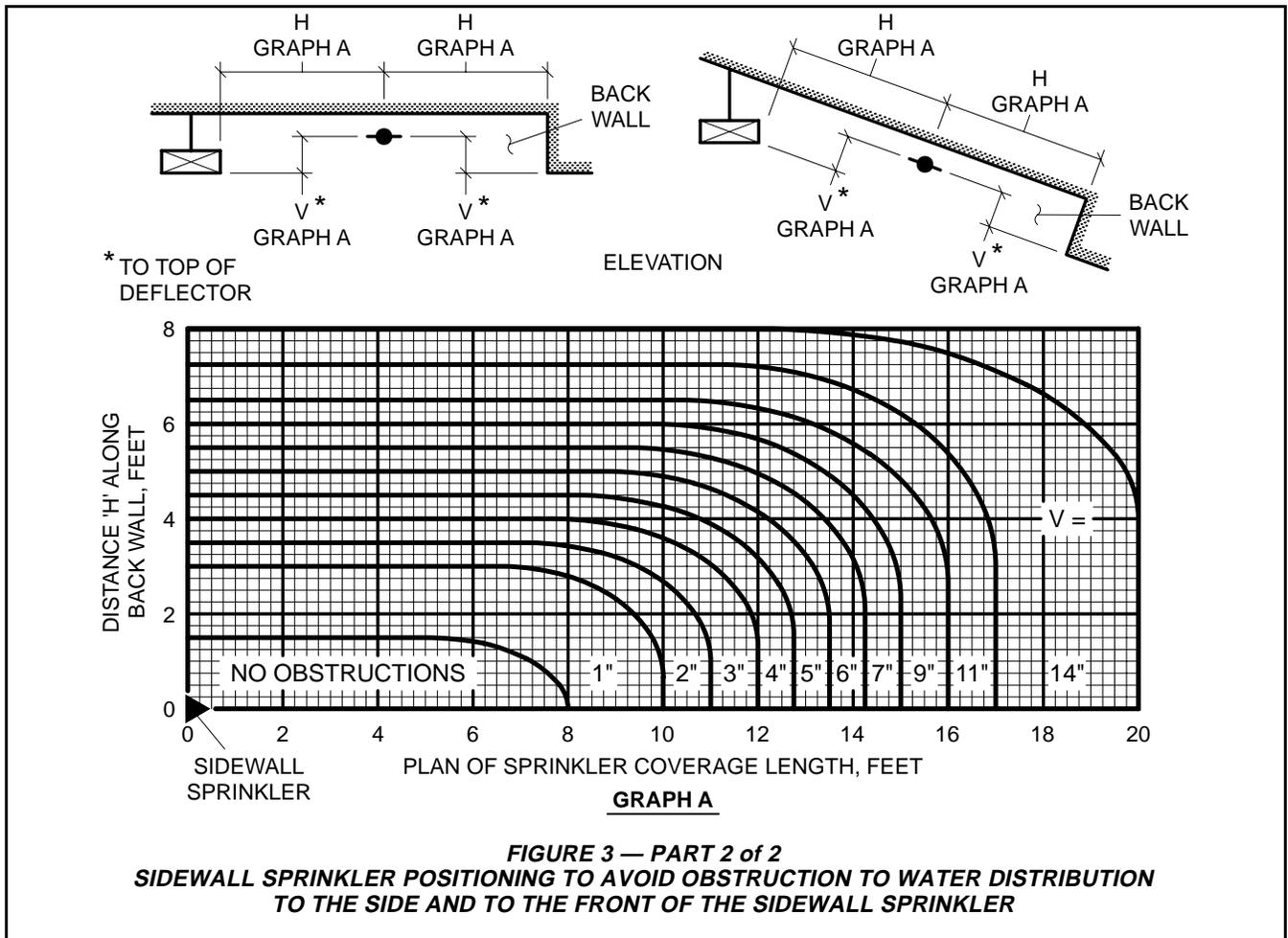
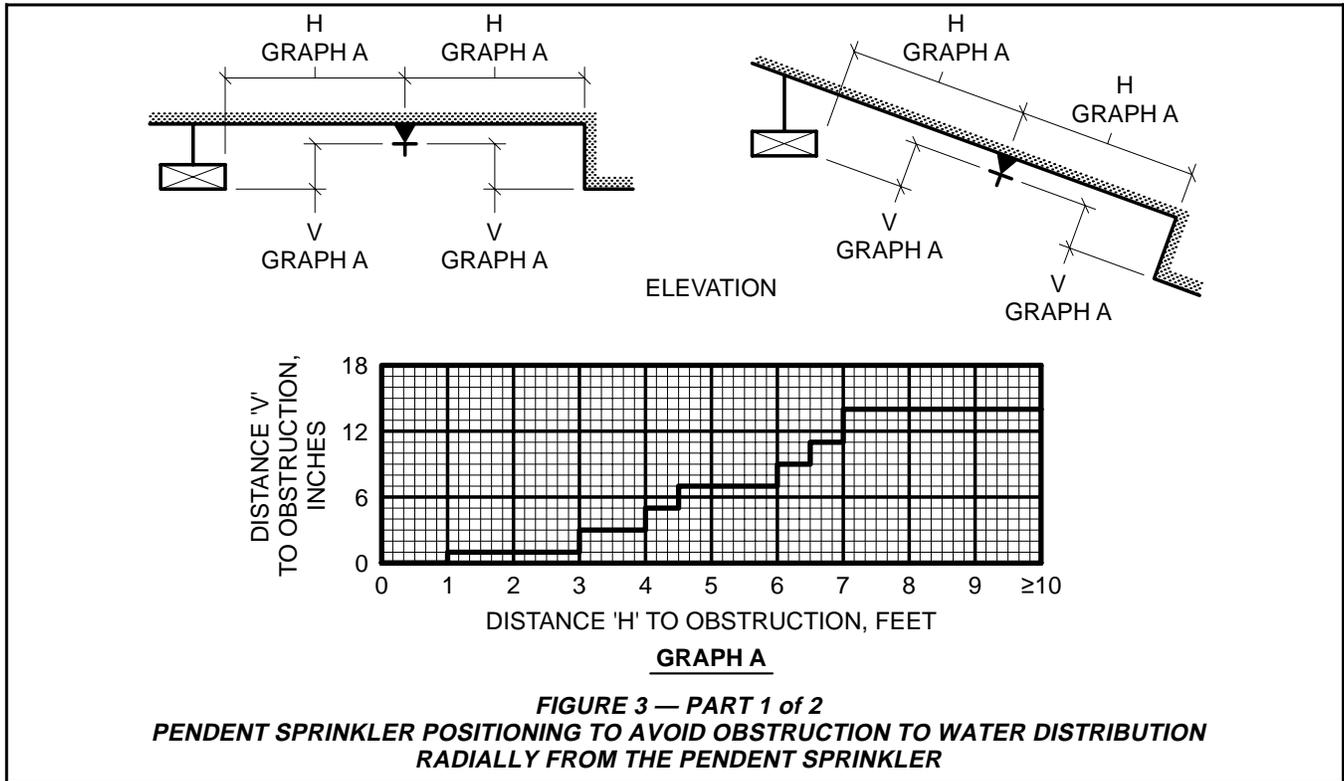
**FIGURE 2 — PART 5 of 6
SPRINKLER SPACING UNDER SLOPED CEILINGS
—PENDENT SPRINKLERS LOCATED AT PEAK —**

