

ROCIS ISSUE BRIEF

Thomas J. Phillips
Principal Investigator

January 2018

Ducted Range Hoods: Recommendations for New and Existing Homes

WHAT is a ducted range hood?

Ducted range hoods are metal or glass devices installed above stoves and ovens. Usually shaped like an inverted funnel or bowl to capture the cooking emissions, they employ a fan and ductwork to remove pollutants directly to the outdoors. Range hoods are also known as kitchen hoods, exhaust hoods, fan hoods, and extractor hoods. Some microwave ovens mounted above stovetops also have an exhaust fan and ducting to move cooking emissions outdoors. However, ductless (or recirculating) range hoods lack a vent to the outside and do not effectively remove cooking emissions, even if the hood has grease, particle, or charcoal filters. *(Note: the following recommendations will only be referring to **ducted (vented)** range hoods that exhaust to the outside of homes, unless specified otherwise.)*

WHY do homes need a ducted range hood?

Cooking produces odor, moisture, and air pollutant emissions in homes, whether done with a gas or an electric appliance (Fortmann et al. 2001, Zhang et al. 2010; Dennekamp et al. 2001; Perrot et al. 2003; Fluckiger et al. 2000; Jørgensen et al. 2013; Svedahl et al. 2009; Arbex et al. 2007). Indoor pollutant levels from cooking can exceed health guidelines for particulate matter, nitrogen dioxide, carbon monoxide, and aldehydes, especially for gas stoves (Fortmann 2001; J.M. Logue et al. 2011; Singer et al. 2017). These pollutants can increase the risk of both short-term and long-term health effects (Coker et al. 2015; Belanger et al. 2006). Residential cooking or space heating with a gas stove has been associated with respiratory problems in children (Dekker et al. 2001; Coker et al. 2015), especially in unventilated kitchens (Kile et al. 2014). Cooking can also emit potent mutagens and carcinogens into the air (Sjaastad et al. 2010; Felton 1995; Knize 2006; FCI FAQ 2015; Poudel et al. 2017; Sohn 2017), and the large amounts of moisture emitted by cooking can increase the risk of bio-allergens such as mold, bacteria, and dust mites multiplying in a home (US EPA 2015).

Using a range hood can help reduce pollutant exposures and health impacts from cooking, by keeping emissions from spreading into and lingering in a home (Kile et al. 2014; Pacitto et al. 2018; Jacobs & Borsboom, 2017; Fortmann, 2001; Peters &

Borsboom, 2017; Fluckiger et al. 2000; Singer et al. 2017). Opening windows alone is not nearly as effective as a good range hood, especially when wind speeds are low or outdoor pollutant levels are high. Range hoods also help cool a house by removing excess heat and moisture from cooking. They are required for new home construction, major remodels, and additions, and recommended by green and healthy building programs (Build It Green 2017; EPA 2015; USGBC 2017), ventilation industry standards (ASHRAE 62.2), and state and local building codes (Stratton & Singer 2015).

WHO needs a ducted range hood?

Everybody who cooks with a stove or oven needs to use a range hood – especially if your household includes children, persons with asthma or other respiratory diseases, the elderly, or persons sensitive to odors. The more burners you use, the longer you cook, and the more the cooking produces odors, smoke, or moisture, the more you need to use effective kitchen exhaust ventilation. Range hoods are also essential for smaller homes with less volume to dilute the cooking emissions. Anybody planning a new home, remodel, or replacement of any range hood should take advantage of the opportunity to install a better range hood system.

WHEN AND HOW do I need to operate a ducted range hood?

- Use the hood whenever you use the stove or oven, and especially when cooking at high temperatures or producing large quantities of steam, smoke, or odors. Examples of “high emitting” cooking activities include grilling, frying, stir-frying, broiling, and roasting. Operate the hood fan at the speed that seems to best remove smoke, odors, and steam at the highest noise level your household can tolerate.
- Use a back burner whenever possible. Use lower cooking temperatures, and cover pots and pans as much as possible.
- Leave the fan on for at least 10-20 minutes after the cooking ends, or until the cooking surfaces have cooled, whichever comes first (Sjaastad & Svendsen 2010). Continue using the fan if odors or smoke are noticeable when you enter from outdoors or a distant part of the house. (For airtight homes, see SUPPLEMENT: Caveats and Cautions.)
- When using the oven cleaning cycle, evacuate the house and operate the range hood at maximum speed. Also, clean the hood’s grease filters afterwards.

HOW do I select a “good” ducted range hood?

The best range hood to meet your needs depends on your building and appliance characteristics, your type of cooking, your household’s sensitivity to odor, pollutants, and noise, and your budget. (See SUPPLEMENT: Criteria for Selecting an Effective Ducted Range Hood.)

- Determine the airflow rate you need for your hood type, stove size, building airtightness, and type of cooking. Airflow rates for typical homes should be 200-350 cubic feet per minute (cfm). Island installations will require higher flows than wall installations.
- Check range hood listings for a Capture Efficiency (CE) rating from the Home Ventilating Institute (HVI) or the manufacturer if necessary. A standard test method for CE is expected by 2018. Select a hood with a CE of at least 75%, or more if possible. If CE ratings are not available yet, pick a deep, wide hood that has an open bottom and that covers all the burners. (Singer et al. 2012)



HOME VENTILATING INSTITUTE Certified Home Ventilating Products Directory

HVI provides third-party, certified test results for airflow (cfm) and noise (sone) for range hoods. Manufacturers may also conduct tests at multiple fan speeds, but the results may not be accurate.

- Select a range hood that is quiet: Look for a hood with an HVI noise rating of less than 3 sones at an airflow rate of 200 cfm or more. If you need a larger capacity range hood that does not have a sone rating at 200 cfm, choose one that has a lower sone rating than others at equivalent speeds.
- Select a multispeed fan that can be used at lower flow rates and sound levels when cooking with low emissions or on small burners.
- Make sure the hood and ducting will fit. Ensure that the hood dimensions from the manufacturer and the duct layout can be accommodated in the available space. Double check that the hood and ductwork are installed properly, and measure the flow rates of the installed hood. (See SUPPLEMENT: How to Install Ducted Range Hood Systems.)

Some cautions:

- High airflow rates (and even low rates in airtight homes) can depressurize a home, potentially pulling in unwanted pollutants from combustion appliances, outdoor air, soil, or attached garages, basements, or apartments, which may create a need for make-up air. (See SUPPLEMENT: Caveats and Cautions.)
- Flat “designer” style hoods are not very effective. Many existing range hoods with propeller-type fans and small diameter ducts are not very effective and are too noisy.
- Some over-the-range microwaves can effectively remove indoor pollutants, but only at very high (and noisy) fan speeds and flow rates.
- Large “power” burners produce much more heat and pollutant emissions than typical gas burners, and may need a wider range hood and higher airflow rates.

WHAT ELSE can I do?

Regardless of whether you have an effective vented range hood, there are some easy ways to further reduce indoor pollution exposures from cooking and to improve pollutant removal by the hood, including reducing cooking emissions and funneling the plume into the hood. (See SUPPLEMENT: Easy Ways to Reduce Exposures to Cooking Pollutants.)