

Clothes Dryer Fires in Residential Buildings (2008–2010)

These topical reports are designed to explore facets of the U.S. fire problem as depicted through data collected in the U.S. Fire Administration's (USFA's) National Fire Incident Reporting System (NFIRS). Each topical report briefly addresses the nature of the specific fire or fire-related topic, highlights important findings from the data, and may suggest other resources to consider for further information. Also included are recent examples of fire incidents that demonstrate some of the issues addressed in the report or that put the report topic in context.

Findings

- An estimated 2,900 clothes dryer fires in residential buildings are reported to U.S. fire departments each year and cause an estimated 5 deaths, 100 injuries, and \$35 million in property loss.
- Clothes dryer fire incidence in residential buildings was higher in the fall and winter months, peaking in January at 11 percent.
- Failure to clean (34 percent) was the leading factor contributing to the ignition of clothes dryer fires in residential buildings.
- Dust, fiber, and lint (28 percent) and clothing not on a person (27 percent) were, by far, the leading items first ignited in clothes dryer fires in residential buildings.
- Fifty-four percent of clothes dryer fires in residential buildings were confined to the object of origin.

For many households and other establishments, the clothes dryer is an indispensable convenience and necessity. However, damaging fires can occur if clothes dryers are not properly installed and maintained. Eighty-four percent of clothes dryer fires that occurred in buildings took place in residential buildings.^{1,2} Because the residential building portion of these fires predominates, the primary focus of this analysis addresses the characteristics of clothes dryer fires in residential buildings reported to the National Fire Incident Reporting System (NFIRS). The focus is on fires reported from 2008 to 2010, the most recent data available at the time of this analysis.

From 2008 to 2010, fire departments responded to an estimated 2,900 clothes dryer fires in residential buildings each year across the Nation.³ These fires resulted in an annual average loss of 5 deaths, 100 injuries, and \$35 million in property loss.

For the purpose of this report, the term "clothes dryer fires" is synonymous with "clothes dryer fires in residential buildings." "Clothes dryer fires" is used throughout the body of this report; the findings, tables, charts, headings, and footnotes reflect the full category, "clothes dryer fires in residential buildings."

The Hows and Whys of a Clothes Dryer Fire

A clothes dryer works by forcing hot air through a turning drum. Wet clothes placed in the drum are then dried by

moving hot air. It is possible for a full load of wet clothes to contain as much as one and a half gallons of water. Lint, consisting mostly of small fibers from the clothes and debris in or on the clothes, is created from the clothes as the clothes tumble in the drum. While much of the lint is trapped by the dryer's filter, lint is also carried through the vent system along with moist air.⁴ Lint is a highly combustible material that can accumulate both in the dryer and in the dryer vent. Accumulated lint leads to reduced airflow and can pose a potential fire hazard.⁵

In addition to the accumulation of lint, blockage in dryer exhaust vents also can occur from the nests of small birds or other animals or from damages to the venting system itself. A compromised vent will not exhaust properly to the outside. As a result, overheating may occur and a fire may ensue.⁶

Loss Measures

Table 1 presents losses, averaged over the 3-year period from 2008 to 2010, of reported clothes dryer fires in residential buildings.⁷ The average number of injuries per 1,000 clothes dryer fires was slightly higher than the same loss measure for all other residential building fires. The average number of fatalities per 1,000 clothes dryer fires and average dollar loss per clothes dryer fire, however, were notably less than the same loss measures for all other residential building fires.



FEMA



Examples

The following are recent examples of clothes dryer fires reported by the media:

- March 2012: A family was displaced after a clothes dryer fire quickly spread and destroyed their two-story Colonial home in Readington, NJ. The blaze, which started on the second floor and rapidly spread to the rest of the house, kept crews from the local fire companies and a tanker task force on the scene for more than two and a half hours. No one was injured, and neighboring homes were not damaged.¹⁶
- March 2012: A load of clothes in a dryer ignited a fire that displaced residents from their home in Chapel Hill, NC. The Chapel Hill Fire Department was dispatched to the 63-year-old home and quickly discovered that a dryer in the unfinished basement was the source of smoke reported by the residents. Firefighters extinguished a load of clothes in the dryer that had caught fire and then removed the dryer from the home. No injuries were reported.¹⁷
- February 2012: Investigators believe a clothes dryer sparked a fire in a Cornelius, OR home causing approximately \$75,000 in damage. The homeowner had put clothes in the dryer and was playing with her son in another room when she heard two loud noises from the laundry room. After discovering smoke coming from the dryer, the woman ran upstairs to get her sleeping daughter, grabbed her son, and got out of the house. She then called 9-1-1. No injuries were reported, but the fire caused "serious smoke damage" throughout the house and "significant damage" in the laundry room and nearby bathroom and playroom.¹⁸

Clothes Dryer Venting Systems

In order to prevent possible fire hazards, building codes¹⁹ require that clothes dryers be exhausted directly to the outdoors. Venting a dryer into attics, soffits, ridge vents, or crawl spaces is expressly prohibited.