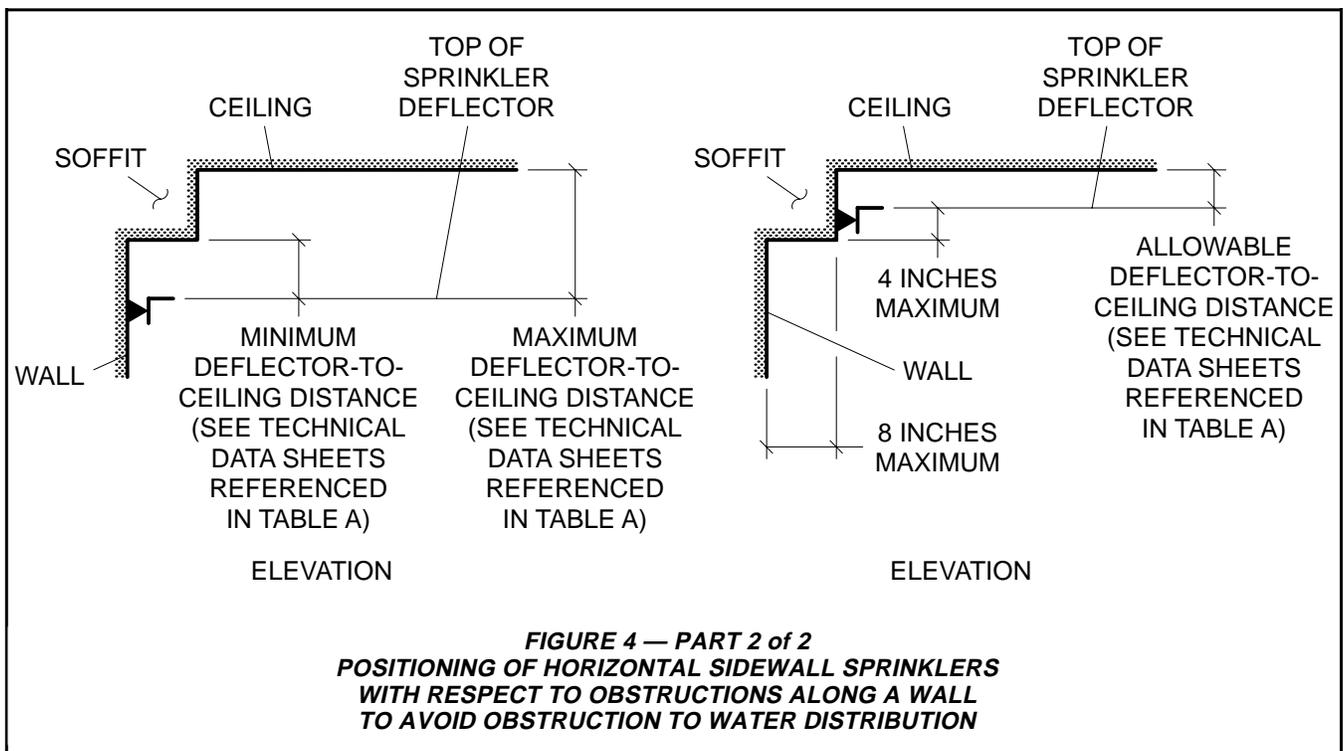
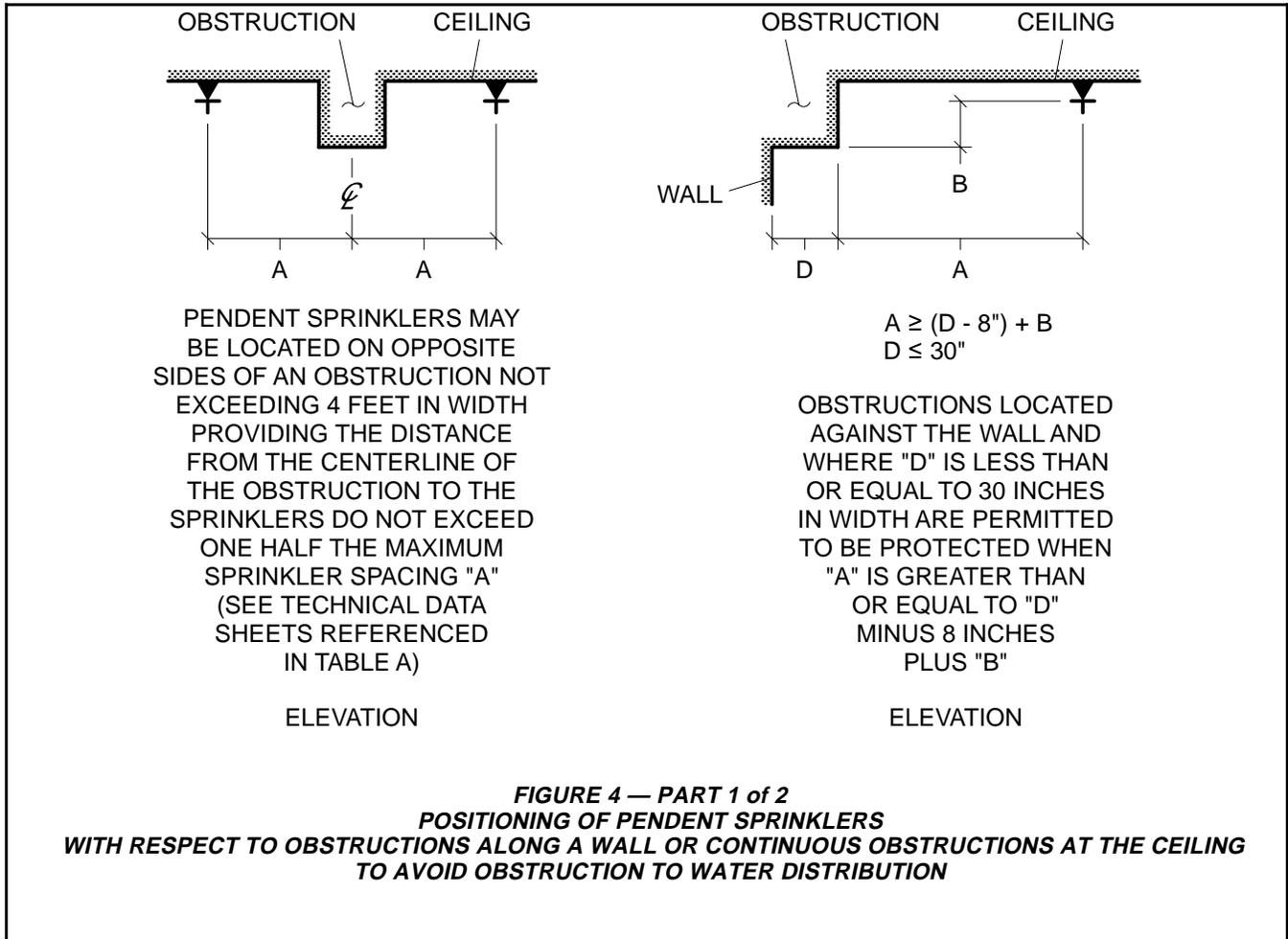


