



Fire Protection Publications

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Residential Smoke Alarms

Most fire deaths occur in the home while people are sleeping. The United States Fire Administration annually reports that Oklahoma's fire death rate is more than double the national average. Residential smoke alarms and a home fire drill are the key to saving lives.

Residential smoke alarms are designed to be installed in hallways outside of sleeping areas so smoke from a fire intersects the smoke detector and the alarm sounds and awakens sleeping people. Once awake the people know how to get out and call the fire department for help.

Most deadly fires happen at night while people are asleep and their daytime/awake senses do not alert them to the fire. If you are awake you see, smell or hear a fire. Smoke is deadly and some home fires can kill before the flames and heat of the fire reach victims.

As the nature of home fires has changed there is a need for more smoke alarms in each home to provide sufficient time to get out. In 1975 fire tests showed that when the home smoke alarm sounds occupants had 12 to 14 minutes to escape the fire. Similar fire tests were repeated in 2004 and the time to escape is reduced to 3 minutes. Everyone needs to be alerted quickly and everyone must know how to get out. Modern codes now require smoke alarms on every level of the home, outside each sleeping area and in all bedrooms. The codes also required that the smoke alarms be inner connected so if one smoke alarm sounds they all alert.

The wakefulness of smoke alarms for children, young adults, alcohol intoxicated young adults, older adults and people who are hard of hearing has been evaluated in sleep studies funded in part by the federal government.

Do residential smoke alarms wake children?

A scientific study confirms that children do not wake up while sleeping at night, to the standard T-3 (temporal-three three beeps and a pause) 3100 Hz alarm which is the sound required for residential smoke alarms.

In the study, a lower frequency, 520 Hz, T-3 sound at 89 dBA was as effective as voice alarms in waking children 6-10 years. This evidence suggests that the responsiveness is a function of lower frequency sound not the urgency, verbal content or the voice itself.

The effectiveness of an alarm signal is primarily the function of the frequency of the signal.

Waking to a parent's voice is the function of the low pitch of the voice – not the “familiar” voice, the urgency of the voice or what is said.

Do residential smoke alarms wake older adults, people who are hard of hearing or young adults who are alcohol intoxicated?

The effectiveness lower frequency 520 Hz square wave signal in arousing sleepers has been demonstrated in:

- Children
- Sober young adults
- Alcohol intoxicated young adults
- Older adults
- People who are hard of hearing

“In all these studies the high pitched alarm has been found to be the least effective of the auditory alternatives tested, for waking people up” (Waking Effectiveness of Smoke Alarms, Fire Protection Research Foundation, 2007)

Children, older adults and people with disabilities will need assistance to wake up and get out. Insure someone will help them. Practice this as part of your family fire drill.

Also note:

More deep sleep occurs in younger children than older people. The likelihood of arousal at lower volumes increases with age. It was found in an earlier study on alarms that the younger children (6-10 years) were more likely to sleep through alarm signals than older ones (11-15 years). Extrapolating from this data and what we know about sleep, we can assume that **children aged below 6 years will generally be harder to arouse than the children tested in the studies reported here.** (THE EFFECTIVENESS OF DIFFERENT ALARMS IN WAKING SLEEPING CHILDREN, 2004)

The new National Fire Alarm Code requires a 520 Hz sound at 75 dBA at the pillow for people with mild to moderate hearing loss. There are new alert devices that meet this code requirement. One device was invented in Oklahoma, the Lifetone HL

www.lifetonesafety.com

Key Points:

Working smoke alarms and a family fire drill save lives.

Home fire deaths happen in homes without working smoke alarms.

Children, older adults and people with disabilities need assistance to wake up and get out. Insure someone will help them. Practice this as part of your family fire drill.

There is no indication in home fire death reports that children not waking up to the sound of the smoke alarms has contributed to more fire deaths. No working smoke alarms in the home is the contributing factor.

From NFPA:

CHILDREN AND SMOKE ALARMS

NFPA is aware of research indicating that sleeping children don't always awake when a smoke alarm activates. While this research is worrisome, we shouldn't allow them to obscure the fact that smoke alarms are highly effective at reducing fire deaths and injuries.

NFPA would like to reaffirm the value of the smoke alarms already available to protect people from home fire deaths and voice its concern about the number of U.S. households without these early warning devices. While 96% of American homes have at least one smoke alarm, no smoke alarms were present or none operated in two out of five (41%) of the reported home fires between 2003-2006. Almost two-thirds of home fire deaths resulted from fires in homes with no smoke alarms or no working smoke alarms.

NFPA emphasizes the need to continue planning and practicing [home fire escape plans](#) and to make sure everyone in a home can be awakened by the sound of the smoke alarm. NFPA suggests practicing the escape plan during which the smoke alarm is activated so all family members know its sound.

Every home fire escape plan is different, and every family should know who will – and who won't – awaken at the sound of the smoke alarm. If someone doesn't wake up when the alarm sounds during a drill, the family should design an escape plan that assigns a grown-up who is easily awakened by the alarm to wake the sleepers, perhaps by yelling "FIRE," pounding on the wall or door, or blowing a whistle.

www.nfpa.org