

# HOME FIRE SPRINKLERS SAVE LIVES, MONEY AND WATER

## A GUIDE FOR WATER PURVEYORS



**Home Fire Sprinkler®**

**COALITION**

Protect What You Value Most™

**HomeFireSprinkler.org**

## **FIRE—THE LARGEST SINGLE CAUSE OF PROPERTY LOSS**

Fire is the largest single cause of property loss in the United States. According to the National Fire Protection Association (NFPA), fire damage caused \$7.4 billion in residential property loss in the U.S. in 2007, representing a significant increase of 15.6 percent over the previous year. More than half of the residential fires took place in one- and two-family dwellings, destroying an estimated \$5.7 billion in property.

On average, three-quarters of all U.S. structure fires happen in residential properties. Most people are surprised to learn that eight out of every 10 fire deaths occur where they assume they are safest: at home.

These figures underscore a fact you need to know – your residents are most vulnerable from fire right in their own homes. Installing residential fire protection equipment is good for your community.



## **LIKE HAVING A FIREFIGHTER ON DUTY 24 HOURS A DAY**

Fire sprinklers are a highly effective fire protection technology that is particularly valuable in homes. Having a fire sprinkler system installed is like having a firefighter on duty 24 hours a day.

Home fire sprinkler systems are being installed in thousands of one- and two-family homes each year in communities throughout the country. This trend is the result of communities passing ordinances, developers taking advantage of trade ups and homeowners requesting sprinklers as an option.

By detecting a fire while it is still small and extinguishing or controlling it automatically, fire sprinklers limit the growth and spread of heat and toxic smoke, giving residents more time to escape and survive. Also important is the sprinkler's immediate action, which severely limits fire, heat and smoke damage to the property and its contents.

Not only do fire sprinklers save lives and property, but they also save water and reduce infrastructure costs. Fire sprinklers control home fires using 90% less water than fire departments. Fire flows can be reduced and hydrant spacing increased for fully sprinklered developments, reducing costs for developers and communities.



## **SAVING WATER, SAVING LIVES**

This guide provides water purveyors with information on topics that need to be addressed in preparing a jurisdiction for fire sprinklers in single-family dwellings. By understanding the details of residential fire sprinkler water usage, backflow protection and hydraulic requirements, water purveyors will gain new understanding of issues such as metering, infrastructure construction and standby fees.



## AWWA RESEARCH FOUNDATION SUPPORTS SPRINKLERS

AWWA Research Foundation has published the report, Impact of Fire Flow on Distribution System Water Quality, Design, and Operation. This report concludes the following:

**“Water-efficient fire suppression technologies exist that use less water than conventional standards. In particular, the universal application of automatic sprinkler systems provides the most proven method for reducing loss of life and property due to fire, while at the same time providing faster response to the fire and requiring significantly less water than conventional fire-fighting techniques. It is recommended that the universal application of automatic fire sprinklers be adopted by local jurisdictions.”**

## CODES AND STANDARDS CALL FOR FIRE SPRINKLERS

Fire sprinklers are required in one- and two-family dwellings by the following codes:

- The International Residential Code, 2009 edition
- The International Residential Code, 2006 edition (Appendix P)
- NFPA 101, Life Safety Code, 2006 edition
- NFPA 5000, Building Construction and Safety Code, 2006 edition
- NFPA 1, Uniform Fire Code, 2006 edition
- International Building Code / International Fire Code, 2003 editions

### Overview of NFPA 13D: The Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings

When a sprinkler system is installed in accordance with NFPA 13D, the system improves the chance for occupants to escape and prevents flashover in the room where the fire starts. (Flashover is when the entire room and its contents ignite.)

NFPA 13D requires a minimum 10-minute water supply (7 minutes under certain conditions – see standard for details).