SIDEWALL SPRINKLERS
ELEVATION

- A - MAXIMUM: UP TO THE MAXIMUM SPRINKLER COVERAGE AREA LENGTH (SEE TECHNICAL DATA SHEETS REFERENCED IN TABLE A) FOR THE COVERAGE AREA BEING HYDRAULICALLY CALCULATED.
- B - RANGE: 10° - 45° CEILING ANGLE.

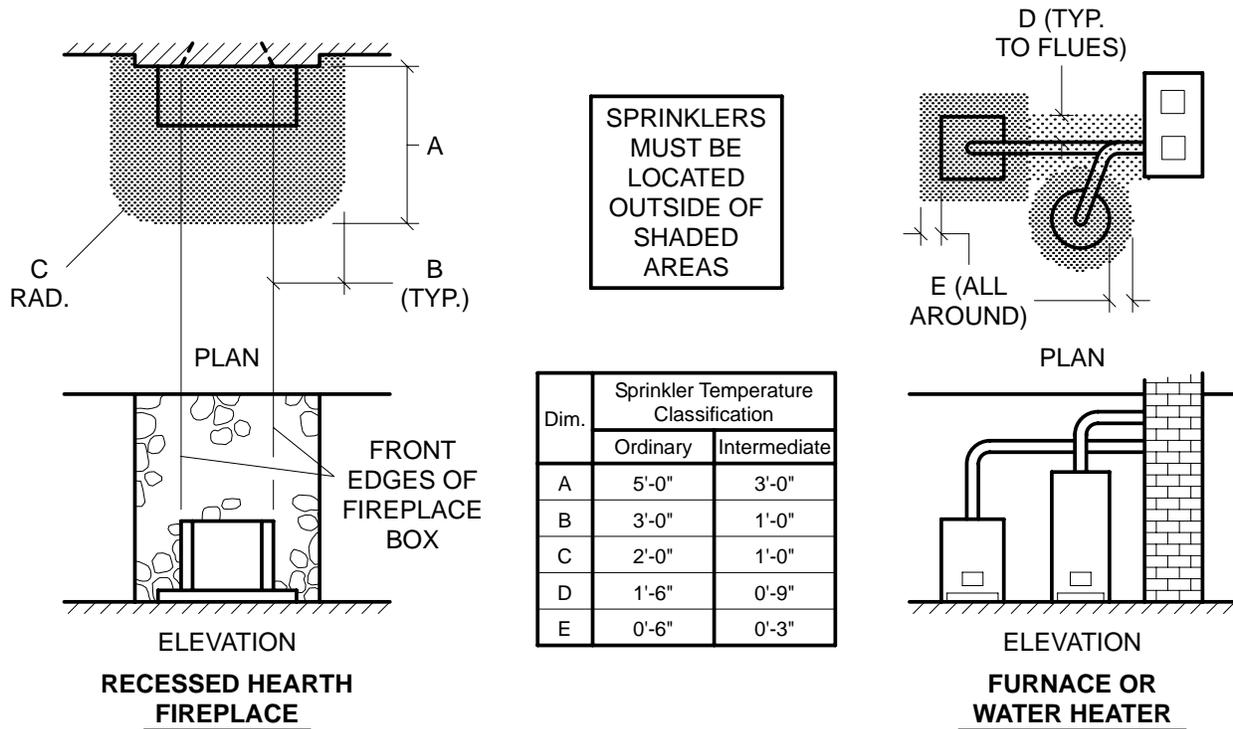
FIGURE 2 — PART 6 of 6
SPRINKLER SPACING UNDER SLOPED CEILINGS
—SIDEWALL SPRINKLERS LOCATED AT PEAK —



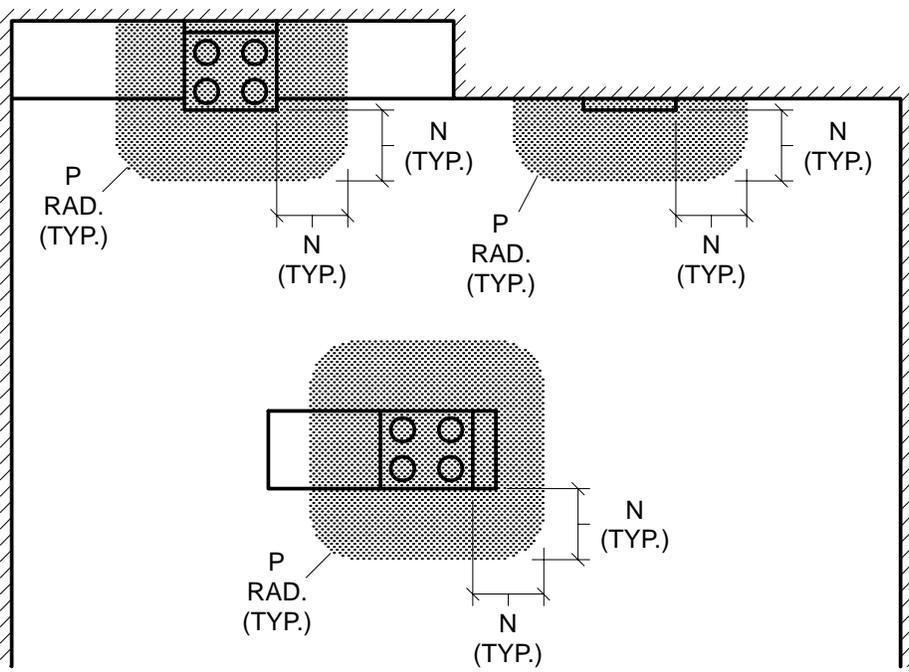


- A. To prevent the possible release of a Residential Sprinkler's heat responsive element, due to exposure to heat sources other than abnormal fire, ordinary temperature classification (135°F-170°F temperature rating) Residential Sprinklers are only to be installed where the maximum (non-fire) temperature will not exceed 100°F/38°C; and intermediate temperature classification (175°F-225°F temperature rating) Residential Sprinklers are to be installed where the maximum (non-fire) temperature will be from 101°F/39°C to 150°F/66°C.
- B. The sprinkler system piping must NOT be run through heating ducts, or connected to the domestic hot water system.
- C. When installing Residential Sprinklers in the locations listed below, use the indicated temperature classification:

Location		Temperature Classification	
1. Where they will be exposed to the rays of the sun passing through glass or plastic skylights.		Intermediate	
2. In unventilated attics or in an unventilated-concealed compartment under an uninsulated roof, where the maximum ambient temperature does not exceed 150°F/66°C.		Intermediate	
3. Proximity to exposed light fixtures.	Less than 250 Watts	Within 3 to 6 inches	Intermediate
		6 inches or more	Ordinary
	250-499 Watts	Within 6 to 12 inches	Intermediate
		12 inches or more	Ordinary
4. Proximity to uninsulated heating duct.	Within 9 to 18 inches		Intermediate
	18 inches or more		Ordinary
5. Proximity to uninsulated hot water pipe.	Within 6 to 12 inches		Intermediate
	12 inches or more		Ordinary
6. As specified in the adjacent illustrations in Figure 5, Parts 1 and 2.			

