

Home Fires: No Prevention Strategy Has as Much Documented Life Safety Effectiveness as Fire Sprinklers

The fire problem in the U.S. is overwhelmingly a home fire problem. According to the National Fire Protection Association's (NFPA) latest U.S. data, 92% of all civilian structure fire deaths resulted from home structure fires. Quite clearly, any improvements in overall fire safety must be improvements in *home* fire safety, and no strategy has as much documented life safety effectiveness as installed fire sprinkler systems.

Homes Burn, Whether New or Old

Few fatal home fires involve installed features of homes. Instead, they usually involve the actions and errors of the occupants in combination with the flaws and vulnerabilities of products brought into the home. New homes benefit from fire sprinkler protection as much as older homes.

Fires Today "Burn Faster and Kill Quicker"

Research conducted by the National Institute of Standards and Technology (NIST) has shown that home fires become deadly in as few as three minutes. Fires today seem to burn faster and kill quicker, because the contents of modern homes (such as furnishings) can burn faster and more intensely. New and old homes alike are filled with these newer contents and furnishings, which provide less margin for success for smoke alarms and add to the need for fire sprinklers. Modern lightweight home construction products, especially wood truss roof systems and wood joists, can rapidly fail under fire conditions, an extreme risk to firefighters responding to a fire.

Important Information about Smoke Alarms

Working smoke alarms provide valuable early warning in dwellings. HFSC recommends that every home have smoke alarms installed on each level. For smoke alarms to be effective, occupants must react quickly and escape immediately when the alarm warns of a fire. Every household should hold regular fire drills to practice how to properly respond to a fire alarm. Smoke alarms are designed only to signal a warning, which gives residents time to put their escape plan into action. Many high-risk populations – infants, children, people with disabilities, older adults – can have difficulty hearing and waking to smoke alarms, and difficulty reacting quickly and effectively enough for a safe escape. Their lives depend on stopping the fire early in its development. Their lives depend on fire sprinklers.

Fire Sprinklers Make Up for Human Error

Fire sprinklers provide a level of protection that no other fire protection technology can offer. Like smoke alarms, sprinklers detect a fire; but they do even more. Fire sprinklers automatically respond to a fire while it is still small, controlling the spread of deadly heat, flames and toxic smoke. Fire sprinklers are effective whether or not the residents have responded to the smoke alarm. Fire sprinklers make up for human error, and they provide a life-saving cushion for a time-consuming escape.

How Fire Sprinklers Work

In most settings where there is a municipal water supply, sprinklers operate off the household water main. When the water supply is a well, or there is not enough water pressure, a holding tank is used. Sprinklers are linked by a network of piping, typically hidden behind walls and ceilings. The high temperature of an early-stage fire (135°-165°F) will cause the sprinkler to activate. Only this high heat initiates the sprinkler to flow water (neither smoke nor a smoke alarm can activate a fire sprinkler). Only the sprinkler closest to the fire will operate, flowing water directly on the flames in the area of the fire's origin. This quick action controls or extinguishes the flames (often before the fire department arrives). Fire sprinklers slow the spread of deadly heat and toxic smoke, preventing flashover. This also provides residents with more time to safely escape.

Each Sprinkler Works Individually

Unlike interconnected smoke alarms (if one signals, they all signal), fire sprinklers activate independently. In a survey of home fires*, 90% of the time a single sprinkler was sufficient to control the fire. Despite the fictional special effects commonly seen in action movies, fire sprinklers do not spray water all at once. They do not operate in response to smoke, burned toast, cooking vapors, steam, an activating smoke alarm, or anything other than high heat.

Home Fire Sprinklers Are Simple to Maintain

Home fire sprinkler systems require very little maintenance. In fact, the sprinklers themselves require nothing more than an occasional look to ensure they are not painted and that nothing is hanging from them, or blocking them. Valves should be similarly checked to ensure they are turned on. According to the National Fire Protection Association, once a month, homeowners or sprinkler contractors should test the pump (if any) and visually verify that all valves are open and the storage tank (if any) is full. Twice a year, the water flow device and monitoring service (if any) should be tested. That's it.

Fire Sprinklers in Cold Climate Homes

Wet pipe fire sprinkler systems can be installed in homes where freezing may occur. Several design options exist in NFPA 13D, including insulation, heating of sprinkler piping areas, dry pipe and the limited use of antifreeze. These systems are installed in areas like Alaska and Colorado and even the mountain area of California where they have a state requirement for residential sprinklers.

Home Fire Sprinklers Are Good for the Environment

According to a groundbreaking joint research project from FM Global and HFSC on the environmental impact of fires, automatic fire sprinklers can reduce greenhouse gas emissions by 98%, reduce fire damage by up to 97%, reduce water usage to fight a home fire by as much as 91% and reduce water pollution.**

Fire Sprinklers Are a Smart Investment for Developers

A national 2008 report from the Fire Protection Research Foundation found that the average cost to builders to install sprinklers in new homes was \$1.61 per sprinklered square foot. Reduced labor costs and municipal trade-up incentives have made fire sprinklers a valuable way for homebuilders to protect their bottom line. Options vary by jurisdiction, but typical trade ups for a sprinklered residential development or sub-division include street width reduction, additional units, and increased hydrant spacing. Another Foundation study, conducted in 2010, evaluated incentives in 16 communities. Both reports can be downloaded at www.NFPA.org.

