

U.S. Fire Administration TOPICAL FIRE RESEARCH SERIES

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Residential Air Conditioner Fires

FINDINGS

- Residential A/C fires result in less injury (60/year) and death (about 5/year) than other residential fires.
- 75% of A/C fires occur in one- and two-family dwellings.
- 35% of installed A/C units are either portable or fixed local units, yet these account for 55% of all A/C fires.
- 86% of A/C fires are caused by mechanical failure or malfunction; half of these are from short circuits.
- A/C fires are highest from 2 to 8 p.m., the period when the demand for air conditioning is at its peak.

Sources: NFPA and NFIRS

Each year in the United States, an average of 2,300 air conditioning fires occur in residential structures. These fires are responsible for approximately 60 civilian injuries, less than 5 civilian deaths, and \$23.8 million in property loss.¹ As of 1997, nearly three-quarters (72 percent) of all American households had air conditioners or air conditioning systems. Forty-seven percent of all households have central air conditioning systems and 25 percent have window/wall air conditioning units.²

This topical report examines some of the major characteristics of residential air conditioning fires.

LOSS MEASURES

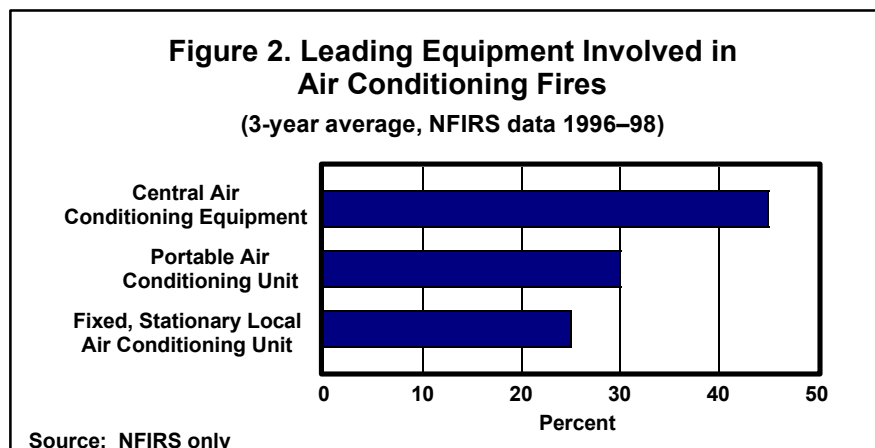
Data from the National Fire Incident Reporting System (NFIRS) (1996–1998) (Figure 1) show that dollar loss from residential air conditioning fires is slightly lower than that averaged across all residential structure fires. Residential air conditioning fires tend to result in significantly less injury and death than other residential fires.

Figure 1. Loss Measures for Air Conditioning Fires (3-year average, NFIRS data 1996–98)		
MEASURE	ALL RESIDENTIAL STRUCTURE FIRES	AIR CONDITIONING FIRES*
Dollar Loss/Fire	\$11,271	\$10,558
Injuries/1,000 Fires	48.0	27.8
Fatalities/1,000 Fires	7.7	0.5

Source: NFIRS only

EQUIPMENT INVOLVED IN A/C FIRES

The term *air conditioning fires* applies to those fires in which central air conditioning units, fixed local air conditioning units (usually wall units), or portable local air conditioning units (usually window units) were identified as the equipment involved in the ignition of the fire. Figure 2 illustrates the proportions of the air conditioner systems involved in these fires.

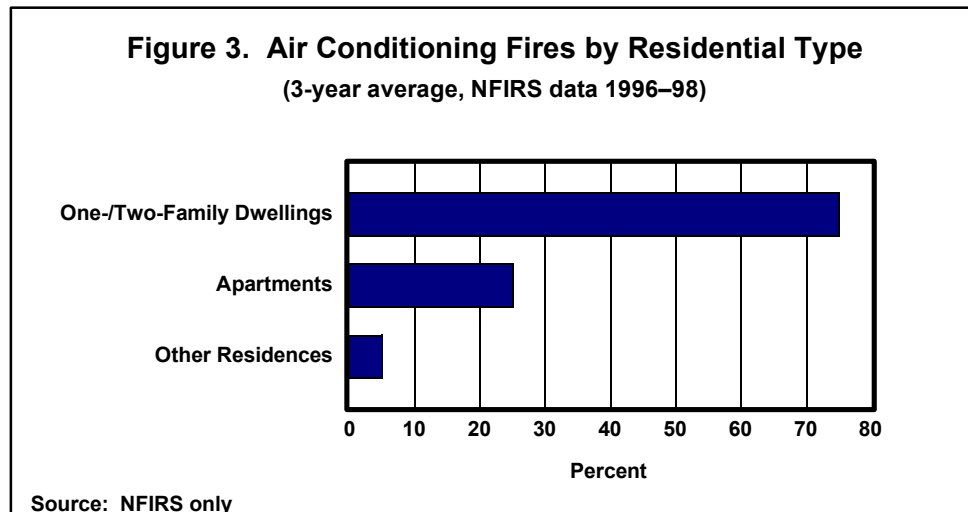


Central air conditioning equipment fires are more common in apartments (58%); portable air conditioner and fixed local air conditioner equipment (window and wall units) fires are more common in one- and two-family dwellings (also 58%).

