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Recent incidents in New York, New Jersey, North Carolina and Kentucky point to the dangers of dryer fires. In fact, on average, more than 13,000 fires start in laundry rooms in the United States each year, resulting in 10 deaths and \$97 million in property damage. Nearly 4,000 of these fires arise from lint buildup that occurs when people fail to clean their dryer vents. The following advice can help you prevent a disaster. When it comes to dryer fires, flexible dryer ducts made of foil or plastic are the most problematic because they can sag and let lint build up at low points. Ridges can also trap lint. Metal ducts are far safer because they don't sag, so lint is less likely to accumulate. What's more, if a fire does start, a metal duct is more likely to contain it. No matter which kind of duct you have, clean it regularly. Also clean the lint screen each time you use your dryer and get rid of any lint inside, behind, and underneath the dryer. These simple steps will not only reduce the risk of a fire, but your dryer will also dry your clothes faster and use less energy.

Anatomy of a Dryer Fire

Dryer fires start when the dryer overheats. Overheating is caused by a build-up of lint in the duct that increases the drying time and blocks the flow of air. Naturally, any lint that has collected in the dryer will burn and the draft from the dryer will pull that fire up into the duct. Since the duct may be coated or even blocked with lint, many times a house fire results. Other contributing conditions may include failure of the thermostat and hi limit switches in the dryer, lint inside the dryer, a missing or damaged lint screen, a crushed hose behind the dryer, or a bird's nest or other debris blocking the vent.

Dryer Fire Fact Sheet

Statistics and Implications

Dryer exhaust fires now surpass creosote (chimney) fires in frequency on a national level. In 1998, the most recent statistics available, the Consumer Product Safety Commission reports that over 15,600 dryer fires occurred killing 20 people, injuring 370 more and causing over \$75.4 million in property damage. According to the CPSC, in most of these cases the culprit was lint getting into the machine's heating element, sparking and fueling a fire. Not surprisingly, some fire departments and insurance companies now require that dryer vents be inspected and cleaned regularly.

With gas dryers, there is also concern of carbon monoxide (CO) poisoning. Since lint and flue gases use the same avenue of exit from the house, a blocked vent can cause CO fumes to back up into the house. These fumes are colorless and odorless and they can be fatal. Low-level CO poisoning mimics flu symptoms (without the fever): headache, weakness, nausea, disorientation and deep fatigue. At higher levels, occupants can fall asleep, lapse into a coma and die.

Warning Signs

- It takes longer and longer to dry clothes, especially towels and jeans or any other article of clothing.
- Clothes are damp or hotter than usual at the end of the cycle.
- Outdoor flapper on vent hood doesn't open when dryer is on.

Benefits to Dryer Vent Cleaning Regularly

- Allows your dryer to operate more efficiently, using less energy and saving you money.
- Protects your dryer from excess wear and premature death.
- Helps clothes dry faster—a time savings for busy families.
- Reduces excess household dust and humidity
- Helps preserve clothing, as the life of many fabrics is damaged by excessive high heat.

Inspection Frequency

- Most vents should be cleaned every year.
- Dryer Vent Cleaning is the only solution.
- Some dryer vents need attention more often.
- Determining factors include:

- How heavily the dryer is used
- How long the vent is / angles and the materials used. Shorter vents usually blow better.
- The age and type of dryer and venting used.
- The design of the vent. Those with a lot of turns and elbows blow worse and build up more lint.

Clothes Dryer Fires in Residential Buildings

Findings:

Clothes dryer fires account for about 15,600 structure fires, 15 deaths, and 400 injuries annually.

Eighty percent of clothes dryer fires in structures occur in residential buildings.

Annually, 12,700 clothes dryer fires occur in residential buildings resulting in 15 deaths and 300 injuries.

"Failure to clean" is the leading factor contributing to clothes dryer fires in residential buildings.

New home construction trends place clothes dryers and washing machines in more hazardous locations away from outside walls such as bedrooms, second-floor hallways, bathrooms, and kitchens.

For many households and other establishments, the clothes dryer is an indispensable convenience and necessity. However, if clothes dryers are not properly installed or maintained, critical fires can occur. Using 3 years of data, from 2002 to 2004, the yearly national fire loss for clothes dryer fires in structures is estimated at \$99 million. Each year, these losses result from an estimated 15,600 fires that required a fire department response. These clothes dryer fires cause an annual average of approximately 400 injuries and 15 fatalities.

