



# Protecting Your Family From Fire

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## Fire in the Home

American homes suffer an unwanted fire every 10 seconds, and every 60 seconds they suffer a fire serious enough to call the fire department. Most importantly, every three hours someone is killed in a home fire—that's more than 2,600 people in 2006 alone. Another 13,000 people are injured in home fires in a typical year.

Protecting your family from fire requires advance planning for what to do if fire strikes. This includes the use of protective devices, usually smoke alarms, to provide early warning of fire, especially at night when they are most vulnerable. However, depending on the size and layout of your home and the characteristics of your family, you may need to do more to assure their safety. This brochure was written to provide the information you need to decide what you must do to protect your family from fire.

## The Dangers of House Fires

Most home fires occur in the kitchen while cooking and are the leading cause of injuries from fire. However, they are often extinguished with only minor damage since a person is generally present. Common causes of fires at night are carelessly discarded cigarettes, sparks from fireplaces without spark screens or glass doors, and heating appliances left too close to furniture or other combustibles. These fires can be particularly dangerous because they may smolder for a long period of time before being discovered by sleeping residents.

Most victims of fire succumb to the smoke and toxic gases and not to burns. Fire produces poisonous gases that can spread rapidly and far from the fire itself to claim victims who are asleep and not even aware of the fire. Even if residents awaken, the effects of exposure to these gases can cloud their thinking and slow their reactions so that they cannot make their escape. This is why it is so crucial for you and your family to have sufficient warning so that you can all escape before your ability to think and move is impaired. In addition, more than half of fatal fires in homes occur when people are asleep—this represents only a third of a 24-hour day. Therefore, any fire protection system must be able to protect people who are asleep in their bedrooms when fire starts.

Furthermore, nearly half the people killed in home fires each year are either preschool children or adults 65 years old or older. Add people with physical, mental, or emotional handicaps, and it is clear that home fire protection must be designed for people with limitations. That is why every fire safety program should include provisions for people with special needs.

## Children and Fire

Children playing with matches or lighters are a leading cause of home fires and one in which the children and others present are often hurt. Children have a natural curiosity about fire and are

tempted to play with matches or lighters left within their reach. In many cases, children who start fires have a history of firesetting. Many fire departments offer counseling programs for juveniles who set fires. If your child is setting fires, you should contact your local fire department for information about counseling before the situation gets out of hand and your child gets hurt. Nevertheless, the most important thing you can do is to keep all matches and lighters out of the sight and reach of children. Store them up high, preferably in a locked cabinet.

Even though they have a natural curiosity about fire, children may become frightened and confused in a fire and hide rather than escape to safety; especially if they started the fire. Children are often found hiding in closets or under beds where they feel safe. Therefore, it is crucial for your child's safety that you hold fire drills in the home at least twice a year to let them practice the right things to do in a fire emergency.

Clothing fires are a significant cause of fire injuries to children (and to adults too). They set their clothes on fire by getting too close to heat sources such as open fires or stoves, or when playing with matches or lighters. Here too, the best defense is a respect for fire and training in what to do if their clothes do catch fire. Their natural reaction is to run—which will make the situation worse. STOP, DROP, and ROLL is taught as the correct action and has saved many lives in clothing fires. The moment clothes start to burn, stop where you are, drop to the ground, cover your face with your hands and roll repeatedly to smother the flames.

Of course, young children should never be left alone in the home. Even if they don't play with fire, unattended children can accidentally start a fire by attempting to cook something or by using a heater or electrical appliance in the wrong way. All too often, tragic fires occur when young children are left unattended, for even short periods.

## **Children's Sleepwear**

In the 1970's, the hazards of accidental ignition of sleepwear on young children were addressed through Federal legislation. The Flammable Fabrics Act required that children's sleepwear (sizes 0-6X) be flame retardant. In a short time, this had a dramatic impact on deaths and injuries, reducing them by 95%.

Recently, an increase in injuries has been reported among children sleeping in garments classified as "daywear" such as tee shirts and jerseys. These garments look just like sleepwear but are not fire retardant. The only way to tell the difference is by careful examination of the garment label. Therefore, parents should be careful to buy only fire retardant sleepwear for their children in order to enjoy the fire safety benefits of these garments.