Although window and wall air conditioning units account for 35% of the air conditioning equipment in residences, they cause 55% of air conditioning equipment fires. This may be due to smaller, undersized wiring that was not designed to carry the power load required by air conditioning equipment. Homes with central air conditioners generally have dedicated circuits appropriately sized for this equipment.

WHERE A/C FIRES START

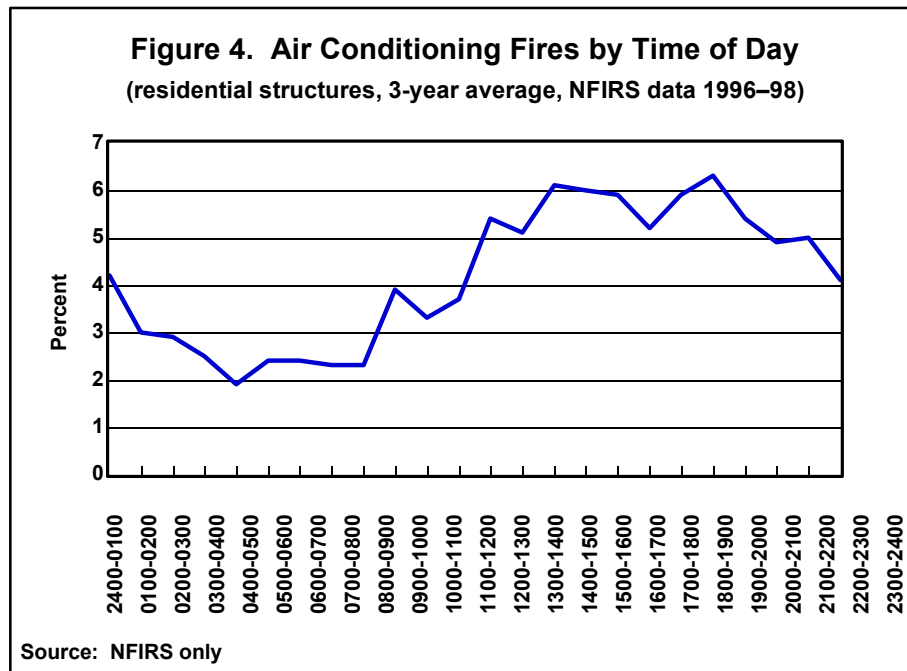
The majority of residential air conditioning fires occur in one- and two-family dwellings (75%) (Figure 3). Another 20% occur in apartments, with the remaining 5% occurring in other residential occupancies such as dormitories and boarding houses.



Overall, the bedroom (23%) and the lounge area (14%) are the leading areas where these fires originate in residential structures. These are the areas where window or wall units are most commonly found.

TIME OF DAY

Figure 4 illustrates the 24-hour distribution of residential air conditioner fires. Thirty-five percent of residential air conditioning fires occur between 2 and 8 p.m. It is not unusual for air conditioning units to be at full power during this period. Air conditioning fires coincide with the sustained level of air conditioning usage during this time period.



Air temperatures are usually at their highest between 2 and 3 p.m. Air conditioning fires reach their highest peak between 7 and 8 p.m. This difference may be because working families set their thermostats at a high temperature while they are at work to save energy, and turn them down when they return home. The air conditioning units must then work at full power to cool the warm house to the lower temperature.

Air conditioning fires decrease during the late evening and overnight hours. The lowest incidence of air conditioning fires occurs before dawn when the air temperature is generally at its lowest.

IGNITION FACTORS

Eighty-six percent of residential air conditioning fires are ignited as a result of some type of mechanical failure or malfunction. The leading factors contributing to these mechanical failures and malfunctions is a short circuit (51%) or other electrical failure (22%) in the air conditioning unit. In many cases, air conditioner units run at full capacity during the hottest summer months and are not always routinely inspected or maintained, often causing the mechanical failures or malfunctions that result in fire.

EXAMPLES

- Firefighters fought a blaze in New Jersey late April, 2000 but were unable to save three residents. The fire was began when an undersized air conditioner overheated. The fire had been smoldering for hours before the firefighters arrived on the scene.³
- In June 2000, a fire broke out in Augusta, Maine, in the early morning. The residents of the home escaped. The cause of the fire was determined to be an air conditioner that overheated, setting the carpet and furniture on fire.⁴
- An air conditioner overheated in a Brooklyn, New York, apartment July 23, 2001, igniting a sofa and ultimately killing two adults. Their 3-year-old son was spared because his father put him in a water-filled bathtub.⁵

CONCLUSION

Product maintenance, routine inspection, and the installation of smoke alarms can aid in the prevention or reduction of air conditioning fires. For further information on air conditioning fires, contact your local fire department or the USFA.

NOTES:

- ¹. National estimates are based on National Fire Incident Reporting System (NFIRS) data (1996–1998) and the National Fire Protection Association’s (NFPA) annual survey, *Fire Loss in the United States*.
- ². “1997 Residential Energy Consumption Survey,” Energy Information Administration. See also http://www.ela.doe.gov/emeu/consumptionbriefs/recs/aircond_use.html.
- ³. *Firehouse Magazine*, April 24, 2001.
- ⁴. *Augusta Chronicle*, June 14, 2000.
- ⁵. *New York Post*, July 24, 2001.

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