Fire Rates Attributed to Clothes Dryers

Dryer fires in nonresidential buildings are far more injurious than those in their residential counterparts. The injury rates resulting from nonresidential building dryer fires is 78% higher than the injury rate for dryer fires in residential buildings. Dollar loss per fire, however, is higher (by 23%) for residential building dryer fires. Nonresidential buildings generally can include large occupancy type buildings such as hospitals, schools, institutions, service areas, or stores, where the incidence of even a small fire could affect more people. The only deaths reported to the National Fire Incident Reporting System (NFIRS), however, occurred in residential buildings. NFIRS data show that 80% of clothes dryer fires in structures occur in residential buildings and resulted in approximately 12,700 fires, 15 deaths, 300 injuries, and \$88 million in property loss each year. As the residential portion of these fires predominates, the primary focus of this analysis will involve fires in residential buildings, which include single or multifamily dwellings, mobile homes, hotels and motels, dormitory-type residences, barracks, and other such occupancies.

The Hows and Whys of a Dryer Fire

A clothes dryer works by forcing hot air through a turning drum. Wet clothes placed in the drum are then dried by the hot air forcing the moisture outside. It is possible for a full load of wet clothes to contain as much as one and a half gallons of water. Lint is created from the clothes as the water is removed and the clothes dry. While much of the lint is trapped by the dryer's filter, lint also is carried through the venting system, together with moist air. The accumulation of lint, both in the dryer and in the dryer vent, reduces the airflow and creates a highly flammable fuel source.

Table 1. Loss Measures for Clothes Dryer Fires in Buildings [All fires, 3-year average (2002-2004)]

Measure	All Buildings	Non-residential Buildings	Residential Buildings
Loss per fire	\$8,891	\$7,462	\$9,176
Injuries per 1000 fires	37.2	58.9	33.0
Deaths per 1000 fires	1.0	0.0	1.2

In addition to the accumulation of lint, blockage in dryer exhaust vents also can occur from the nests of small birds and animals or from bends in the venting system itself. A compromised vent will not exhaust properly to the outside. Overheating may result. If enough heat is produced to ignite the lint itself or nearby combustible items, such as the clothes in the dryer or combustibles left nearby, the engineered safety mechanisms are compromised and fire ensues.

Where Residential Clothes Dryer Fires Occur

One and two family residences account for 81% of residential building dryer fires. Only 13% of dryer fires occur in multifamily homes, and even fewer dryer fires occur in hotels and motels (4%). The remaining 2% of residential properties include boarding and rooming homes, sororities and fraternities, dormitories, barracks, and other residences. According to the NFIRS data, 83% of clothes dryer fires occur in a "laundry area." However, a precise location for the laundry area within the residence is not provided. Traditionally, laundry areas were adjacent to utility areas, often in a basement or garage. In current housing, however, laundry areas can be in the bedroom area, kitchen and family room areas, hallways, closets, and other areas of convenience for the homeowner. Based on the standard NFIRS data, further investigation of the actual location in the home of residential building dryer fires, therefore, cannot be pursued.

When Residential Clothes Dryer Fires Occur

People typically do laundry at all times of the day and all year long. Clothes dryer fires increase in frequency beginning in the early morning and occur fairly regularly between the hours of 8 a.m. and midnight. There is a constant peak between noon and 5 p.m. and again after the dinner hour. Interestingly, the peak month for clothes dryer fires is January. Notably, clothes dryer fires show a slight increase during the winter and spring months from November until the end of April. The quantity and type of clothing worn in cooler months may be the defining factor in the monthly occurrence of dryer fires.

Leading Factors Contributing to Residential Building Dryer Fires

Proper maintenance for clothes dryers involves removing the lint from the dryer, traps, vents, and surrounding areas of the dryer. Not unexpectedly, the leading factor contributing to ignition for dryer fires is operation deficiencies specifically "failure to clean the dryer vent." Failure to clean the dryer vent accounts for 70% of dryer fires. Operational deficiency is the number one contributing factor. Other leading factors contributing to dryer fires include "mechanical failure," "electrical failure," and "misuse of material or product." A clothes dryer that has to work harder to evacuate lint and moisture and can trigger enough heat to cause some dryer components to malfunction and can sometimes produce sparks or even flames. The

overheating can sometimes produce enough heat to ignite lint or other nearby combustibles. As a good fire safety practice, combustibles such as clothing, boxes, and other items should not be placed near or around the clothes dryer. In addition, synthetic materials are more combustible than natural materials they ignite at lower temperatures and burn at much higher temperatures. For example, anything made of plastic, rubber or foam should not be placed in the drum for drying.