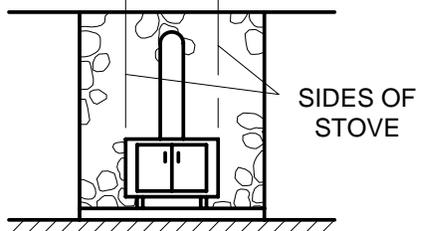
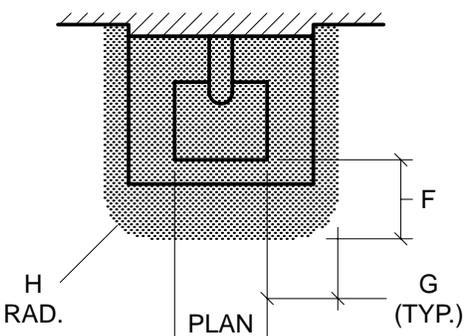


**FIGURE 5 — PART 1 of 2
PROXIMITY TO HEAT SOURCES**



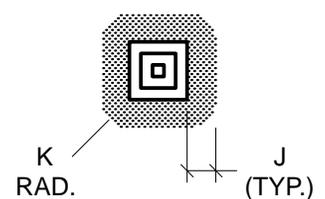
PLAN
KITCHEN RANGE AND/OR OVEN

SPRINKLERS
MUST BE
LOCATED
OUTSIDE OF
SHADED
AREAS

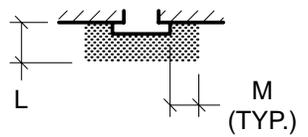


ELEVATION
COAL OR WOOD
BURNING STOVE

Dim.	Sprinkler Temperature Classification	
	Ordinary	Intermediate
F	3'-6"	1'-0"
G	3'-6"	1'-0"
H	3'-6"	1'-0"
J	2'-0"	1'-0"
K	2'-0"	1'-0"
L	3'-0"	1'-6"
M	2'-0"	1'-0"
N	1'-6"	0'-9"
P	1'-6"	0'-9"



PLAN
CEILING MOUNTED
HOT AIR DIFFUSER



PLAN
WALL MOUNTED
HOT AIR DIFFUSER

**FIGURE 5 — PART 2 of 2
PROXIMITY TO HEAT SOURCES**

Design — Beam Ceilings

Residential occupancies with horizontal ceilings (i.e., slopes up to a 2 inch rise over a 12 inch run) with beams may be sprinklered as follows:

General Information. The basic concept of this protection scheme is to locate the sprinklers on the underside of the beams, Ref. Figure 6, (not in the beam pockets); to identify the main beams that principally run in one direction as "primary beams"; and, to identify the beams that run principally perpendicular to the main beams, as may be present (or in some cases may be necessary for proper sprinkler protection), as "secondary beams".

Primary and Secondary Beam Types. Solid surface, solid or hollow core, combustible or non-combustible.

Primary and Secondary Beam Positioning. Directly attached to the underside of a combustible or non-combustible smooth ceiling at any elevation.

Primary Beam Cross-Section: Maximum depth of 14 inches and the maximum width is unlimited. The cross-sectional shape of the primary beam may be rectangular to circular.

Secondary Beam Cross-Section. Maximum depth to be no greater than the primary beam and the maximum width is unlimited. The cross-sectional shape of the secondary beam may be rectangular to circular.

Primary Beam Spacing. The primary beams (Fig. 7A) are to be 3 ft. - 4 in. to 6 ft. from the compartment wall to center of the nearest beam and from center to center between beams.

Secondary Beam Spacing. The secondary beams principally run perpendicular to the primary beams.

Secondary beams of a depth equal to the primary beam must be placed so that the beam pockets created by the primary beams do not exceed 20 feet in length (Fig. 7B).

NOTE

When the beam pockets created by the primary beams exceed 20 feet in length, the installation will require the use of secondary beams as described above. Otherwise, secondary beams need not be present.

Secondary beams of a cross-sectional depth greater than one-quarter the depth of the primary beams are to be a minimum of 3 ft. - 4 in. from the compartment wall to center of the

nearest beam and from center to center between beams (Fig. 7C).

Secondary beams of a cross-sectional depth no greater than one-quarter the depth of the primary beams may be placed at any compartment wall to center of the nearest beam distance and from any center to center distance between beams (Fig. 7C).

Lintels. Lintels over doorways exiting the compartment must be present. The minimum height for the lintels is 8 inches or no less than the depth of the Primary Beams, whichever is greater.

Sprinkler Types. Series LFII (TY2234), 155F and 175F, Pendent and Recessed Pendent Residential Sprinklers; and, Series LFII (TY2284), 162F, Flush Pendent Residential Sprinklers.

