

Candle Fires in Residential Structures

Findings:

- Annually, an estimated 23,600 fires in residences are caused by candles and result in 1,525 civilian injuries, 165 fatalities, and \$390 million in direct property loss.
- Women are more likely to be injured or killed in residential structure candle fires.
- December has the highest occurrence of candle-ignited residential structure fires.
- Over one-third of residential structure candle fires begin in a bedroom.
- Over half of all residential structure candle fires were started because the candle was placed too close to combustible materials.

Retail sales of candles are growing each year. “In the last 10 years, the increase in candle sales has been at least 700 percent,” noted Valerie Cooper, executive vice president of the National Candle Association, in a 2004 interview.¹ The National Candle Association estimates that candles are used in 7 out of 10 U.S. households with annual candle sales averaging \$2 billion.² Nearly 2,000 varieties of candles are on the market, ranging from small votive warming candles to those used for religious purposes and holiday decorations.³

Candles, though, are responsible for an estimated 23,600 residential structure fires each year and cause 1,525 civilian injuries, 165 fatalities, and \$390 million in direct property loss.^{4 5 6} This topical report examines the causes and characteristics of these candle fires, based on 3 years of fire data (2002–2004).⁷

Loss Measures

Fires caused directly by candles result in considerably more injuries but fewer deaths per fire than the average of all residential structure fires (Table 1). Property loss is only slightly less than the average residential structure fire. When compared to other fires from consumer products that involve open flame (matches, lighters, and cigarettes), candle fires are generally less injurious than lighter fires, but more injurious than match fires. Fatalities per fire may be higher for lighter, match, and cigarette fires, as an individual is generally involved with the ignition source at the time of ignition. Many candle fires, on the other hand, begin as unattended fires.

Table 1. Loss Measures for Residential Structure Open Flame Fires

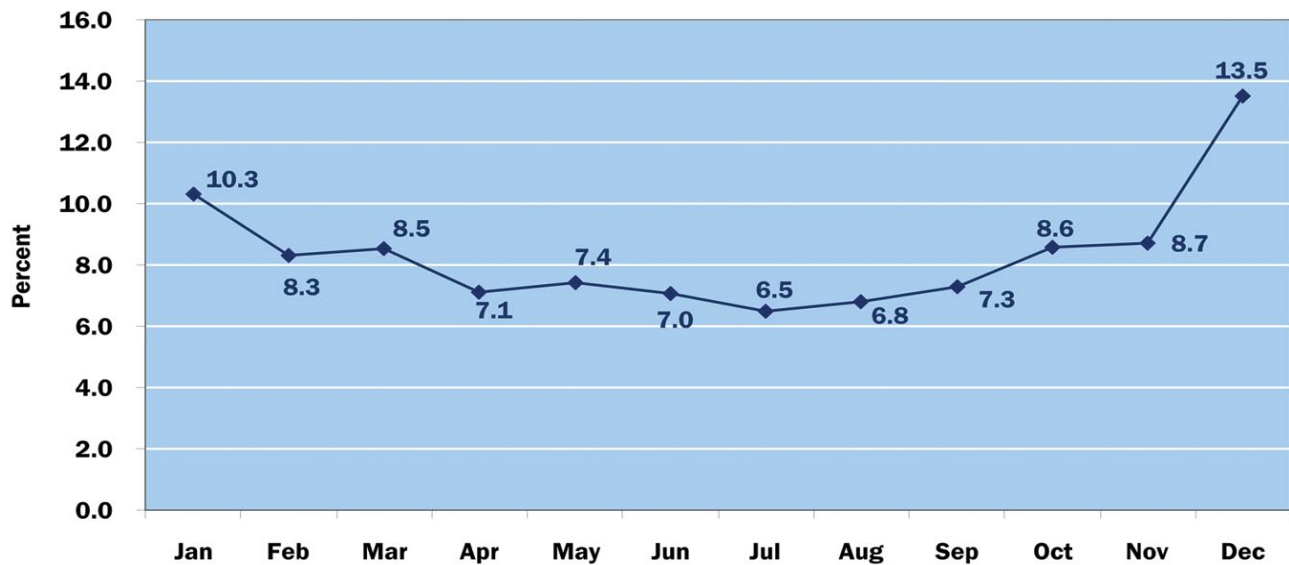
[Residential structures, 3-year average (2002–2004) NFIRS 5.0 data]

Measure	All Residential Structure Fires (any heat source)	Residential Structure Fires with Known Heat Source			
		Candle	Cigarette	Match	Lighter
Loss per fire	\$19,378	\$17,049	\$15,561	\$14,276	\$17,042
Injuries per 1,000 fires	50.6	98.6	99.8	70.7	126.0
Deaths per 1,000 fires	10.8	6.6	25.8	9.9	14.9

Source: NFIRS 5.0 data only

Figure 1. Monthly Incidence of Residential Structure Candle Fires

[Residential structures, 3-year average (2002–2004) NFIRS 5.0 data]



Source: NFIRS 5.0 data only

According to manufacturer surveys, more than 95 percent of candle buyers are women.⁸ This statistic may be part of the reason why women are 30 percent more likely to be injured and are 45 percent more likely to die in residential candle fires than men.

