

This edition of TechNotes was written by Jon Nisja, Fire Protection and Data Specialist with the NFSA.

Fires in Sprinkler-Protected Buildings

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Here we will review fire department data on sprinkler-protected building fires, cover the components of a sprinkler system that are critical for fire department operations, discuss how they are intended to function, and identify their proper design and installation.

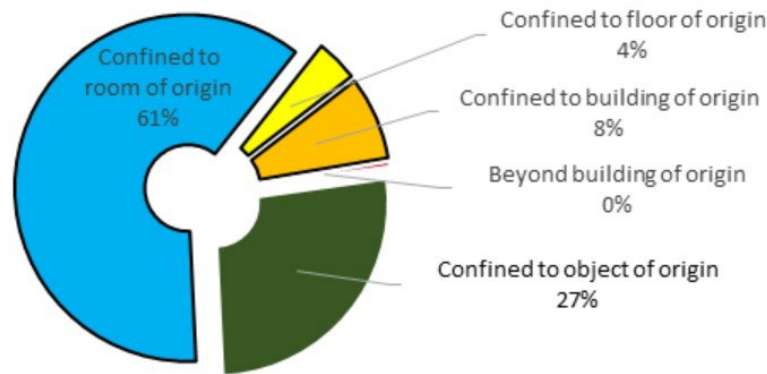
Sprinkler Performance and Effectiveness

Fire sprinklers have been found to be highly effective. In a review of thousands of fire reports from 2017-2021, a low number of sprinklers operated in a fire (96 percent were controlled with four or fewer sprinklers.)

Number of Sprinklers Operated in the Fire (2017-2021)		
Sprinklers Operated	Percent	Cumulative Percent
1	76.4	76.4
2	13.5	89.9
3	3.7	93.6
4	2.3	95.9
5-9	2.4	98.3
10-19	0.9	99.2
20-39	0.4	99.6
40 or more	0.3	99.9 *

* Due to rounding, does not add up to 100%

In addition, sprinklers confined the damage to the object of fire origin or the room of fire origin in 88 percent of the fires.



Sprinkler Components Critical for Fire Department Operations

When fire departments respond to a sprinkler activation, it is critical that they are able to locate and access components found on almost every sprinkler system – such as the main control valve, main drain, fire department connection (FDC), and spare sprinklers. In other buildings, standpipes, convenience hose connections, fire pumps, and pressure reducing valves might be present and part of the fire sprinkler system.



Codes, Standards, and Recommended Practices

The fire, building, and life safety codes mandate which buildings or conditions need fire sprinkler protection. The standards (such as NFPA 13, 13D, or 13R) prescribe how those systems or components be installed. Much lesser known are “recommended practices”; NFPA publishes about 20 recommended practices. NFPA 13E is one of them; it is entitled “Recommended Practice for Fire Department Operations in Properties Protected by Sprinkler and Standpipe Systems.” Recommended practices use non-mandatory language and act as guides for how certain conditions should be treated.

NFPA 13E

NFPA 13E has a long history, starting in 1933 as an informational brochure and adopted as a recommended practice in 1966. Chapter 5 of the 2020 edition of NFPA 13E provides guidance for fire departments responding to sprinkler-protected properties. The guidance includes:

- Implementing standard operating procedures.
- Conducting pre-incident planning inspections on sprinkler-protected properties.
- Not shutting down sprinkler systems in an attempt to improve visibility.
- Connecting to the FDC, upon arrival, and supplying the sprinkler system at 150 psi.
- Exercising caution if manual firefighting with hoselines is necessary to ensure an adequate water supply for sprinklers.

- Providing other firefighting operations, such as ventilation, salvage, overhaul, and water removal.
- Shutting down the sprinkler system following fire extinguishment.
- Assisting in the restoration of the sprinkler system.



Site-Specific Consideration for Sprinkler Components

There is no “one-size, fits all” for the location of the various sprinkler components; the locations will vary greatly based on the site and building features. The location where the water enters the building will often be where the sprinkler riser and control valve will be located. Previous editions of NFPA 13 preferred that the FDC be located on the address side of the building; this was not always the ideal location based on the site, nearby fire hydrants, fire department access, or vehicle traffic. NFPA 13 now specifies that the FDC be accessible and at an approved location (2022 edition of NFPA 13, Section 16.12.5.7.)

Some communities require that a fire hydrant be located relatively close to the FDC.