## **Fire and Older Adults**

The risk of death from fire for Americans age 65 and over is two times greater than the risk for adults under 65, and hospital stays of more than 40 days are common for older burn victims. Thus, older people need to be especially careful with fire. People can become victims of fire by falling asleep smoking, either in bed or in a favorite chair, especially after consuming alcohol or taking medication. Ashtrays emptied before smoldering materials are completely out also start a number of fires in homes of smokers. Cooking is a major cause of fire injuries among older persons when

loose fitting clothing is ignited as the wearer reaches over a hot burner, or slips and falls onto the stove.

## **Smoke Alarms**

One of the most important fire safety devices for the home is the smoke alarm. After becoming generally available in the early 1970's home smoke alarm sales grew rapidly and the price fell, so that by 1991, 88% of US homes had at least one, and alarms could be purchased for under \$10.

Several studies have concluded that when working smoke alarms are present, the chance of dying from the fire is cut in half. The smoke alarms currently in place have saved thousands of lives, but several problems exist. First, the 12% of homes without alarms have more than half of the fires; second, it is estimated that a third of the smoke alarms in place are not working, often due to failure to replace a worn-out battery; and third, many homes do not have as many smoke alarms as are needed to protect the occupants properly. In this chapter, we will examine how to protect your family with smoke alarms.

### ***How Many Alarms are Needed?***

The primary job of a smoke alarm is to protect you from fires while you are asleep. Thus, your alarms should be located between any sleeping persons and the rest of the house—outside bedrooms or sleeping areas. But tests conducted in the 1970's clearly showed that this might not be enough.

In multi-story homes, fires on a floor level without a smoke alarm can grow to dangerous conditions before sufficient smoke can rise in a stairway to set off an alarm on the upper floor. Based on this observation, most codes require that additional smoke alarms be located on each floor level of the home.

A closed door provides protection from smoke on the other side, but will also prevent smoke from reaching a smoke alarm. This is particularly a problem in bedrooms. If you sleep with your bedroom door closed, you should add a smoke alarm in the bedroom; particularly if you smoke in the bedroom or there is a TV, air conditioner, or other major appliances in the bedroom that might start a fire. If you sleep with the bedroom door open, the alarm in the hall outside will detect a fire in the bedroom or elsewhere.

There are a few places where a smoke alarm should not be placed. These include kitchens and garages (cooking fumes and car exhaust are likely to set them off) and unheated attics and crawl spaces (where it can get too cold or hot for the electronics to work properly). Fires beginning in these areas are generally detected by the other smoke alarms in enough time to escape safely. If an alarm is desired in these spaces, heat detectors are available. But remember that the smoke alarms are the primary safety devices in any home protection scheme.

### ***What Kind of Smoke Alarms Should You Get?***

There are two basic types of smoke alarms available; the ionization type and the photoelectric type. The ionization alarm reacts faster to open flaming fires and is usually the least expensive. The photoelectric alarm reacts faster to smoldering fires and is less likely to react to cooking. You should consider getting one or more of each type of alarm, since there is no way of predicting what type of fire might occur in your home. There is also an alarm that combines the features of both the

ionization and photoelectric smoke alarms into one unit. It is called a “dual sensor” smoke alarm. For the best protection, the U.S. Fire Administration (USFA) recommends installing either the dual sensor alarm or a combination of ionization and photoelectric alarms in every home. All of the above smoke alarms should be replaced no later than ten years after their installation.

There are also multiple ways to power smoke alarms. Most operate on a battery (usually 9 volt), which should be replaced at least once a year. When the battery needs changing, the smoke alarm will begin to “chirp” every 20 seconds or so; this will persist for a month. This is most likely to start in the middle of the night (when the temperature in the house drops) causing you to get up and remove the battery so you can sleep. To prevent this nuisance you should pick a special day and give your alarms new batteries once a year. Some fire safety organizations promote “change your clocks, change your batteries” when the change is made back from daylight savings time each fall. Always make sure that you use the right battery—the required battery type is marked on the alarm near where the battery goes. Smoke alarms installed in a house may be operated from the household electrical power and not need battery replacement. This type of alarm has a “power on” light to tell you that the alarm has power. Smoke alarms are available which run on house power but also have a battery in case the main power fails. Both types of alarms need to be tested monthly and batteries should be replaced yearly just as with the battery-only operated type.