Fire Sprinklers Are a Smart Investment for Homeowners

The installed fire sprinkler system is paid for over the life of a mortgage, just as is the home's electrical or plumbing system. A national poll conducted by Harris Interactive® showed that two-thirds (69%) of U.S. homeowners say having a fire sprinkler system increases a home's value.

The Home Insurance Industry Encourages Sprinkler Installations

The insurance industry banks on the fact that having installed fire sprinklers not only protects against fire injuries and deaths; they also protect against fire damage. As an incentive for customers, insurance companies offer discounts ranging from 5% to 25% off the fire portion of homeowner premiums. HFSC urges consumers to shop around for the best insurance discount.

Q: How effective are fire sprinklers?

A: The National Fire Protection Association (NFPA) has no record of a fire killing more than two people in a completely sprinklered public assembly, educational, institutional or residential building where the system was working properly. Cases in which fatalities occur in a building equipped with fire sprinklers, the deceased are almost always in intimate contact with the fire and were burned severely before the sprinkler activated (i.e., smoking in bed, explosions, etc.). Sprinklers typically reduce chances of dying in a fire and the average property loss by one-half to two-thirds in any kind of property where they are used.

Q: Do any studies exist that document the effectiveness of fire sprinklers?

A: "U.S. Experience with Sprinklers" (September, 2001) by Kimberly Rohr provides an excellent study of the use and experience of automatic fire sprinklers. This report was produced by and is available from the National Fire Protection Association. (see:

<http://www.nfpa.org/Research/nfpafactsheets/sprinkler/sprinkler.asp>)

Residential sprinklers have been required by the City of Scottsdale, Arizona for over fifteen years. A

comprehensive report on its experience with residential fire sprinkler systems is available from the Home Fire Sprinkler Coalition at: <http://www.homefiresprinkler.org/hfsc.html>

Q: Are fire sprinklers prone to accidental discharge?

A: The odds of a sprinkler activation due to a manufacturing defect are about 1 in 16 million. Fire sprinklers have a long history of proven dependability and reliability. Although sprinklers can be damaged and activated through intentional or accidental abuse, this is rare. Sprinkler piping is no more likely to leak than existing plumbing piping in every home and building.

Q: Don't fire sprinkler activation results in a lot of water damage?

A: No, fire sprinklers are designed to control a fire in its early stages where less water is required. Most fires are completely controlled with the activation of only one or two sprinklers. Fire hoses, on average, use more than 8 times the water that sprinklers do to contain a fire. According the Scottsdale Report, a residential fire sprinkler uses, on average, 341 gallons of water to control a fire. Firefighters, on average, use 2,935 gallons. Reduced water damage is a major source of savings.

Q: Why are fire sprinklers required in some areas, and not in others? Why are there variations in sprinkler requirements?

A: The requirements for the installation of fire sprinklers are adopted as law by state or local jurisdictions as a part of their building code or local ordinance. At times jurisdictions may vary some of the requirements contained in the NFPA or building code documents. Differences in requirements will vary from city to city based on local changes made to the code or standards, or the year of the standard adopted by the local jurisdiction.

Tank Systems

This is to address one of the questions about in-fill lots and well systems with residential fire sprinkler systems. Residential sprinkler systems are designed to have a water supply with a minimum duration of 10 minutes. The average residential sprinkler system is designed to flow two sprinklers for 10 minutes minimum, thus needing an approximate 300 gallon water supply. A water utility company can provide this service for an average cost of \$3,500. But in areas without water, what options are available. The most common solution is a pump and tank system, as shown in the above and below photos. This system is comprised of a tank, typically plastic, and a small pump suited to meet the sprinkler system design needs. The tanks have a float-fill system keeping the systems adequately filled once connected to the domestic system. These systems can be purchased as a package or separately to meet the consumer needs.



300 gallon tank & pump sys, 29"W x 49"L x 62"H

In comparing the costs of a pump and tank system versus those found in a home water utility system, pump and tank systems have an average cost of \$3,400. Based on our research the cost difference of a residential sprinkler system served by a water utility versus a pump and tank is an average of \$100 cheaper for the pump and tank and in some cases this systems could be much cheaper than the fees of the water utility department.

Additional benefits of the pump and tank systems are the systems are designed for space efficiency with small footprints. Some tanks are designed to fit thru doorways as small as 29" or can be installed in confined spaces as bolt-together tanks. Many of the pump and tank systems have options for use in areas without power, such as connection to solar power supplies or pneumatic design utilizing a pressurized nitrogen cylinder instead of a pump.