

# AFSA Scholarship Contest

## Fire Sprinkler Industry Overview

### WELCOME

This is it! It's your senior year and you are ready to hit the ground running – college or trade school, real world, and everything in between – *bring it on!* And up until this very moment, you may or may not have heard of automatic fire sprinkler systems. So what's the big deal about these systems and why should you care?

The simplest way to put it is that your life may depend on them someday. Unfortunately every year, young people just like you lose their lives in college dorms, nightclubs, hotels, apartments and off-campus housing due to the lack of fire sprinkler systems. Nobody ever sees a fire coming, and the aftermath is not always kind. In fact, it can be downright devastating.

So take this opportunity to educate yourself on these little systems that you don't hear too much about. Then start taking a look around – you just might be surprised at how relieved you feel when you see they're installed where you happen to be for the moment. Oh yeah, and the chance to win a scholarship to help with college or trade school expenses? Not too shabby either.

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### BACKGROUND HISTORY

The concept of automatic fire sprinkler systems dates back to the 1800s, most notably to English inventor John Carey, who in 1806 developed a heat-operated system that distributed water through perforated pipes to extinguish a fire.

In 1864, Major Stewart Harrison of London's 1st Engineer Volunteers furthered Carey's idea by introducing the automatic sprinkler.

Meanwhile in America, Henry S. Parmelee was also developing the concept while looking for a way to protect his piano factory in Newhaven, Conn., from the irreparable damage that could be caused by a fire.

Although the system had already been patented by another American, Philip W. Pratt of Abington, Mass. in 1872, Parmelee is credited with creating the first commercially successful closed sprinkler in 1874.

Frederick Grinnell continued the progress of the invention in Providence, R.I. by adding his patented version in 1881.

In an effort to standardize these systems, a group of insurance companies joined together to form the National Fire Protection Association (NFPA) in 1896.

## Four Basic Types of Fire Sprinkler Systems:

1

**WET PIPE SYSTEM** — most common, simplest and least expensive to install and maintain

**Examples of use:** offices, warehouses, stores, homes, college dorms, nursing homes, high-rise apartments

2

**DRY PIPE SYSTEM** — installed wherever the system is subject to freezing

**Examples of use:** loading docks, unheated attics

3

**PREACTION SYSTEM** — a special system that typically does not activate until the fire is confirmed by detection equipment

**Examples of use:** computer rooms, art galleries

4

**DELUGE SYSTEM** — all sprinklers open and spray water when the system activates

**Examples of use:** petrochemical plants, aircraft hangers

## HOW DOES IT WORK?

The idea behind the automatic fire sprinkler system actually hasn't changed much since its inception. The goal is to have a steady supply of fire extinguishing material (usually water, but in some cases specially formulated foam) ready to burst into action should the need arise. At the same time, you don't want the system to go off when it's not needed.

The systems can be classified in two basic categories, residential and commercial, with four basic types of fire sprinkler systems: wet pipe system, dry pipe system, preaction system, and deluge system.

Residential systems are usually fed from the same city water supply that feeds the plumbing system of the home. In circumstances where the home's water supply is inadequate, for example in rural areas, water tanks and pumps can be installed to supply the sprinkler demand. Sprinklers are spaced throughout the house based on specific regulations.

Typically, each sprinkler contains a glass bulb filled with a special fluid or a soldered link that acts as a "stopper" to the water supply behind it. In order to activate the sprinkler, the bulb or link must be heated to a specific temperature. At that point the fluid will expand and break the glass or the link will melt, and allow the water to be released at a force of anywhere between 30 to 175 pounds per square inch (psi).

Once the water is released, it sprays at a radius of about 20 feet. Usually, a single sprinkler is enough to put out a fire before it gets out of control.

### CONSIDER THIS SCENARIO:

Your roommate, who's never heard of emphysema, falls asleep on the couch with a lit cigarette in his or her hand. The cigarette falls to the floor, lighting the bottom of the 1970s curtains that came with the place. Within seconds, the fire makes its way up the fabric, generating enough heat at the ceiling level to expand the fluid in the glass bulb and break it or melt the metal link. (Believe it or not, this process can take less than a minute.) Melting of the link or breaking of the bulb activates the sprinkler, releasing water that controls or extinguishes the fire and giving your roommate a rude, but welcome awakening.