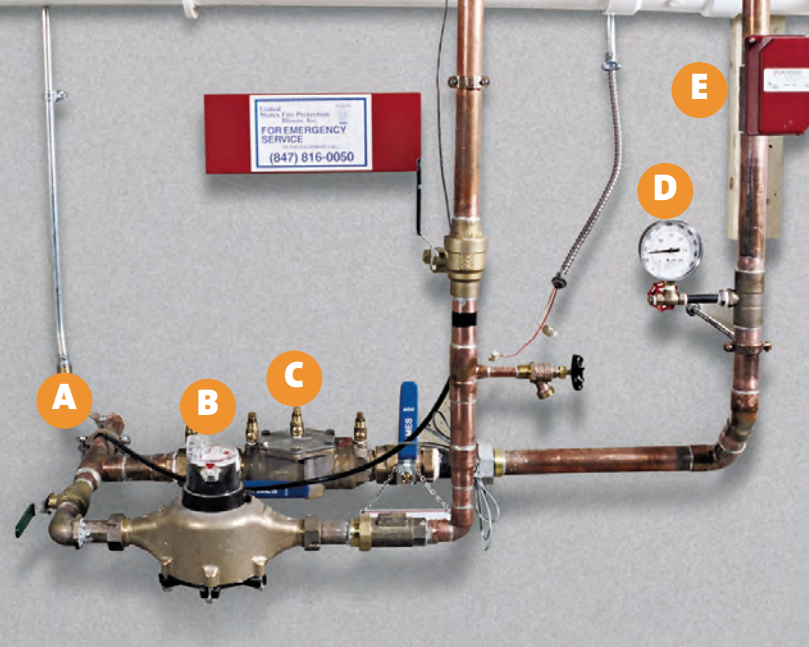
The standard allows Independent, Multipurpose (serving both domestic and fire protection supplies) and Network systems (supplies domestic fire protection and each sprinkler is supplied by a minimum of three separate paths).

NFPA 13D recommends, but does not require, sprinklers in all areas of a dwelling. The standard permits sprinklers to be omitted from the following spaces:

- Bathrooms smaller than 55 sq. ft.
- Closets and pantries smaller than 24 sq. ft.
- Garages, open attached porches, carports and similar structures
- Attic spaces that are not used for living space
- Covered, unheated projections of the building at entrances and exits

Please read the standard for compliance with the above exceptions. NFPA 13D includes information for installation of sprinkler systems in areas where freezing may occur.





- A "T" CONNECTION TO WATER MAIN**
- B WATER METER**
- C BACKFLOW VALVE**
- D PRESSURE GAUGE**
- E FLOW SWITCH\***

\*Not required in all locales

## TYPICAL FIRE SPRINKLER WATER SUPPLY

The connection includes a single supply from the water main into the house. Once inside the house, the water delivery is split so that the domestic system is isolated from the fire sprinkler system. The water meter is only installed on the domestic portion, and therefore does not need to be included in the hydraulic calculations for the fire sprinkler system, and does not need to have any special requirements as far as the sprinkler system is concerned.



*Sidewall Sprinkler*

*Concealed Sprinkler*

*Pendent Sprinkler*

## BACKFLOW AND METERS

### Stand Alone Sprinkler Systems

- Non-testable single or double check

### Multipurpose Piping System

- No additional backflow requirements (same as potable system)

### Design Water Flow = 15 To 40 GPM (max)

- Effects Primarily Meter Size ( $\frac{3}{4}$ " minimum)
- May effect smaller tapline size

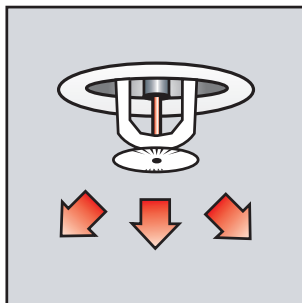
Backflow preventers should not be necessary on small residential systems with the same components as domestic systems or on small residential systems integrated with domestic systems. Research sponsored by the United States Fire Administration and conducted by Worcester Polytechnic Institute showed that water that sits for long periods of time in fire sprinkler systems is not hazardous as long as the pipe is an approved potable piping material.