Sprinkler Coverage Area and Hydraulic Design. The sprinkler coverage areas and hydraulic design criteria as presented in Technical Data Sheets TF400 and TFP420 for "Horizontal Ceilings" are to be applied.

Sprinkler Position. The deflector to bottom of primary beams for the Series LFII (TY2234) Pendent Sprinklers or Series LFII (TY2234) Recessed Pendent Sprinklers is to be 1-1/4 to 1-3/4 inches (Fig. 6A). The vertical centerline of the Series LFII (TY2234) Pendent Sprinklers is to be no greater than half the primary beam cross-sectional width plus 2 inches from the centerline of the primary beam (Fig. 6B).

The bottom of heat collector to bottom of primary beams for the Series LFII (TY2284) Flush Pendent Sprinklers is to be 23/32 to 1-3/32 inches (Fig. 6C). The vertical centerline of the Series LFII (TY2284) Flush Pendent Sprinklers is to be no greater than half the primary beam cross-sectional width plus 2 inches from the centerline of the primary beam (Fig. 6D).

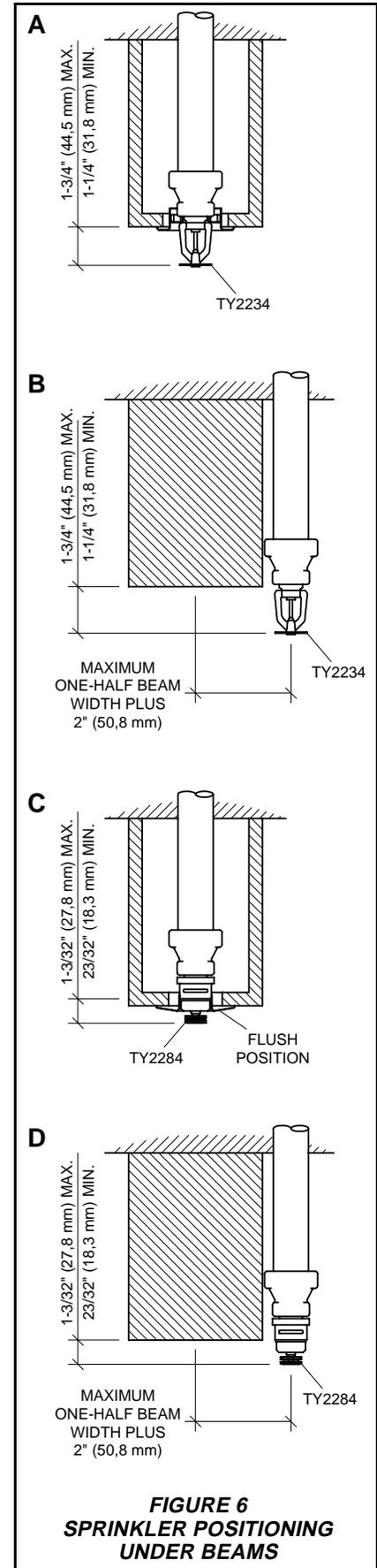
NOTES

Core drilling of beams to allow the installation of sprinkler drops requires consulting with a structural engineer.

Where core drilling is not permitted, the previously stated sprinkler position criteria for the Series LFII (TY2234) Pendent Sprinklers allows for the sprinkler drop to be placed adjacent to the primary beam.

Beam and Soffit Arrangements. A soffit is permitted to be placed around the perimeter of a compartment with the beam arrangement within the soffit area (Fig.8).

The cross-section of the soffit may be any size as long as it does not create an obstruction to water distribution per



**FIGURE 6
SPRINKLER POSITIONING
UNDER BEAMS**

ALL FIGURES:
DISTANCES ARE
MEASURED TO
COMPARTMENT
WALL FACES AND
TO CENTERLINES
OF BEAMS

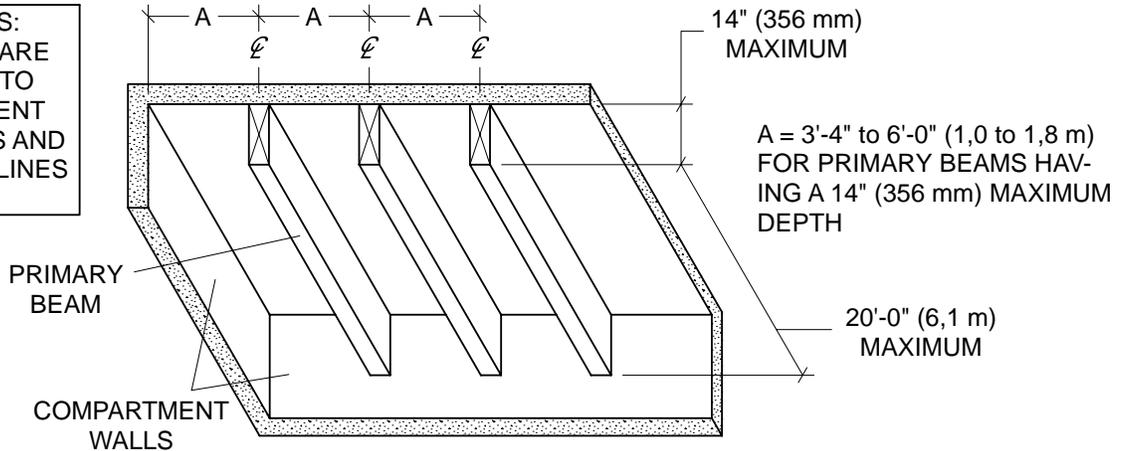


FIGURE 7A

PRIMARY BEAM SPANS UP TO 20'-0" (6,1 m)