One of the biggest myths regarding automatic fire sprinkler systems is that the entire system kicks into action when a single head is activated. This is not true! Except in specially designed deluge systems, the sprinklers act independently of each other, which is why so often a single sprinkler does the job of putting the fire out. If for some reason the first sprinkler that activates does not control or extinguish the fire, the next sprinkler nearest the fire will activate. A fire can start *anywhere*, and a properly installed system will include sprinklers throughout the structure as mandated by special building codes and standards.

Commercial systems are reserved for bigger buildings, even when the building is residential in nature. For example, college dorms and high-rise apartments call for commercial systems, although they are used as residences. The various systems have specific functions that differ accordingly. However, the concept behind commercial systems is the same as with residential fire sprinkler systems. The objective is to have a system in place that will control a fire at the smallest possible level, therefore avoiding major damage to the building and even more importantly, loss of life.

## BASIC CODE INFORMATION: WHO DETERMINES WHAT?

Fire sprinkler installations are governed by codes and standards. In general, a code (building code, fire code, *Life Safety Code®*, etc.) defines when and where fire sprinklers must be installed. When a fire sprinkler is to be installed, a standard defines how a system should be installed to protect a specific structure and its contents. At this time, there is no standard rule across the entire United States that determines where fire sprinklers should be installed. States and/or individual cities adopt and sometimes modify codes that are developed by organizations such as the National Fire Protection Association (NFPA) and the International Code Council (ICC). Some states determine basic guidelines that must be followed by all counties and/or cities, while others allow each municipality to decide this on its own.

One of the most important standards used is NFPA 13, *Installation of Fire Sprinkler Systems*. Developed by the National Fire Protection Association, it is the “grandma” of standards pertaining to fire sprinkler systems. There are many, many more standards that break it down even further by type of structure, size, etc. Other codes address the testing and maintenance of the systems. There are entire careers based on knowing these codes inside and out, and we won’t be going into each code in this paper (no need to thank us). Needless to say, the codes are constantly changing and being updated as technology and building structures change. Committees meet periodically to review and examine the codes for possible improvements, clarifications and updates.

## CHALLENGES FACED BY THE FIRE SPRINKLER INDUSTRY

By this point, the benefits of automatic fire sprinkler systems should be obvious. However, the industry still faces opposition from those who may be ignorant to the way the systems operate, the costs of installing them and/or the overall necessity of having the systems in place. There are major misconceptions about fire sprinkler systems that must constantly be dispelled despite the amount of educational material available explaining otherwise. Below are just a few examples of myths about the systems and the reasons why they are incorrect.

### Myth #1:

“Water damage from a sprinkler system will be more extensive than fire damage.”

### Fact:

Water damage from a fire sprinkler system is generally much less severe than the damage caused by water from fire-fighting hoses or smoke and fire damage if the fire goes unabated. For example, in residences with fire sprinklers, property losses are 85 percent less when compared to those without sprinklers. Quick response sprinklers release 13-24 gallons of water per minute compared to 100-250 gallons per minute released by a fire hose.

### Myth #2:

“A smoke detector is enough protection.”

### Fact:

Smoke detectors can save lives by providing a warning system but can do nothing to extinguish a fire or protect those physically unable to escape on their own, such as the elderly or small children. Though nearly 90 percent of U.S. homes have at least one smoke detector, only 60 percent have working detectors, often because of dead or missing batteries.

### Myth #3:

“When a fire occurs, every sprinkler goes off.”

### Fact:

Unlike what is often mistakenly portrayed in the movies, sprinklers are individually activated by heat. Residential fires are usually controlled with one operating sprinkler. Ninety percent of all commercial fires are controlled with six or fewer sprinklers. Experience over an 82-year period in Australia and New Zealand with sprinklers documents an astonishing 99.8 percent effective rate.

### Myth #4:

“Automatic fire sprinkler systems are too expensive.”

### Fact:

The cost associated with installing an automatic fire sprinkler system depends on several factors such as the location, size, type of construction and intended use of the structure. Typically, the cost of installing a system during the construction of a new home ranges between 1 to 1½ percent of the total cost of the home. That is about the same cost as upgrading your choice of carpeting, but sprinklers give the added value of a lifesaving feature. Installing a typical wet pipe sprinkler system in a new office building costs about 5 percent of the total building cost. Whether commercial or residential, it is usually much less expensive to install a system than to replace and/or repair the damage caused by a fire in a building that is not protected with sprinklers.