As a general rule, a fire protection water line should not have any devices in line that could restrict the flow of water (for example a meter). The case of combined domestic/fire protection water lines should be the only time such meters are used.

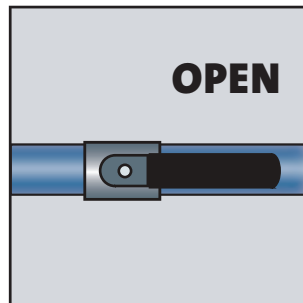
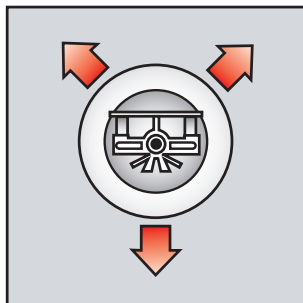
Rural water supply options for supplying water to a fire sprinkler system when a public main is not available or there is insufficient water pressure include:

- Elevated tank
- Storage tank with a pump
- Pressure tank
- Underground well

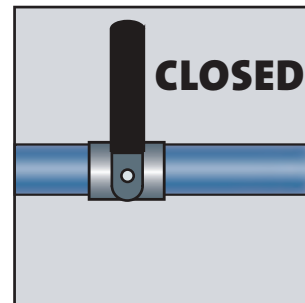




**Keep area around the sprinklers clear.**



**Make sure valves are open.**



## MAINTENANCE IS SIMPLE

Sprinklers require very little maintenance. It's essential to keep the water valve turned on, so a simple visual inspection should be done routinely to ensure the valve is open. And, inspect the pipes and sprinklers occasionally to make sure nothing is obstructing them.

The Home Fire Sprinkler Coalition recommends that every home sprinkler system should have a water flow test on a regular basis. It's a simple test that can be done by the homeowner or a fire sprinkler contractor.

Here are eight simple steps\*:

- (1) Visually inspect all sprinklers to ensure against obstruction of spray.
- (2) Inspect all valves to ensure they are open.
- (3) Test all waterflow devices
- (4) Test the alarm system, where installed. Should it appear likely that the test will result in a fire department response, notify the fire department prior to the test.
- (5) Operate pumps, where employed.
- (6) Check pressure of air used with dry systems.
- (7) Check water level in tanks.
- (8) Ensure that the sprinklers are not painted either at the time of installation or during subsequent redecoration. When sprinkler piping or areas next to sprinklers are being painted, the sprinklers should be protected by covering them with a bag, which should be removed immediately after painting is finished.

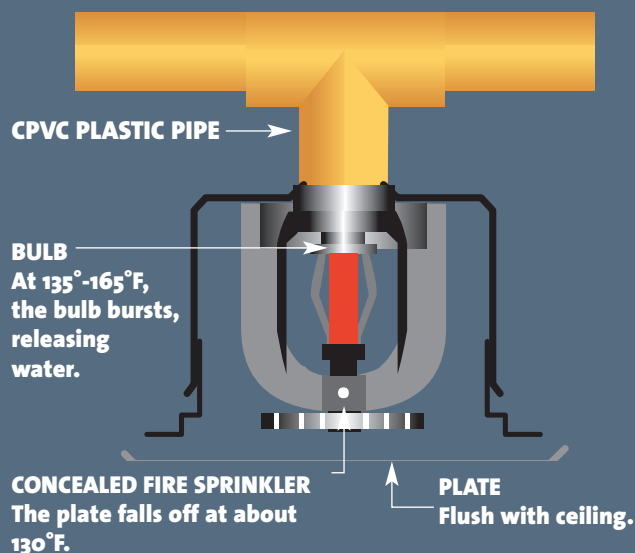
## SPRINKLERS OPERATE INDIVIDUALLY, IN RESPONSE TO THE HIGH TEMPERATURE OF A FIRE

Each fire sprinkler has a temperature-sensitive element. Sprinklers flow only when the temperature near the sprinkler reaches 135°-165°F and they operate for sufficient time to keep a fire extinguished or controlled until the fire department arrives. Each sprinkler is designed to operate independently.