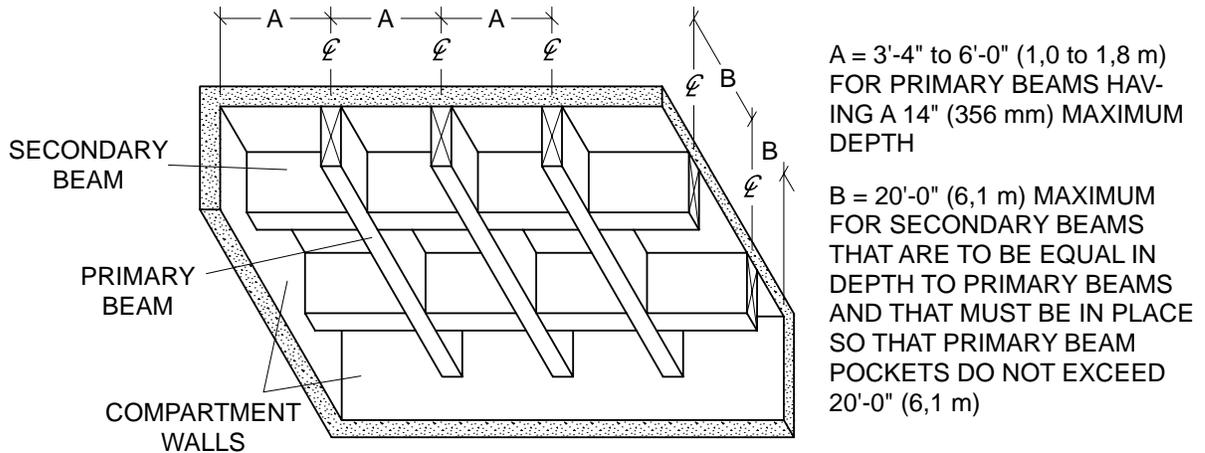


FIGURE 7B

PRIMARY BEAM SPANS GREATER THAN 20'-0" (6,1 m)

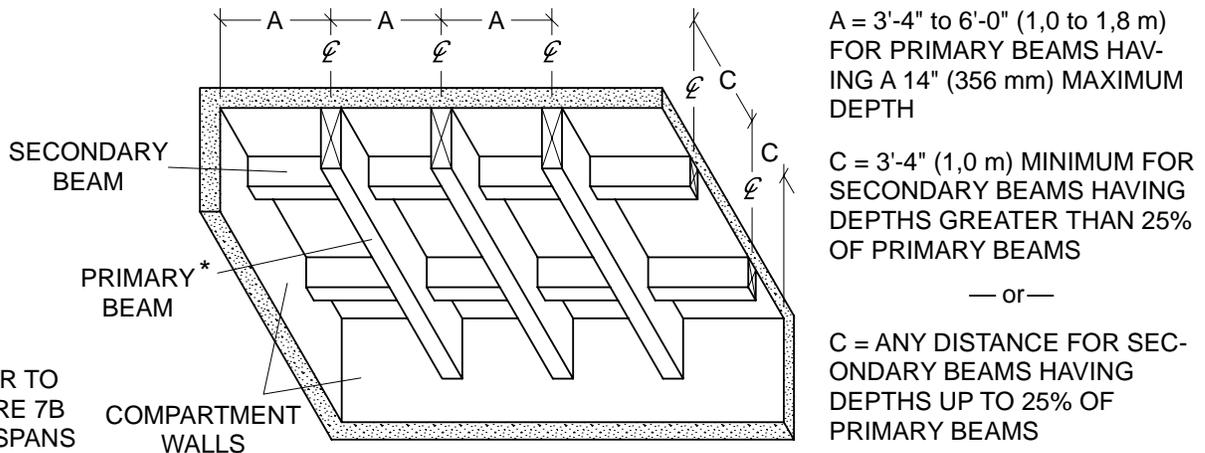
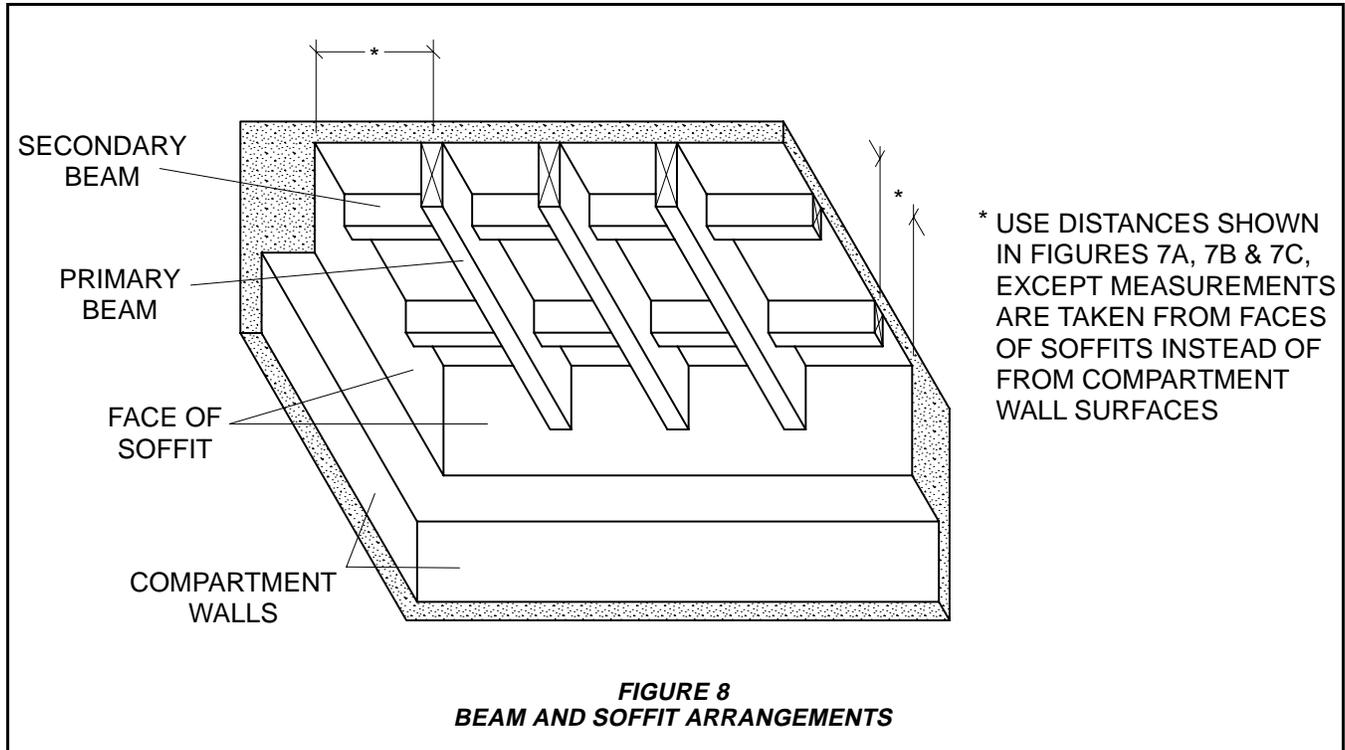