There now are available long-life smoke alarms that last for up to ten years. They are different than the alarms described above in that their batteries do not need to be changed every year. However, they still need to be tested on a regular basis and should be replaced between eight and ten years of their initial installation.

### ***How Should Your Smoke Alarms be Installed?***

Smoke alarms should always be installed according to the manufacturer's directions. In general, smoke alarms are installed on the ceiling or high on the wall. Alarms should be installed no closer than 3 feet from supply registers of forced air heating systems (that might blow on the alarm preventing it from exposure to smoke) and no closer than 3 feet from the door to a kitchen or a bathroom containing a shower (steam can set the alarm off when the door is opened). Alarms should be no closer than 3 feet from supply registers of forced air heating systems (that might blow on the alarm preventing it from seeing smoke) and no closer than 3 feet from the door to a kitchen or a bathroom containing a shower (steam can set the alarm off when the door is opened).

If an alarm is mounted on an exterior wall or a ceiling below an unheated attic that is poorly insulated (the surface gets noticeably cold in the winter and warm in the summer), the temperature difference can prevent smoke from getting to the alarm. Placing the alarm on an inside wall avoids the problem. In desert climates where evaporative coolers are being used, mount smoke alarms on walls 12 inches below the ceiling. These coolers add moisture that can cause the smoke to drop.

Older adults may have difficulty reaching alarms on ceiling to change batteries. If hard-wired alarms are impractical, wall mounting 12 inches down should be considered.

### ***Will You be Able to Hear Your Alarms?***

The ultimate test for smoke alarms is their ability to wake you when you are asleep. This generally means that the nearest alarm to the bedroom can be no further away than in the next room with the intervening door open.

Hard-wired alarms can be connected together (with a wire) so when one alarm activates, all interconnected alarms go off. Many alarms in new homes have this feature. It means any alarm in the home can awaken you in your bedroom if the nearest alarm is loud enough to do so.

For homes with battery-powered alarms, there are models that contain a radio transmitter that will activate a receiver that can be placed in the bedroom. An advantage of this type is that, when you go vacation, you can give the receiver to a neighbor who could call the fire department if a fire starts. Of course, these are a lot more expensive than the simple alarms.

All battery-powered and most hard-wired smoke alarms use a high-pitched electronic horn which is difficult for some people to hear. Test alarms before installation to make sure that all members of the household can hear them clearly.

People with hearing impairments can get smoke alarms with bright, flashing lights or vibrating signals. To awaken you, the light needs to be over the head of the bed and should be rated at least 110 candles. Such bright lights must be powered from house power, so if it is battery operated, it is probably not bright enough to use in the bedroom.

### ***Testing and Maintenance***

Smoke alarms should be tested at least once a month. All smoke alarms have a test button that you push to check out the entire alarm, including its sensitivity (how much smoke it takes to set it off). If the testing mechanism does not work properly, the alarm should be replaced immediately. Never use open flame devices to test an alarm.

Older adults and the physically impaired may have problems reaching their alarms to test them. There is one brand of smoke alarm on which the test feature can be activated by shining a flashlight on it. Another brand has an automatic test that activates at the same time and day, once a week. These models can be used where proper testing might not otherwise be done.

Smoke alarms need no maintenance other than changing batteries (in those that have batteries) and an occasional vacuuming of dust or cobwebs. Every smoke alarm comes with a homeowner booklet, which describes how to use and take care of that particular alarm. You should read that booklet and keep it in a safe place for future reference.

