

Dryer Venting

When was the last time you checked a dryer's vent hose?

by Jonathan Beers

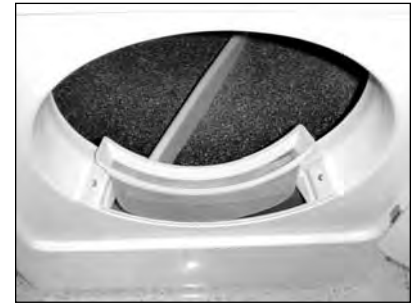
In 1998, a letter to Ann Landers about clothes dryer fires triggered many testimonials urging readers to check their dryer venting. Each year about 15,000 fires start in dryers and cause 10 to 20 deaths in the United States. Reduced air flow—either from lint blockage or from improper venting materials—creates many of these fires.

The three leading culprits in reduced air flow are

1. White flexible hose. Although it is frequently used for dryer venting, the white vinyl slinky-style flexible hose doesn't meet the Underwriters' Laboratories (UL) standard for dryer venting, and it is a fire hazard to boot. (The UL standard requires metal dryer venting.) The spiral ribs restrict air flow, and the resulting overheating can ignite lint in the vent or inside the dryer. Air flow is restricted even more if people omit the elbows from the venting system and simply stretch the flex hose from the back of the dryer to the vent cap. Once a fire starts, the plastic vent hose burns, spreading the fire. The warranty on new dryers may be voided if unapproved venting such as vinyl flex hose is used.

2. Clogged vent caps or louvers where the dryer exhausts through the wall. Lint isn't the only culprit, as birds or rodents sometimes block dryer vents. Check to see if the backdraft flap opens when the dryer is running, and if warm moist air is coming out. Lint often holds the hinged backdraft damper on the vent cap open, which can let cold air into the dryer. A screwdriver or toothbrush works well to remove lint that has accumulated.

3. Lint buildup in other parts of the venting system. Lint buildup is especially dangerous within the dryer. The back of the dryer drum can get hot enough to ignite lint, as can the motor or electrical connections.



Spring Cleaning

Ask your customer when the venting system was last cleaned. Venting systems should be cleaned at least once a year. I prefer to take the entire venting system apart and clean it outdoors. Attaching the metal elbow to the back of the dryer with a 4-inch clamp makes it easier to remove for cleaning. Screws are not approved for venting systems, since the screws protrude into the vent and catch lint. Foil tape is OK, as are pop rivets, but both make it hard to remove the vent for cleaning. Be careful not to crush the vent when pushing the dryer back into place after cleaning. Unplug the dryer before moving it. Turn off the hand shutoff on gas dryers and take special care not to damage the flexible gas con-

ductor. If removing the vent isn't practical, dryer vent brushes are available from a variety of sources, including repair2000.com and Repairclinic.com. If cleaning vents is not a task you wish to tackle, refer your customer to an appliance repair company or even a chimney sweep.

Better Venting

Replace plastic vent hose with UL-approved metal venting. In general, the straighter, smoother, and shorter the vent, the better the air flow. As a rule of thumb, a venting system with two 90° elbows shouldn't have more than 15 ft of straight duct, unless the dryer manufacturer states otherwise. To avoid crushing the elbow at the back of the dryer, I

recommend a reinforced close elbow. If space is tight between the dryer and the wall, a periscope vent allows the dryer to be 2 inches closer to the wall.

Booster fans are available to improve air flow for dryers located in the middle of apartment buildings or condos. Another solution is to purchase a long-vent dryer with a more powerful blower. Whirlpool says that all of their full-sized dryers can accommodate a duct run of up

the laundry may be slightly damp when removed from the dryer. However, I grew up using a Bendix Duomatic combination washer/dryer, and it was convenient to toss a load in the machine and have it washed and dried automatically. Since conventional dryers exhaust significant quantities of air, condensation dryers can also be useful in homes with inadequate makeup air or backdrafting problems.

Update, and *Appliance* magazine, also with no success. The most useful reply to my questions on the relationship between higher pressures in the vent hose and drying time that I received came from Maytag: "The drying times will increase if the water column is higher than .58 inches." (One inch of water column [WC] = 250 Pa.)

I decided to do a little seat-of-the-pants research with my own dryer. I



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(left) If space is tight between the dryer and the wall, a periscope vent allows the dryer to be 2 inches closer to the wall. (right) I stuck this gauge's right-angled terminal tube into a vertical section of the vent to measure static pressure.

to 64 ft, if rigid metal duct is used, and no 90° elbows are utilized (or up to 44 ft with two elbows). Maytag's models that carry model numbers starting with MDE can handle similarly sized duct runs.

All dryers should be vented outdoors to avoid indoor air quality problems. The moisture and lint from any dryer can cause health problems, and venting a gas dryer indoors violates codes. (I wouldn't want to breathe the chemicals found in fabric softeners either.) For situations where outdoor venting is impossible, condensation dryers are sold by Bosch, Miele, AEG, Asko, Malber, and Eurotech. Bendix, Equator, Splendide, Malber, Haier, Quietline, Thor, LG, and Eurotech make combination washer/condensation dryers.