Smoke, cooking vapors or steam cannot and will not cause the sprinklers to activate – sprinklers operate in response to the high temperature of a fire.

## HOW HOME FIRE SPRINKLERS WORK

**A sprinkler covers a minimum 12 X 12 foot area. Extended coverage sprinklers can cover a maximum area of 20 X 20 feet.**





**“The American Water Works Association (AWWA) recognizes the increasing use of residential fire sprinkler systems and encourages that they be designed by licensed or accredited professionals and installed by licensed fire sprinkler contractors or properly trained personnel. The design of a system requires communication with the utility so that available water pressures and flow to the residential fire system can be determined and the design can meet the utility's requirements.”**

## **STANDBY FEES**

Scottsdale, Arizona, has been a sprinklered community for more than 20 years with more than 50 percent of the homes protected with fire sprinkler systems. According to the Scottsdale Report, there was less water used in fires in the homes with sprinklers. Sprinkler systems discharged an average of 341 gallons of water/fire as compared to 2,935 gallons of water/fire released by firefighter hoses. Many water departments and communities have recognized this savings by developing incentives for the installation of fire sprinkler systems:

- The City of Altamonte Springs, Florida, allows a 40% credit against the water connection charge for residential occupancies which have a sprinkler system installed.
- The Kentucky Public Service Commission ordered all utilities that currently access a minimum monthly bill for fire protection services to file a new rate structure and to eliminate standby fees.
- The City of Erie, Pennsylvania, has made a decision

to provide a rate relief which would provide a 67% decrease for sprinkler standby fees and 35% for sprinkler connections of 2 inches or less.

- AWWA M31, Distribution System Requirements for Fire Protection, mentions that water utilities can levy a one-time capital recovery fee or annual standby charges for fire protection systems. These charges should be based on the actual cost to provide the service.
- AWWA M1, Principles of Water Rates, Fees, and Charges, recognizes that sprinklers can reduce fire demands by faster, more efficient extinguishing of fires. In addition, private sprinkler connections use significantly less water than hydrants for firefighting; as a result, they may reduce actual fire demands, because water is typically supplied only in the area of the fire. Accordingly, it is argued, there should be no additional charges for private fire service.

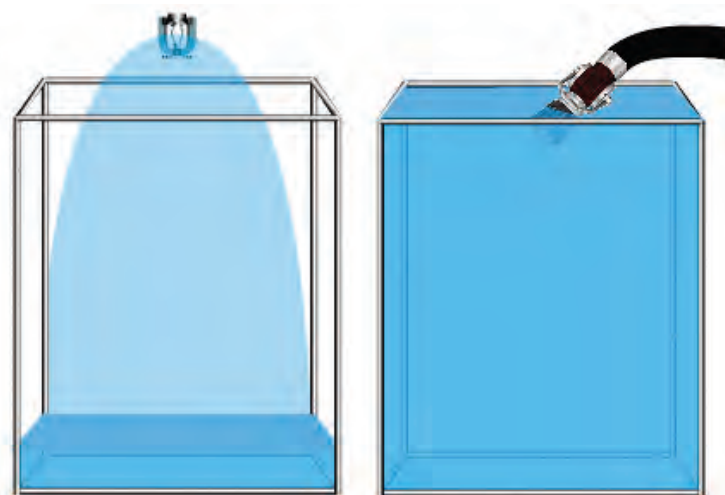
Rather than charge standby fees, water purveyors are encouraged to build a fee structure based on the required fire flow necessary to fight a fire in the building. A fee structure based on the fire flow requires everyone who relies on water for fire protection to pay for it, rather than allow people without sprinkler systems to avoid paying their fair share. At the same time, such a fee structure would recognize the fact that less water is used in sprinklered buildings by charging people with sprinklered buildings less. This would be a fair way to share the cost of fire protection in a community without penalizing building owners who install fire sprinkler systems. This fee structure can actually increase the revenue for the water purveyor.

