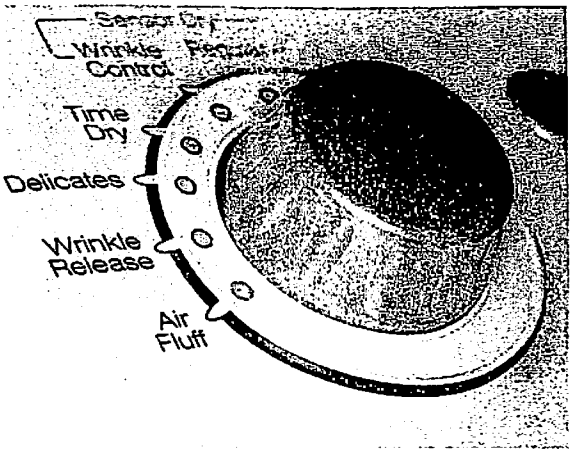
Dryer Fire Potential

by Julius Ballanco, P.E.



Being involved in the codes and standards business for the past 30 years, I have often heard people say: "It's not if you have a dryer fire, but when!"

I used to assume that this was a scare tactic until "when" finally happened to my family. My wife was doing laundry one evening, and shortly after going down to the basement to check on a load came running back up saying that she smelled smoke. I asked what she did and she replied that she had turned off the gas dryer. When I entered the basement it became immediately obvious that something was burning. I began to take the dryer apart to investigate further and, thanks to the quick action of my wife, was able to put out the small fire.

Unfortunately the same was not true for our best friend's sister. On Christmas morning she threw a load of wash in the dryer and ran to the corner store to buy a few last-minute things for the family dinner. When she returned her house had burned to the ground as the result of a dryer fire.

We were lucky. Our dryer was located on a concrete floor and backed up against a concrete block wall, the area around it was always kept immaculate by my wife, and I cleaned the dryer vent regularly. So what happened?

When I took the dryer apart I noticed that the seal between the lint trap and the vent had been compromised. As a result, the inside cavity of the dryer filled with lint to the point that it was finally ignited by the gas flame. Obviously one would not expect the inside cavity of a three-year-old dryer like ours to be filled with lint, but when I referred to the manufacturer's installation manual I found the recommendation that the dryer panels be removed and the inside cavity cleaned every five years. I had to wonder how many people ever read that part of the manual, much less remembered to perform the recommended maintenance, and decided to investigate the potential threat more thoroughly.

Sobering Statistics

The U.S. Consumer Product Safety Commission (CPSC) estimates that there are 15,500 clothes gas and electric dryer fires in the nation each year, resulting in an average of 10 deaths, 310 injuries and $84.4 million in property damage. Lack of proper maintenance is listed as the primary cause of 28 percent of these fires.

This alarming data prompted further research by the CPSC, and in May 2003 it issued a report entitled *Electric Clothes Dryers and Lint Ignition Characteristics*. The CPSC researchers found that a substantial amount of lint can accumulate within a dryer even if the exhaust vent and lint trap are clean and that the high-limit thermostat can fail under high ambient temperatures. The complete report is available on the CPSC website, located at *www.cpsc.gov*. A helpful consumer product safety tip sheet is also available from Underwriters Laboratories Inc. at *www.ul.com/consumers/dryers.html*.

Vent Receptacle Fire Testing

An emerging mitigation measure is the use of a vent receptacle to limit fire spread in the event of a dryer fire. East-West Technology Corporation labs in Jupiter, Florida, recently conducted fire tests on three commercially available dryer vent receptacles: two made of polystyrene plastic and one made of aluminized steel. The testing simulated a dryer fire that spreads to the rear of the appliance. The burner was directly exposed to the dryer receptacles, which were located 10 inches from a stud wall assembly.

The first plastic vent receptacle began to deform at 12 seconds. The fire entered the test wall assembly at 43 seconds, there were large flames inside the wall cavity at 80 seconds and the test was terminated at 190 seconds.

The second plastic receptacle completely melted away after 100 seconds. At 150 seconds, the temperature in the wall assembly was 1000°F and flames were observed coming out of the top of the assembly. The test was terminated at 210 seconds.

In the test of the metal vent receptacle, flames were visible in the wall cavity around the seams of the box at 18 minutes but self-extinguished. At 26 minutes, flames were observed on the back side of the wallboard—those flames also self-extinguished. When the test was terminated at 60 minutes the fire had not penetrated the wall assembly or spread into the wall cavity.