FIGURE 7C

COMBINATIONS OF PRIMARY AND SECONDARY BEAMS

* REFER TO
FIGURE 7B
FOR SPANS
EXCEEDING
20'-0" (6,1 m)

**FIGURE 7
PERMITTED BEAM ARRANGEMENTS**



the obstruction rules of NFPA 13 for residential sprinklers.

When soffits are present, the previously provided 3 ft.- 4 in. to 6 ft. "compartment wall to adjacent beam" distance for the primary and secondary beams is to be measured from the face of the soffit as opposed to the compartment wall.

NOTE

Although the distance to the beams is measured from the face of the soffit, the sprinkler coverage area is to be measured from the compartment wall.

Installation

The Series LFII Residential Sprinklers must be installed in accordance with the applicable Technical Data Sheet referenced in Table A.

Care and Maintenance

The Series LFII Residential Sprinklers must be maintained and serviced in accordance with the applicable Technical Data Sheet referenced in Table A.

Sprinklers which are found to be leaking or exhibiting visible signs of corrosion must be replaced.

The owner is responsible for the inspection, testing, and maintenance of their fire protection system and devices in compliance with this document, as well as with the applicable standards of the National Fire Protection Association (e.g., NFPA 25), in addition to the standards of any other authorities having jurisdiction. The installing contractor or sprinkler manufacturer should be contacted relative to any questions.

It is recommended that automatic sprinkler systems be inspected, tested, and maintained by a qualified Inspection Service in accordance with local requirements and/or national codes.

Limited Warranty

Products manufactured by Tyco Fire & Building Products (TFBP) are warranted solely to the original Buyer for ten (10) years against defects in material and workmanship when paid for and properly installed and maintained under normal use and service. This warranty will expire ten (10) years from date of shipment by TFBP. No warranty is given for products or components manufactured by companies not affiliated by ownership with TFBP or for products and components which have been subject to misuse, improper installation, corrosion, or which have not been installed, maintained, modified or repaired in accordance with applicable Standards of the National Fire Protection Association, and/or the standards of any other Authorities Having Jurisdiction. Materials found by TFBP to be defective shall be either repaired or replaced, at TFBP's sole option. TFBP neither assumes, nor authorizes any person to assume for it, any other obligation in connection with the sale of products or parts of products. TFBP shall not be responsible for sprinkler system design errors or inaccurate or incomplete information supplied by Buyer or Buyer's representatives.

In no event shall TFBP be liable, in contract, tort, strict liability or under any other legal theory, for incidental, indirect, special or consequential damages, including but not limited to labor charges, regardless of whether TFBP was informed about the possibility of such damages, and in no event shall TFBP's liability exceed an amount equal to the sales price.

The foregoing warranty is made in lieu of any and all other warranties, express or implied, including warranties of merchantability and fitness for a particular purpose.

This limited warranty sets forth the exclusive remedy for claims based on failure of or defect in products, materials or components, whether the claim is made in contract, tort, strict liability or any other legal theory.

This warranty will apply to the full extent permitted by law. The invalidity, in whole or part, of any portion of this warranty will not affect the remainder.