## ADVANCES MADE BY THE FIRE SPRINKLER INDUSTRY

Despite the challenges faced by the fire sprinkler industry, it has gained a considerable amount of attention and credibility, especially over the past 25 years, due in part to organizations such as AFSA and NFPA that promote public awareness about the systems and the public's growing concern with its own safety.

In an unsprinklered building, a fire can grow from a single lit match to flashover in a matter of minutes – often less than 5 minutes. Flashover is a condition in which everything in the room catches fire. Temperatures reach well over 1000 degrees Fahrenheit. Nothing and no one will survive if they are in a room when it reaches flashover.

Burn trailer demonstrations or side-by-side sprinklered versus unsprinklered burn demonstrations are often sponsored by AFSA chapters or local fire departments. These demonstrations allow spectators outside to watch as a fire is set and the system activates. The most common reaction is amazement at (1) how quickly a fire spreads and (2) the speed and effectiveness of a fire sprinkler system. Seeing is believing!

Segments on popular television shows such as *Good Morning America* and *The Today Show* reach broader populations. TV personality Ron Hazelton from ABC's *Good Morning America* and HGTV's *The House Doctor* endorses and explains the systems to his viewers. Hazelton has also installed a system in his own home.

More and more homebuilders are encouraging the installation of fire sprinkler systems by taking advantage of building incentives and trade-ups that work in their favor. This is particularly good because misinformed homebuilders sometimes oppose the systems due to a mistaken belief that they will cut into the overall profits involved with building a new home.

One of the biggest successes of recent years is the amount of legislation passing in favor of automatic fire sprinkler systems. Unfortunately, it is often tragedy that fuels the realization that these systems are a necessary requirement in buildings. For example, a fire on February 20, 2003 at the Station Nightclub in West Warwick, R.I. brought national attention to a common issue: buildings such as nightclubs (even the smaller ones) sometimes get overcrowded with people and should require a fire sprinkler system in case of emergencies.

This sad event sparked legislative action that addresses this growing concern. A number of college campus fires in the last several years has increased interest in passing laws to ensure the safety of college students in dorms and off-campus housing.

Getting laws passed is a long, drawn-out process and it may be a few years before we see results. However, the simple fact that lawmakers are seriously looking at the issue of fire safety and automatic sprinkler systems' role in saving lives is a victory unto itself.

## CAREERS IN THE INDUSTRY

The career opportunities within the fire sprinkler industry cover various types of skills and education. If you look at what's involved in building a structure, you can see that members of the fire sprinkler industry are directly involved at many stages of the process.

A **fire sprinkler contractor** works with architects, general contractors, code officials and sometimes building owners, to provide the appropriate fire protection for a structure.

Fire sprinkler contractors often employ a **fire protection engineer** or a **sprinkler system designer/layout technician** who knows the specific design requirements involved with a fire sprinkler system and how they fit into the rest of the structure's design.

A **sales representative** or **estimator** uses the fire sprinkler system drawings to determine how much the system is going to cost, and might even be able to recommend **manufacturers** and **suppliers** to provide material needed.

A contractor will work with the sales person or estimator to bid on the project. Should the contractor's company win the bid and get chosen to install the system, the contractor and/or his or her **fire sprinkler fitters** will install the actual system in the structure. Finally, an **inspector** from the city's fire or building department will test the system to make sure it works properly and passes the city's requirements before approving the system. Fire sprinkler contractors sometimes perform inspections as part of maintenance of the system.

The sprinkler industry also draws from other **business-related fields**. For example, manufacturers and suppliers, and some contracting companies, often hire people in sales and marketing, project management, purchasing and materials management, research & development, human resources, public relations and accounting to name a few jobs that may land you in the fire sprinkler industry.

Depending on your interest, you may or may not need a college education for the job. Fire sprinkler fitters do not require college degrees; however, there is special training involved when installing fire sprinkler systems. A good fitter will want to get involved in an apprenticeship program, sometimes paid for by the employer. AFSA offers nationally recognized apprentice training materials that take a sprinkler fitter from his or her first day all the way to foremanship training. Many successful owners of fire sprinkler contracting companies began their careers as apprentices. AFSA also offers correspondence courses and classes that teach fire sprinkler system layout.