Condensation dryers remove water from clothes and send it down a drain, rather than carrying the moisture away via a vent. They're fairly expensive and not easy to find in North America, and

Energy Savings from Proper Venting

Many sources cite reduced drying time as one of the benefits of improved dryer venting. In an effort to find out how much energy can be saved by improved air flow, I wrote to dryer manufacturers; the Association of Home Appliance Manufacturers (AHAM); The Electric Power Research Institute (EPRI); the Department of Energy's Office of Energy Efficiency (EREN); Captain Toolhead (also known as Mike Staats, columnist for *Appliance Service News* and owner of an appliance repair business); Danny Parker at the Florida Solar Energy Center; and Gary Nelson of the Energy Conservatory. Nobody had information on measured energy savings from proper venting.

Next, the librarians at the Energy Center of Wisconsin searched ASHRAE, *Home Energy*, *Energy Design*

assembled a small load of assorted rags and old clothes and used a refrigerant scale, which is accurate to 0.1 oz, according to the manufacturer, to weigh the load both before and after drying. At 4 lb 7 oz before the wash and 4 lb 5 oz after, the weight of my first load wasn't much affected by going through the washer/dryer cycle. Subsequent loads displayed similar consistencies. I didn't check the weight of the lint, but my load produced very little of it, as it was mostly old socks and underwear. Gary Nelson of the Energy Conservatory provided helpful tips for setting up the tests, including this humorous suggestion: "There may be a need for a new ASTM standard for field testing of dryer efficiency. 'Take 12 pair size 34 men's Jockey shorts, add 0.5 liter of water, etc.'"

To measure drying time, I plugged a Pacific Science and Technology Line Logger into the electrical outlet serving my gas dryer. Since on a gas dryer, the



By taping shut first, two, and then, three louvers on the vent hood, I raised static pressures in the venting system.

number of watt-hours used per cycle is largely a function of the amount of time the fan is on and drum is turning, I used watt-hours per load as a way of measuring drying time without having to babysit every test. I did babysit a couple of tests to make sure that the electric use during the cool-down portion of the cycle didn't vary.

To measure static pressure, I used a portable Dwyer Magnehelic gauge, and stuck its right-angled terminal tube into a vertical section of the vent. I don't have access to a flow hood or a pressure pan, so I didn't measure exhaust pressures directly. The static pressure probe's initial reading with smooth aluminum venting was a surprisingly high 0.57 inch WC, but after I cleaned the lint out of the louvered vent cap, it dropped to 0.15 inch WC.

I then tried different venting materials, which is when the surprises started. Installing 20 ft of white vinyl flex hose (on a 12 ft run) slightly lowered the static pressure to 0.12 inch WC! Flex hose with the solid elbows removed theoretically should have shown the greatest increase in static pressure, but the pressure was slightly lower than the 0.15 inch WC with smooth aluminum. Semirigid metal flex vent, which should be better than vinyl flex hose, showed a static pressure of 0.20 inch WC.

Figuring that these results were due to clean venting materials and a dryer only 4 ft from the exterior wall, I intentionally created higher static pressures by taping shut louvers on the vent hood.

With two out of the four louvers closed, I got 0.45 inch WC. With three out of four closed, I got 0.80 inch WC. The kicker is, none of these higher static pressures increased drying time! One of the shortest drying times was with the mostly blocked vent at 0.80 inch WC.

I still believe that increased static pressure in a dryer vent should increase drying time, and that my results weren't typical. One explanation I can think of is that perhaps increased static pressure in the vent increases the temperature in the dryer. Dale Watterson, a trainer at Madison Gas and Electric, where I work, thinks that air was leaving the dryer drum via the drum gaskets and vent and blower connections, instead of via the vent. The problem with this pathway is that the blocked vents force lint into the dryer cavity, where it can catch fire. Higher heat within the dryer cavity probably also shortens the life of the components.

I hope that some *Home Energy* readers may know of research on the relationship between static pressure and drying time or will conduct some

research themselves. Knowing the true relationship between improved dryer venting and energy savings would be helpful.



Jonathan Beers coordinates an air conditioner shut-off program and is an all-around energy geek for Madison Gas and Electric Company's residential programs.

For more information:

To learn more about condenser dryers, visit <http://ths.gardenweb.com/faq/lists/appl/2002100151001744.html>.

For general information on dryer safety, the following Web sites are helpful:

www.nfpa.org/Research/nfpafactsheets/dryer_safety/dryer_safety.asp;
www.cpsc.gov/cpsc/pub/pubs/5022.html;
and www.ul.com/consumers/dryers.html.

To buy brushes for dryer vent cleaning, visit www.repair2000.com/brush.html <http://hartshearth.com/chimney/dryer/dryervent.htm>.

For information on dryer booster fans go to www.fantech.net/dryer_boosting.htm.

Reasons not to vent dryers indoors: www.buildersbest.com/indoor.htm#ILLNESS.