Seasonality of Candle Fires

Although candles are purchased and used year-round, the sale and use of candles increase substantially during the winter holiday season. As would be expected, the incidence of residential candle fires corresponds to this time period. Approximately 35 percent of candle sales occur at this time.⁹ More candle fires occur during December than in any other month, and 24 percent of all candle fires occurs in December and January (Figure 1).

Items First Ignited and Area of Origin

The leading materials first ignited by candles are furniture, curtains, cabinetry, and bedding. In December, however, holiday decorations are the leading materials first ignited. Candle users say they most frequently burn candles in a lounge area (living room or family room) (42 percent), followed by the kitchen (18 percent) and the bedroom (13 percent).¹⁰ Nonetheless, the most common areas of candle fire origin are in the reverse order. Most residential structure candle fires originate in the bedroom, where over one-third of fires start (38 percent, Figure 2). During the

winter months of December and January, however, a higher percentage of candle fires originate in a dining area, perhaps due to the holiday season, although the bedroom remains the leading area of origin. More than 75 percent of residential candle fires are confined to the object or room of origin.

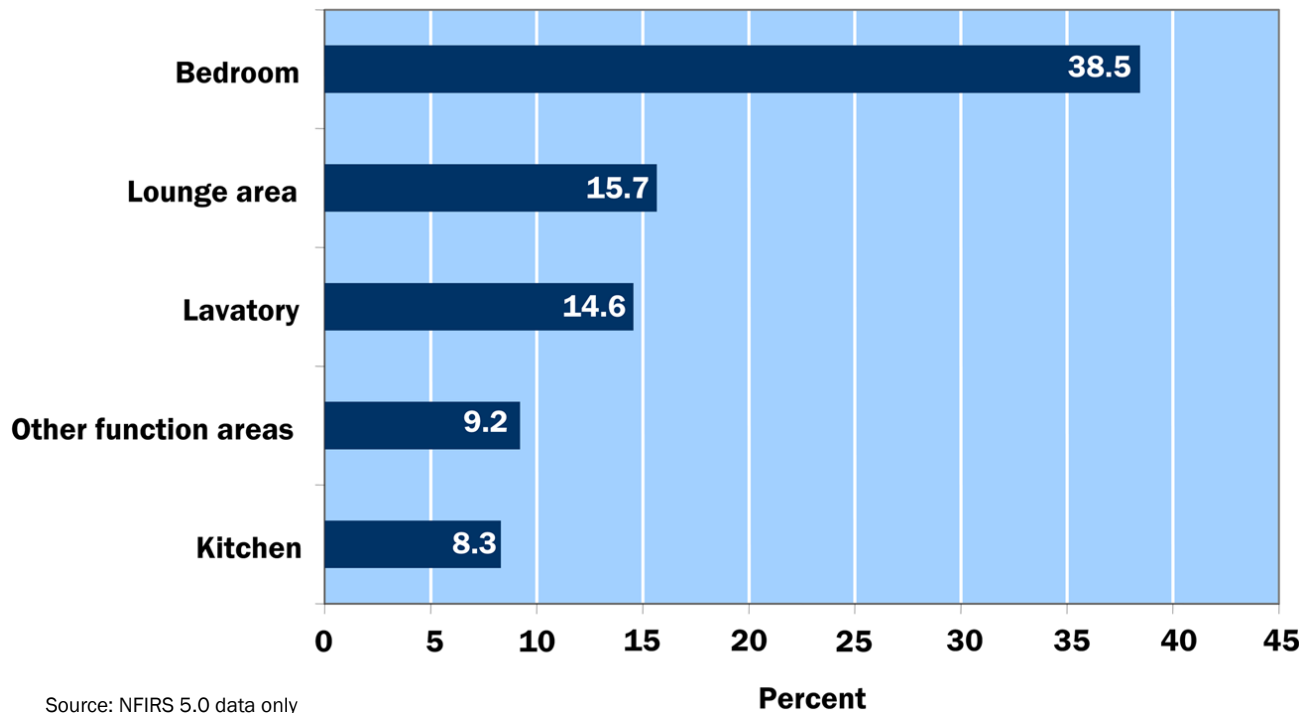
Factors Leading to Candle Fires

Data from the National Fire Incident Reporting System (NFIRS) indicate that the majority of candle fires result from error and negligence. Candles placed too close to combustibles alone account for over half (55 percent) of residential structure candle fires (Figure 3).¹¹ When specific actions can be identified, 21 percent of residential structure candle fires involve an unattended or unsupervised individual. An additional 12 percent of these fires started when the candle user fell asleep. These statistics underscore the importance of ensuring that candles are safely positioned, used properly, and never left unattended.

Product Recalls