**Designer/layout technicians** may also want to train in computer-aided design (CAD), which does require further education at institutions such as the School of Fire Protection Technology, Seneca College of Applied Arts & Technology in Toronto, Ontario, Canada.

The Fire Protection Engineering Technology program at Bates Technical College in Tacoma, Wash. has a heavy focus on training to achieve certification by NICET (National Institute for Certification in Engineering Technologies®), which is particularly important to the fire protection field.

For more information about these schools, visit them online at:

- School of Fire Protection Technology, Seneca College of Applied Arts & Technology (<http://www.senecac.on.ca>)
- Bates Technical College (<http://www.bates.ctc.edu>)

A more academic field is that of **fire protection engineers**, who devote themselves to the study of subjects that relate to the systems such as fire behavior. Their research is often used to improve upon existing system components and technology.

A higher education is required for engineers, and there are various schools that specialize in fire protection-related degrees.

Oklahoma State University in Stillwater has a Fire Protection and Safety Technology Department.

The University of Maryland in College Park has a Department of Fire Protection Engineering.

Worcester Polytechnic Institute (WPI) in Massachusetts has a Fire Protection Engineering & Center for Firesafety Studies program.

To find out more about these programs, visit the schools' web sites at:

- Oklahoma State University (<http://osu.okstate.edu>)
- University of Maryland (<http://www.fpe.umd.edu>)
- Worcester Polytechnic Institute (<http://www.wpi.edu>)

## ORGANIZATIONS AND HELPFUL LINKS

In addition to AFSA, there are several organizations devoted to educating the public about fire safety, including the benefits of automatic fire sprinkler systems. They are great sources of information and provide a wide range of educational material on the subject.

### **Campus Firewatch**

(413) 323-6002

<http://www.campus-firewatch.com>

Campus Firewatch is a monthly electronic newsletter focusing exclusively on campus fire safety. Each issue is filled with valuable information on campus fire safety, both on- and off-campus.

### **Home Fire Sprinkler Coalition (HFSC)**

(888) 635-7222

<http://www.homefiresprinkler.org>

The HFSC was formed in 1996 in response to the tremendous need to inform the public about the life-saving value of residential fire sprinkler protection. The HFSC has developed educational material, available upon request, with details about automatic home fire sprinkler systems, how they work, why they provide affordable protection and answers to common myths and misconceptions about their operation.

### **National Fire Protection Association (NFPA)**

1 Batterymarch Park

Quincy, MA 02169

(617) 770-3000

<http://www.nfpa.org>

The NFPA develops, publishes, and disseminates fire safety standards prepared by its technical committees. It also provides information on fire protection, prevention, and suppression through its publications. NFPA publishes the annual report, Fire Loss in the United States.

### **Residential Fire Safety Institute (RFSI)**

(712) 829-2734

<http://www.firesafehome.org>

RFSI is a public interest group created in 1982 to promote fire-safe homes through built-in fire protection and fire safety education. RFSI operates a resource center that provides extensive legislative and technical information regarding fire sprinklers, including ordinance adoption resources and a listing of jurisdictions with sprinkler ordinances.

### **U.S. Fire Administration, Federal Emergency Management Agency (USFA)**

16825 South Seton Ave.

Emmitsburg, MD 21727

(301) 447-1000

<http://www.fema.gov>

As an entity of the Department of Homeland Security and the Federal Emergency Management Agency, the mission of the USFA is to reduce life and economic losses due to fire and related emergencies. Through USFA and FEMA you may access many federal programs. USFA serves the nation independently, in coordination with other Federal agencies, and in partnership with fire protection and emergency service communities. It provides public education, training, technology and data initiatives.

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## THANKS AND GOOD LUCK!

AFSA appreciates you taking the time to learn about automatic fire sprinkler systems – we hope it was relatively painless! We feel strongly about the property- and life-saving benefits of these systems because in our business, we see the end results of situations involving fires every day. It is our hope that now that you're more educated about these systems, you will not only be more conscientious about your own fire safety but will also spread the word to those you care about and who could benefit from this knowledge as well.

Please proceed to the open-book testing portion of the contest where you'll answer randomly selected questions about the information you've just read. Best of luck to you and remember: **Fire Sprinklers Save Lives!**

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