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Dryer Fire Potential continued

Conclusion

The CPSC research serves to emphasize the importance of maintaining a clean environment around clothes dryers: the lint filter must be cleaned after each use and periodic cleaning of the inside of the dryer is necessary. When a dryer vent is installed within a wall cavity, the use of a vent receptacle prevents the flexible transition hose from being crushed, thus reducing the possibility of a blockage that could cause a fire. Further, as demonstrated by the East-West Technology tests, proper firestopping of the wall opening behind the dryer can prevent a small, contained fire from rapidly growing into a potentially catastrophic blaze. ◆

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CPSC Testing of Dryers

- CPSC testing indicated that the temperature in the exhaust outlet did not increase between 0-blockage and 50-percent blockage. Above 50-percent blockage, the temperatures increased in the exhaust outlet.
- In one test on the exhaust outlet of the dryer with 75-percent blockage, the temperatures rose to approximately 375°C (707°F). With complete blockage, the maximum temperature in the outlet temporarily spiked at 550°C (1022°F).
- It was also noted during the CPSC tests that the exhaust vent airflow significantly decreases over time, as the lint screen becomes progressively blocked. The velocity in one test dropped from 1,300 square feet per minute to 950 square feet per minute.
- During the lint ignition tests, lint was placed in various locations in the dryer. When lint was located on top of the heating element, the high-limit thermostat cut off the power supply once the lint began to smolder. To simulate a failure of the high-limit thermostat, the thermostat was bypassed. In all of the bypass tests, the lint either smoldered or ignited.
- The lint was placed within 0 to 4 inches of the heater. Ignition testing was performed with both the high-limit thermostat functioning and bypassed. When the thermostat was bypassed, the ignited lint was within 2 inches from the heater. With the dryer in normal working order and the high-limit thermostat functioning, the lint ignited when located 0 to 2 inches from the heater intake. ◆

2006 INTERNATIONAL RESIDENTIAL CODE®

PORTION OF THE 2006 STATE BUILDING CODE

SECTION M1501
CLOTHES DRYERS EXHAUST

M1501.1 General. Dryer exhaust systems shall be independent of all other systems, shall convey the moisture to the outdoors and shall terminate on the outside of the building. Exhaust duct terminations shall be in accordance with the dryer manufacturer's installation instructions. Screens shall not be installed at the duct termination. Exhaust ducts shall not be connected with sheet-metal screws or fastening means which extend into the duct. Exhaust ducts shall be equipped with a backdraft damper. Exhaust ducts shall be constructed of minimum 0.016-inch-thick (0.406 mm) rigid metal ducts, having smooth interior surfaces with joints running in the direction of air flow. Flexible transition ducts used to connect the dryer to the exhaust duct system shall be limited to single lengths, not to exceed 8 feet (2438 mm) in length and shall be listed and labeled in accordance with UL 2158A. Transition ducts shall not be concealed within construction.

Exception: This section shall not apply to listed and labeled condensing (ductless) clothes dryers.

M1501.2 Exhaust duct size. The diameter of the exhaust duct shall be as required by the clothes dryer's listing and the manufacturer's installation instructions.

M1501.3 Length limitation. The maximum length of a clothes dryer exhaust duct shall not exceed 25 feet (7620 mm) from the dryer location to the wall or roof termination. The maximum length of the duct shall be reduced 2.5 feet (762 mm) for each 45-degree (0.79 rad) bend and 5 feet (1524 mm) for each 90-degree (1.6 rad) bend. The maximum length of the exhaust duct does not include the transition duct.

Exceptions:

1. Where a clothes dryer booster fan is installed and listed and labeled for the application, the maximum length of the exhaust duct, including any transition duct, shall be permitted to be in accordance with the booster fan manufacturer's installation instructions. Where a clothes dryer booster fan is installed and not readily accessible from the room in which the dryer is located, a permanent identifying label shall be placed adjacent to where the exhaust duct enters the wall. The label shall bear the words "This dryer exhaust system is equipped with a remotely located booster fan."
2. Where the make and model of the clothes dryer to be installed is known and the manufacturer's installation instructions for such dryer are provided to the building official, the maximum length of the exhaust duct, including any transition duct, shall be permitted to be in accordance with the dryer manufacturer's installation instructions.