## **90% REDUCTION IN WATER DEMAND**

Fire Department Only = 2,935 Gal.  
FD Operations Average 250 GPM.  
Sprinklers + Fire Department = 341 Gal.  
Sprinklers Average 25 GPM Plus FD Mop-Up.

Fire Sprinklers Have Saved The City Of Scottsdale An Estimated \$7.5 Million In Future Infrastructure Costs.\*

\*“Automatic Sprinklers: A 10-Year Study  
A detailed history of the effects of the automatic sprinkler code in Scottsdale, Arizona”



**Fire hoses, on average, use more than 8½ times the water that sprinklers do to contain a fire.**

## HOME FIRE SPRINKLER FAQs

### If one sprinkler goes off, do they all go off?

Sprinklers activate independently; only the sprinkler(s) closest to the fire will activate. In most home fires only one sprinkler is needed to control a fire.

**Will burning toast activate the sprinkler?** Fire sprinklers do not respond to smoke; they respond to the high temperature of a fire – about 135° to 165°F. Smoke caused by cooking or cigars cannot and will not cause a sprinkler to activate.

### Will my sprinklers leak?

Sprinkler mishaps are generally less likely and less severe than conventional home plumbing system problems. Sprinkler contractors install the systems in accordance with national installation standards, which help ensure proper operation.

### Is post-fire water damage from sprinklers worse than fire damage would be without sprinklers?

Fire damage and water from high-pressure fire hoses is far greater. A residential sprinkler flows 10-26 gallons of water per minute, for approximately 10 minutes (or less if the fire department turns the water off sooner). An uncontrolled fire will cause far greater fire destruction and smoke damage, requiring a tremendous amount of water from fire department hoses – more than 10 times the water per minute. The property loss in a sprinklered home fire is typically only a fraction of the loss in an unsprinklered home fire.

### Won't the fire department be able to put out the fire and save my things?

A 9-12 minute total fire department response time is considered good in most communities. In that time, an uncontrolled fire will have grown and spread through the home, causing tremendous smoke and fire damage before the fire department can get there.

### Will sprinklers freeze in the winter?

Freezing is not a problem when the residential sprinkler system is correctly installed to the requirements of NFPA 13D.

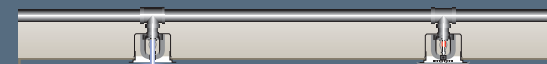
### Since I have smoke alarms, why do I need fire sprinklers?

## HOW HOME FIRE SPRINKLERS WORK

Sprinklers are linked by a network of piping, typically hidden behind walls and ceilings and usually drawing upon household water sources.



Each sprinkler protects an area below, and when heated by fire, activates.



Only the sprinkler closest to the fire will activate, spraying water directly on the fire.

Smoke alarms are essential in every home. But they can only detect a fire; and to be effective residents must be willing and able to respond quickly to the alarm. Only fire sprinklers can detect the fire and automatically control or extinguish it, paving the way for residents to make a safe escape – and also protecting property and valuables. The best protection from fire is having both smoke alarms and a fire sprinkler system.

### Are 13D fire sprinklers difficult to maintain?

Little maintenance is needed. Regular flow tests should be conducted and homeowners can do these simple tests themselves or have the sprinkler contractor do it every year or so.

**THE FOLLOWING WATER SUPPLY SOURCES SHALL BE CONSIDERED TO BE ACCEPTABLE BY THE NFPA 13D:**

- (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. The stored water requirement 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.



**FEMA**



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