Items First Ignited and Fire Spread in Clothes Dryers

Not unexpectedly, the two leading items first ignited are "wearing apparel not on a person" (the clothes in the dryer) and "dust, fiber, lint etc.," which combined account for slightly over half (56%) of the fires. Generally, 62% of clothes dryer fires remain confined to the object of origin and 27% are confined to the room of origin. Less than 4% of fires remain confined to the floor of origin. However, the percentage of fires confined to the building of origin increases slightly to 7%. The likelihood of dryer fires spreading beyond the building is very small—less than 1% of these fires extend beyond the building of origin. The average dollar loss per fire confined to the object and the room of origin is less than \$5,000.

Clothes Dryer Venting Systems

For optimal venting the exhaust should vent directly outside the house. New construction trends now situate washers and dryers in nontraditional areas of the house, such as upstairs bedrooms, hallways, bathrooms, kitchens, and closets. These new sites generally require longer dryer vents in order to reach an outside wall. These routes contain sharp turns and bends that navigate through the structure of the home. **Dryer vents cannot be longer than the equivalent of 25 feet (5 feet is added to the actual vent length for each 90-degree bend in the vent).** When lint has to pass through an exhaust that is under a floor or through walls and is more than 6-feet long, it is almost impossible to propel all the lint out of the vent. As a result, lint can accumulate in pockets along the vent where they are harder to reach and clean. Thus, it is crucial for homeowners to also regularly inspect and clean out the dryer vent.

All manufacturers now state in their manuals not to use plastic or metal foil flexible ducts between the vent and the clothes dryer. However, many homes, as well as some new construction homes, continue to use plastic and metal foil ducts. The plastic and metal foil itself can provide additional fuel for a fire. Flexible foil vents are not the best choice for venting clothes dryers. Flexible vents can sag, allowing lint to build up and catch on fire if it comes in contact with a sufficient amount of heat. If a fire starts in the dryer when the dryer overheats, then the drafts from the dryer can pull that fire up into the duct and vent allowing a house fire to develop. **Other extremely serious dryer hazards occur when dryer vents do not terminate the exhaust outside.** Faulty installations can vent dryer exhaust to the attic, crawl space, chimney or interior walls, which can cause indoor air deterioration and mold buildup. Small birds and animals that nest in dryer vents also can obstruct air flow and prevent the lint from properly venting to the outside.

Proper Dryer Maintenance

By observing a few simple indications of poor system performance, one can examine the dryer components for any blockage or excessive heat. If you notice heavy clothes such as blue jeans or towels taking a long time to dry, or clothes feel hotter than usual at the end of the cycle, then a clogged dryer vent exhaust is likely the problem. Hire a professional company to clean the dryer components & Dryer Vent. Some dryer vents may need more frequent inspection, such as in homes with complex construction where the dryer vents exceed 6 feet from the outside, or with smaller stack dryers and dryers that are older and do not have moisture sensors or high temperature safety limit controls. This will reduce the fire risk and increase the dryer's efficiency. Outside wall dampers should have a covering that will keep out rain, snow, and dirt. However, do not use wire screen or cloth of any kind to protect the exhaust opening. It can collect lint and clog areas of the dryer vent. In order to deter birds and small animals from nesting in vents, make sure the dryer vent system and damper are working suitably.

Several recommendations for clothes dryer safety include the following:

Never put synthetic materials such as rubber, plastic, foam, or pieces of cloth that have been used to sponge up flammable liquids in the dryer, even if previously washed.

Call a professional dryer vent cleaner to clean the lint out of the exhaust pipe and the rear of the dryer regularly.

Inspect your lint filter for rips each time you use it. If you see any rips, replace immediately.

The exhaust pipe should be as short as possible and have limited bends to allow for adequate airflow.

The American Household Appliance Manufacturers Association (AHAM) recommends the use of UL- listed rigid aluminum or steel duct, NOT white vinyl or metal foil hose.

Never let your clothes dryer run while you are out of the house or asleep.

Have gas-powered dryers inspected by a professional annually to ensure that the gas line and connection are intact.

Conclusion

In most cases, clothes dryer fires can be prevented. "Failure to clean" is the number one factor contributing to clothes dryer fires, followed by mechanical and electrical failure. Clogged dryer vents occurring from lint buildup may make the dryer operate incorrectly and raise the temperature of the dryer machinery high enough to ignite lint or nearby combustibles. The exhaust vent should be as short as possible and have limited bends to allow sufficient airflow. Improper items placed in the dryer, such as plastic, foam, or other synthetic materials also can increase the risk of fire. Make sure to follow the recommended safety tips for operating clothes dryers safely.

In particular, by following installation guidelines and performing regular inspections on dryer vents, consumers can protect themselves further from clothes dryer fires. Depending on the frequency of use, how long the vent is, or the age and type of dryer used, dryer vents need inspection on average every 2 to 3 years.