In the past decade (1997–2006), the Consumer Product Safety Commission has issued over 70 recalls of candles or products that include candles.¹² These recalls have largely been because the candle or its holder has posed an undue fire or burn hazard. The identified problems have included excessive flame height, flammable decorations, excess wax pooling, and flammable candleholders.

Figure 2. Area of Fire Origin in Residential Structure Candle Fires
(Residential structures with known area of origin, 3-year average (2002–2004) NFIRS 5.0 data)



Examples

Recent examples of fires caused by candles:

- February 2004: Five people escaped from a burning home, one with burns to 50 percent of his body. The candle fire was started when a child fell asleep with a candle still burning in his room.¹³
- January 2006: A mother and her two preteen daughters were treated for smoke inhalation resulting from a fire in their home. The fire occurred just after 6 p.m. in a second floor bedroom. The two girls were napping in their bedrooms, when it is suspected that a candle ignited combustible materials in one of the rooms.¹⁴
- February 2006: Fire investigators said an unattended candle caused a devastating house fire. Firefighters responded to a fully-involved fire. The residents—a couple and three teenagers—were not home at the time of the blaze. Investigators said the candle could have burned for hours before igniting nearby materials and causing the blaze.¹⁵

Conclusion

Candles have been a part of our lives for centuries, providing both light and decoration. Although their everyday use

for light has been replaced, candles are used during power outages, for religious ceremonies, special occasions, and for decorative purposes. Given the proper conditions, the open flame of a candle poses a risk of fire. Product safety requirements help reduce candle fires but cannot eliminate their occurrences without help from candle users themselves. Common sense and caution must accompany the use of candles.

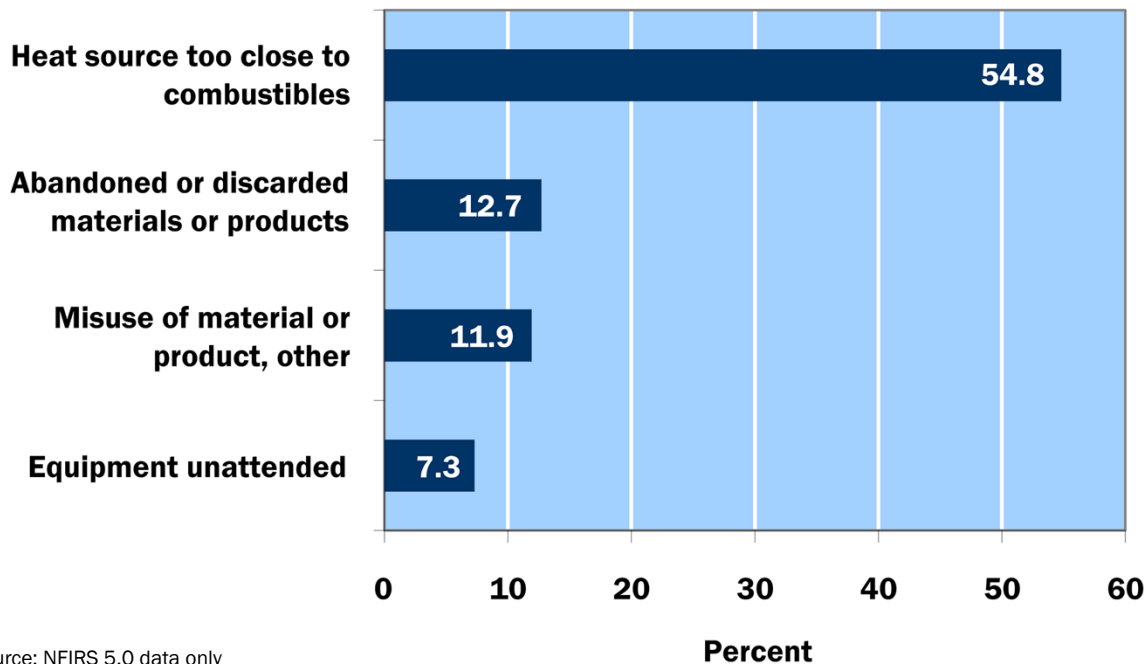
The Massachusetts State Fire Marshal has developed a program called “Candle Circle of Safety.”¹⁶ Their sound recommendations:

- Burn candles inside a 1-foot circle of safety, free of anything that can ignite.
- Extinguish candles after use.
- Keep candles out of the reach of children and pets.
- Use a sturdy metal, glass, or ceramic candleholder.
- Never leave a burning candle unattended.

Additional candle usage tips and safety recommendations are available from the National Candle Association.¹⁷

To request additional information or comment on this report, visit <http://www.usfa.dhs.gov/applications/feedback/>

Figure 3. Leading Factors Contributing to Residential Candle Fires
(Residential structures with known ignition factors, 3-year average (2002–2004) NFIRS 5.0 data)



Notes:

¹ Candle Fires Skyrocketing, CBS News, December 10, 2004. <http://www.cbsnews.com/stories/2004/12/09/earlyshow/contributors/tracysmith/main660125.shtml>

² Facts and Figures, National Candle Association, 2006. http://www.candles.org/about_facts.html.

³ Ibid.

⁴ In NFIRS 5.0, a structure is a constructed item, of which a building is one type. The term “residential structure” commonly refers to buildings. The definition of a structure fire has, therefore, changed to include only those fires where NFIRS 5.0 structure type is 1 or 2 (enclosed building and fixed portable or mobile structure).

⁵ National estimates are based on native version 5.0 data 2002–04 from the National Fire Incident Reporting System (NFIRS) and national residential structure fire loss estimates from the National Fire Protection Association’s (NFPA) annual *Fire Loss in the United States* reports. Fires are rounded to the nearest 100, deaths to the nearest 5, injuries to the nearest 25, and loss to the nearest \$10M.

⁶ Candle fire loss estimates are based on the total number of native version 5.0 NFIRS fires in 2002–2004 for which the heat source was known, and on NFPA’s annual survey, *Fire Loss in the United States*, for 2002–2004. Approximately 72 percent of native NFIRS version 5.0 residential structure fires reported a heat source during this period. If the candle fire estimates were based on all residential structure fires, including those with unknown heat sources, the estimates of candle fire losses would decrease to 17,000 fires, 80 deaths, 1,150 injuries, and \$222 million in dollar loss.

⁷ NFIRS 5.0 contains both converted NFIRS 4.1 data and native NFIRS 5.0 data. This topical report includes only native 5.0 data.

⁸ National Candle Association, *op. cit.*

⁹ Ibid.

¹⁰ Ibid.

¹¹ Statistics for ignition factors reflect those residential structure candle fires for which a factor was noted as contributing to the ignition of the fire. Seventy-three percent of residential structure candle fires have a factor contributing to ignition, 21 percent indicate that no factor contributed to ignition, and 6 percent had no factor specified.

¹² FireSafety.gov, CPSC Recall Search Results for keyword “candle.” <http://www.firesafety.gov/applications/cpsc/>

¹³ CBS News, *op. cit.*

¹⁴ Candle Fire Sends Mother and Two Children to Hospital, No Smoke Alarms, Press Release, January 9, 2006. <http://cms.burlington.ca/English/Candle-Fire-Sends-Mother-and-Two-Children-to-Hospital-No-Smoke-Alarms.html>

¹⁵ Unattended Candle Fire Partially Destroys Shoreline Home, Press Release, February 17, 2006. <http://www.shorelinefire.com/newsroom/NE153-RELEASE.htm>

¹⁶ Prevent Candle Fires, Office of the Massachusetts State Fire Marshal, November 2003. http://www.mass.gov/dfs/osfm/pubed/flyers/candle_fire_safety.pdf

¹⁷ Tips From the Experts, National Candle Association, 2006. http://www.candles.org/about_tips.html

Related Topics:

■ **Topical Fire Research Series: Candle Fires in Residential Structures, Vol. 1, Issue 12 (PDF, 118 Kb), www.usfa.dhs.gov**

■ **Consumer Product Recalls: Candles, www.cpsc.org**

■ **National Fire Protection Association Report: Home Candle Fires (PDF, 144 Kb), www.nfpa.org**

■ **Fact Sheet: Use Candles with Care (PDF, 172 Kb), www.usfa.dhs.gov**

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