The main sprinkler system control valve can be located inside or outside of the building. If located inside, the valve should be located in an accessible location near an outside wall. Fire codes often require signs to be placed on sprinkler riser room doors to assist responding firefighters in locating this critical equipment.

Fire pumps may be needed to increase the water pressure in the case of a tall building, where there is not adequate city water pressure, or for specialized fire protection systems (like those protecting warehouses). If a fire pump is provided, pressures exceed 175 psi, and firefighting standpipe systems are present, pressure reducing valves are needed to provide a reasonable pressure for firefighting operations.

The Fire Department Connection

The primary purpose of the FDC for a sprinkler system is to increase the pressure in the system. How do we know that? Because NFPA 13E recommends that fire departments connect to the FDC and pump in at 150 psi. Notice, NFPA 13E talks about pressure (psi) and not volume (gpm).

FDCs for other systems may have different purposes as outlined in the table below.

Fire Department Connection Purpose Based on System Type	
Fire Protection System Type	Primary Purpose
Fire Sprinkler System	Increase pressure
Standpipe System	Provide volume and pressure
Combined Sprinkler / Standpipe System	Initially to increase pressure; provide both volume and pressure if manual firefighting with hoselines becomes necessary

There are various styles of FDCs, such as exposed, flush, and free-standing along with different types based on the number of inlets and the thread type: Single, Siamese (dual

connection), and Storz (threadless, quick-connect). If threaded connections are used, the thread arrangement must meet the city specifications. While most communities use National Hose Standard Thread (NH or NST), some communities have their own specifications for hose thread. It is critical that the sprinkler designer knows the proper hose thread that the fire department uses.

FDC mounting height is another consideration. Typically, FDCs are mounted at least 18 inches in height so they are above snow accumulation in the winter and adjacent landscaping. FDCs are generally not mounted over four feet high as excessive height makes attaching hoselines difficult and time-consuming for the fire department. In addition, the weight of the water-filled hoses puts significant stresses on the connection itself and the riser assembly it attaches to.

FDCs should have signage or labels indicating what system(s) they supply. The signs or labels should also identify what area(s) of the building they protect and any special instructions, such as higher pressures, that may be necessary.

Automatic sprinkler systems have been shown to be effective in controlling fires. There are situations, however, where it is necessary for fire departments to augment the fire sprinkler system. In these cases, access to critical system components, such as FDCs, control valves, and fire pumps, may be needed. These components need to be properly located and installed to assist the fire department.



Training and Education



Sign-Up for one of our Layout Technician Pathway Courses

NFSA's newly updated fire sprinkler Layout Technician Pathway (LTP) prepares fire sprinkler layout and design professionals for NICET Levels I & II certifications. It also provides a great refresher for those who have been designing systems but need a comprehensive refresher. Students will receive a hard copy of the recently updated and revised "Layout Book" as well as a copy of the 2022 edition of the NFPA 13 standard.

The LTP consists of two parts. Students must first complete the on-line Part 1: Fundamentals before attending the in-person Part 2: Application session. The 25 self-paced online modules cover everything from "Parts of a Sprinkler" to "Introduction to Fire Sprinkler Calculations." The 3-day in-person instructor-led Part 2: Application class applies the content learned in the previous Fundamentals course. There are four in-person and one virtual session offered in 2023.

NOTE: Students must register for Part 1: Application at least one month before the start of in-person Part 2: session in order to allow enough time to complete the on-line modules.

Layout Technician Pathway cost:
Members: \$2,200.00
Non-members: \$4,400.00 – [Join here](#) to save 50%!

Registration Deadline for Fundamental & Application	Layout Technician: Fundamentals Completion Deadline	Layout Technician: Application Class Dates
28-Aug-23	25-Sep-23	September 26-28, 2023
14-Oct-23	13-Nov-23	November 14-16, 2023

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Our next Tech Tuesday will be July 18, 2023 from 12:30 pm to 1:30 pm eastern time. The topic will be Fires in Sprinklered Buildings.

Many fires in sprinkler-protected buildings are extinguished by the time that the fire department arrives. There are, however, fires where the fire department needs to conduct interior fire attack to effect complete extinguishment. In those cases, the fire department may need to support the sprinkler system or conduct more conventional firefighting operations.

This course will review fire department data on sprinkler-protected building fires, cover the components of a sprinkler system that are critical for fire department operations, discuss how they are intended to function, and identify their proper design and installation.

Member Cost: Free

Non-member Cost: \$50.00 [Learn more about membership.](#)

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[Register for the next Tech Tuesday Here](#)

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