The codes require that dryer vents be made of metal with smooth interior finishes, sections of vent duct be securely supported and firmly sealed together, and the total length of the vent duct not exceed 35 feet (shorter if there are

turns or bends). Flexible transition ducts used to connect the dryer to the exhaust duct system are required to be not longer than eight feet, not concealed within construction, and **listed** and **labeled** in accordance with Underwriters Laboratories (UL) 2158A.²⁰

New construction trends often situate washers and dryers in nontraditional areas of the house, such as upstairs bedrooms, hallways, bathrooms, kitchens, and closets. These new sites may require longer dryer vent ducts in order to reach an outside wall. If a dryer vent is too long or has many bends and turns, moisture in the warm air passing through it condenses on the vent surfaces, attracting lint. Eventually, the lint accumulates and creates resistance.²¹ Thus, it is crucial for homeowners to regularly inspect and clean out the dryer vent.

All manufacturers now state in their manuals **not** to use plastic, flexible dryer ducts between the vent and the clothes dryer. Many homes, however, continue to use plastic, flexible ducts.²² The plastic itself can provide additional fuel for a fire. Even flexible foil vents are not a good choice for venting clothes dryers. Flexible vents can twist, allowing lint to build up and catch on fire if it comes in contact with a sufficient amount of heat. If a fire starts beneath the dryer when the motor overheats, then the drafts from the dryer can pull the fire up into the duct, allowing a house fire to develop.²³ Only flexible transition ducts that are **listed** by UL or another approved product safety testing agency should be used.

Serious hazards occur when dryer vents do not exhaust directly to the outside. Faulty installations can vent dryer exhaust into the attic, crawl space, chimney, or interior walls, which can cause indoor air deterioration and mold buildup.²⁴ Small birds and animals that nest in dryer vents or other debris can obstruct air flow and prevent proper venting to the outside.²⁵

By observing a few simple indications of poor system performance, it can be determined whether the dryer components need to be examined for any blockage or excessive heat. If heavy clothes such as blue jeans or towels are taking a long time to dry, or clothes feel hotter than usual at the end of the cycle, a clogged dryer vent exhaust is likely the problem.²⁶

Proper Dryer Installation and Maintenance

The installation and maintenance of clothes dryers are an important part of making sure that a clothes dryer performs as designed and does not become a fire hazard. Several recommendations for clothes dryer safety include the following:^{27, 28, 29, 30, 31, 32}

Clothes Dryer Dos

- Have your clothes dryer installed by qualified personnel.
- Clean the lint filter before and after each cycle. Do not forget to clean the back of the dryer where lint can build up. In addition, clean the lint filter with a nylon brush at least every 6 months or more frequently if it becomes clogged.
- Inspect the venting system behind the dryer to ensure it is not damaged, crushed, or restricted.
- Outside wall dampers should have a covering that will keep out rain, snow, and dirt. Do not, however, use wire screen or cloth as these can collect lint and clog areas of the dryer vent.
- Make sure the outdoor vent covering opens when the dryer is operating.
- The interior of the dryer and venting system should be serviced and cleaned periodically by qualified service personnel, especially if it is taking longer than normal for clothes to dry.
- Replace coiled-wire foil or plastic venting with rigid, non-ribbed metal duct.
- Have gas-powered dryers inspected by a professional annually to ensure that the gas line and connection are intact and free of leaks.
- Check periodically to make sure nests of small animals and insects are not blocking the outside vent.
- Make sure the correct electrical plug and outlet are used and that the dryer is connected properly.
- Read manufacturers' instructions and warnings in use and care manuals that accompany new dryers.
- Keep the area around the clothes dryer free of items that can burn.
- If you will be away from home for an extended time, unplug or disconnect the dryer.

Clothes Dryer Don'ts

- Do not operate a clothes dryer without a lint filter or with a lint filter that is loose, damaged, or clogged.
- Do not dry anything containing foam, rubber, or plastic (i.e., bathroom rugs).
- Do not dry any item for which manufacturers' instructions state "dry away from heat."
- Do not dry glass fiber materials (unless manufacturer's instructions allow).
- Do not dry materials that have come into contact with anything flammable (e.g., alcohol, cooking oils, gasoline, etc.). These should be dried outdoors or in a well-ventilated room, away from heat.
- Do not leave a clothes dryer running if you leave home or when you go to bed.

NFIRS Data Specifications for Clothes Dryer Fires in Residential Buildings

Data for this report were extracted from the NFIRS annual Public Data Release (PDR) files for 2008, 2009, and 2010. Only Version 5.0 data were extracted.

Clothes dryer fires in residential buildings are defined by the following criteria:

- Aid Types 3 (mutual aid given) and 4 (automatic aid given) are excluded to avoid double counting of incidents.
- Incident Types 111–123 (excluding Incident Type 112):

Incident Type	Description
111	Building fire
113	Cooking fire, confined to container
114	Chimney or flue fire, confined to chimney or flue
115	Incinerator overload or malfunction, fire confined
116	Fuel burner/boiler malfunction, fire confined
117	Commercial compactor fire, confined to rubbish
118	Trash or rubbish fire, contained
120	Fire in mobile property used as a fixed structure, other
121	Fire in mobile home used as fixed residence
122	Fire in motor home, camper, recreational vehicle
123	Fire in portable building, fixed location

Notes: 1) Incident Types 113–118 (confined fires) do not specify if the structure is a building.
2) The analyses in this report include all clothes dryer fires and do not distinguish between confined and nonconfined fires. (See the note on "Special Considerations" at the end of this section.)