### ***What if Your Alarm “ACTS UP”?***

Smoke alarms are highly reliable but can sometimes be fooled by cooking or steam. If it sounds when there is no fire, it may need to be moved a few feet to a new position where it is not in the way of cooking vapors or steam. It may also have insects in it, so you should take it down and vacuum it out. If it continues to act up, simply replace it with a new alarm. They are inexpensive and can be purchased at any local hardware store.

### ***How Long Should Your Smoke Alarms Last?***

Smoke alarms have a useful life of about 10 years. At that age they should be replaced, even if they seem to be working. This will assure that the alarm will be working when you need it.

Even though today's smoke alarms are less expensive than you might have paid some years ago, today's alarms are more reliable. Thus, it is usually not worth keeping an old alarm rather than buying a replacement.

## **Fire Alarm Systems**

A home fire alarm system is usually part of a total security system providing burglary protection in addition to fire protection. Such a system supervises doors, windows, and spaces within the home for break-in and may provide monitoring services by dialing your telephone to report a fire or intrusion to a security office, where it will be reported to your local police or fire department.

Due to their relatively high cost, these systems are generally found only in larger homes. The system can cost \$1000 or more to install, with 24-hour monitoring service adding \$15 to \$20 per month.

### ***Components of the System***

These systems consist of a central control panel to which smoke alarms and heat detectors are connected, along with bells or horns that are activated when the system triggers an alarm. Other sensors associated with the burglary functions connect to doors and windows or monitor rooms for motion or body heat. The control panel operates from house power but also usually contains an emergency battery which can operate the system for about 24 hours during a power outage.

The basic requirements for the number and locations of alarms are exactly the same as with the self-contained alarms discussed previously. The difference is that a fire alarm system gives you more flexibility to locate additional alarms and additional bells or horns (or flashing lights, should a person in the household be hearing impaired).

Fire alarm systems that provide remote monitoring services can also be used to provide medical alert services. Here a person with health problems who lives alone carries a radio transmitter that can trigger the system in case they need assistance. Signals received at the monitoring station are identified by type (fire, burglary, medical alert) so that the proper response can be made.

### ***Why Have a Residential Fire Alarm System?***

The primary advantage of a home fire alarm system is increased reliability and the ability to place alarms and bells exactly where needed. However, the reason most people have them is that they wanted a burglar alarm system and the cost of adding fire alarm features to a residential burglary system is relatively small.

Another advantage is that they are the only way to obtain remote monitoring services. This becomes important in cases where family members may not be capable of escaping from a fire without assistance. For example, if you have an older or physically impaired person in your home and a fire started when no one was home to assist that person, alarms alone might not be enough to assure their safety.

A feature of most monitoring services is the ability to keep special information on the residence which comes up on the computer screen whenever an alarm is received from that home. Thus, if there is a disabled person in the home who needs special assistance, this fact will be known to the operator and can be passed along to the fire department when it is called.

## **Escape Planning**

Smoke alarms can only warn of danger. You must then take action to escape. Unless you act quickly and effectively, the extra warning time provided by alarms could be wasted. The best way

to assure that your family will do the correct things in an emergency is to have an escape plan and practice it. The important factors in a home fire evacuation plan are:

***Immediately leave the home.***

Do not waste any time saving property. Call the fire department (Use 9-1-1 if available) from a neighbor's home. Take the safest exit route, but if you must escape through smoke, remember to crawl low under the smoke.

***Know two ways out of each room.***

If the primary way out is blocked by fire or smoke, you will need a second way out. This might be a window onto an adjacent roof or by using an escape ladder (tested and approved by a recognized testing laboratory). Practice escaping by both the primary and secondary routes to be sure that windows are not stuck and screens can be taken out quickly. Windows and doors with security bars need quick release devices to allow them to be opened quickly in an emergency. Practice escaping in the dark.

***Feel the door.***

When you come to a closed door, use the back of your hand to feel the top of the door, the door knob, and the crack between the door and door frame to make sure that fire is not on the other side. If it feels hot, use your secondary escape route. Even if the door feels cool, open it carefully. Brace your shoulder against the door and open slowly. If heat and smoke come in, slam the door and make sure it is securely closed. Use your alternate escape route.

***Have an arranged meeting place.***

If you all meet under a specific tree or at the end of the driveway or front sidewalk, you will know that everyone has gotten out safely and no one will be hurt looking for someone who is already safe. Designate one person to go to a neighbor's home to phone the fire department.

***Once out, STAY OUT!***

Never go back into a burning building for any reason. If someone is missing, tell the firefighters. They are equipped to perform rescues safely.

## **Residential Sprinklers**

Fire sprinklers have been used to protect commercial buildings for more than 100 years. More recently, a new type of sprinkler system has been developed for residences which offers an unprecedented level of fire safety for both lives and property. These systems will be addressed in this chapter.

### ***How Much do Residential Sprinklers Cost?***

The cost of a sprinkler system is about \$1.50 per square foot in a new home (for a 1000 square foot home this is \$1500). In existing homes they range from \$2.50 to \$5.00 per square foot, depending on how difficult it is to run the pipes. This assumes the availability of an adequate and reliable water supply.

## ***How do Residential Sprinklers Differ From Commercial Sprinklers?***

The sprinklers that you have come to expect in hotels, offices, and other commercial buildings are there primarily to protect property and to protect people who are not in the immediate vicinity of the fire's point of origin. Sprinklers work by limiting the size and impact of the fire to a small area. Sprinklers in commercial buildings use larger quantities of water because fires in these types of buildings can involve large fuel loads.

Sprinklers used in the home are a special type referred to as residential sprinklers. These sprinklers use a fast acting element to allow the sprinkler to activate when the fire is still in its very early stages of development. No matter what type of building sprinklers are in, inadvertent operation of the sprinkler system is extremely unlikely. Smaller fuel loads coupled with activation when the fire is smaller allow these sprinklers to require much less water, so much so that the typical home's domestic water system is usually sufficient for such systems.

## ***Why Are Sprinklers so Powerful?***

The primary reason is that as soon as it activates, the sprinkler sprays water on the burning object and puts out or controls the fire. In fact, the sprinkler system not only stops the growth of the fire, it also acts directly on the potentially deadly effect of the fire, for example, by lowering the air temperature-

This means that a combination of sprinklers and smoke alarms can save most potential victims of home fires. The principal exceptions are victims who are very close to the fire when it begins, such as victims of clothing fires, explosions, or flash fires. For some potential victims, there is no substitute for prevention.

## ***What About Water Damage?***

Once a fire begins, only one or two sprinklers near the fire activate and discharge water. Residential sprinklers discharge water at a low rate, so your home will not be flooded. (Flooding is not a danger with sprinklers in commercial buildings either.) After the fire is out, the supply valve can be simply shut off—but never do this yourself. Always call the fire department and let the professionals determine when it is safe to shut off the water.

## ***Do You Need Smoke Alarms Too?***

YES! Smoke alarms will tend to react first, providing extra time to escape. In some fires, sufficient smoke can be released to impair judgment or even threaten persons with preexisting medical problems before enough heat is released to set off the sprinkler. Also, smoke alarms provide early warning of fires that may start out of range of the sprinklers, such as within a wall space. Therefore, it is important that smoke alarms be installed in all of the places discussed in Chapter 2.

## **Protect Your Family From Fire**

- Respect fire and teach your children to respect it too.
- Install smoke alarms, either self-contained or as part of a system, outside and on EVERY LEVEL OF THE HOME.



- Test and maintain your alarms as if your life depends on it. IT DOES!
- Make sure everyone can clearly hear the sound of your smoke alarms their bedrooms.
- Make an escape plan with two ways out of every room and practice it with your family.
- Especially when there are family members who cannot escape unassisted, consider a residential sprinkler system.

## **EMERGENCY PHONE NUMBERS**

Emergency 9-1-1/Or:

Record other emergency phone numbers here so you will have them when you need them.

Fire Department \_\_\_\_\_

Police Department \_\_\_\_\_

Poison Control Center \_\_\_\_\_

Doctor \_\_\_\_\_

Father's Work \_\_\_\_\_

Mother's Work \_\_\_\_\_

Other Important Numbers: \_\_\_\_\_

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