

Gimme Shelter



Build Tight, Ventilate Right

Making your home energy efficient is a good start, but you need to think about how the whole house works together. As you seal up and insulate the house, you must take control of how your house is ventilated to keep it healthy, safe AND energy efficient. You also need to make sure your fuel-burning heating and water heating systems get the combustion air they need to work properly.

Here's a recommended "best practices" checklist whether you're building or remodeling a home:

- ☒ Caulk and seal areas where air leaks in and out of the house
- ☒ Maximize insulation throughout the house: roof, walls, foundations or floors, doors and windows
- ☒ Mechanically ventilate using an upgraded bath fan sized for the whole house, a heat recovery ventilator (HRV) or similar system for ventilation air
- ☒ Use energy-efficient sealed combustion or direct vent heating and water heating systems that are properly sized
- ☒ Maintain your house and equipment, including smoke alarms and carbon monoxide alarms
- ☒ Always follow local codes and standards

Is this happening to your house?

Common Problems & Solutions



Problems	Diagnosis	If left untreated	Solution
High energy usage	Air leakage in heating ducts and building shells, poorly tuned furnaces, boilers and water heaters, inadequate insulation or leaking hot water faucets.	High utility bills and wasted resources.	Inspect home to determine insulation needs and increase to adequate levels. Analyze heating appliances and replace or repair as needed. Seal air leaks. Check water heating system for proper temperature and insulation levels. Repair leaky faucets.
Elevated carbon monoxide (CO) levels	Improperly vented space heaters or back-drafting in combustion appliances such as woodstoves, water heaters, furnaces or boilers. Check for automobile exhaust from attached garage.	Headaches, nausea, lingering lethargy, flu-like symptoms, unconsciousness and death.	Have combustion appliances such as heating and water heating systems inspected and replaced or repaired. Install and maintain carbon monoxide alarms.
Mold and mildew	Too much moisture in home, frequently the result of everyday activities such as breathing, bathing, cooking, cleaning and clothes drying. Plants and aquariums may also be a source of additional moisture.	Mold and mildew growth can lead to rot, structural damage, premature paint failure and a variety of respiratory and health problems.	Use range hood and bath fans. Install energy efficient, continuous duty rated, low sone fan or heat recovery ventilator (HRV). Make sure dryer is vented to outside. Repair foundation water problems. Cover crawl space with ground vapor barriers.
Damp basement or crawlspace	Water may seep into basements and crawl spaces due to poor drainage, clogged gutters or a high water table.	Too much moisture can cause mold, mildew and other biological growth. This can lead to rot, structural damage, premature paint failure and a variety of respiratory and health problems.	Clean gutters and downspouts. Slope ground to keep water away from foundation. Seal around windows and wall penetrations. Cover open dirt floors with a ground vapor barriers.
Moisture on windows	Inefficient windows or high moisture with inadequate ventilation. Using a humidifier when it is not needed.	Moisture problems such as mold, mildew, rot or structural damage.	Vent excess moisture, especially in bathrooms, kitchens and laundry rooms. If you have single pane windows, install storm windows or consider new windows. Turn off humidifier.
High moisture levels	People, pets, showering, cooking, aquariums, plants, damp soil in crawl spaces and basements, gas ovens and unvented combustion appliances are all sources of moisture.	Decrease in building durability, increased rot, structural damage and poor indoor air quality.	Install vapor barriers over dirt crawl spaces and basements. Install and use bath and kitchen fans. Cover aquariums, hot tubs and standing water sources. Repair plumbing, roof and building leaks. Air seal and pressure balance building. Install adequate controlled ventilation.
Poor indoor air quality	Fumes from building materials, pet dander, dust mites, smoking, cooking, exhaust from gas ovens or other combustion appliances, paints, stains, varnishes, thinners and automobile exhaust from attached garage may all be causes of poor indoor air quality.	May cause respiratory and health problems. Asthma and allergies may be aggravated.	Identify, remove or reduce sources of fumes. Air seal building and provide controlled and proper ventilation.

Problems	Diagnosis	If left untreated	Solution
Dry winter air	Heating system removes too much moisture from air, possibly because of heating system problems.	Dry air can cause dry skin and throat and static shocks. It also damages furniture and other property.	Have heating system inspected to determine if properly sized and operating at peak efficiency and safety. Seal air leaks in the home. If you have forced air heating, check that ducts are sealed. Use humidifier if needed.
Water stains on ceiling and walls	Air leaks, especially ceiling light fixtures. Water leaking from outside. Poor insulation.	Soaked insulation, higher energy use, rot, mold and mildew, discoloration of surfaces, blistered paint and soggy sheetrock require repairs and cost money.	Fix water leaks. Seal air leaks. Provide adequate insulation and ventilation.
Fire	Faulty combustion equipment and/or electrical systems, space heaters and unsafe chimneys.	Building destruction and possibly death.	Check electrical, combustion and other equipment for fire safety. Install egress windows in sleeping areas. Install smoke alarms. Keep combustibles away from any heat source.
Peeling paint	Moisture problems or improper application.	Problem is unattractive and could lead to a variety of moisture problems including rot and structural damage.	Correct moisture or air leakage problems. Apply paint according to manufacturer's instructions.
Excessive dust	Dust problems can result from dirty furnace filters, leaky ducts, infiltration through leaky doors and windows, dust producing power tools, etc.	Dust can cause an unpleasant living environment, aggravate respiratory and health problems and damage property.	Change furnace filter. Air seal home. Seal ducts. Test combustion appliances for safety. Don't use dusty power tools such as sanders inside home.
Cold floors	Some floor coverings such as tile, concrete or wood naturally feel cold. However, this problem is generally the result of air infiltration and insufficient insulation.	House will be uncomfortable and inefficiently heated.	Install proper insulation. Properly seal wall and floor penetrations. Have heating system inspected to determine if register location and airflow is adequate.
Icicles or ice dams on roof	Warm air leaking from living space warms the underside of roof, melts snow. Could result from air leaks in home, faulty insulation and/or improper attic ventilation.	Roof leaks, rot decay or roof structure deterioration.	Seal air leaks between ceiling and attic first. Add insulation and ventilation as needed.
Drafts	Air leaks in ceilings, floors, walls or heating ducts.	Discomfort, heat loss, expense, cobwebs, flies or pressure imbalances.	Seal air leaks and air ducts.
Cold rooms	Air leaks in ceilings, floors or walls, inadequate heat supply, leaky ducts or poor air circulation.	Discomfort, heat loss, utility expenses, frost buildup, condensation or mold.	Seal air leaks and check ducts. Have heating system inspected.
Frozen pipes	Air infiltration, pressure imbalances, inadequate insulation or improper placement of plumbing.	Unsanitary conditions, high repair cost or structural damage.	Air seal and pressure balance the home. Move plumbing into the insulated portions of the home. Repair leaks that degrade insulation. Provide adequate insulation.



As you seal up and insulate your home, you must take control of how your home is ventilated to keep it healthy, safe AND energy efficient. Proper ventilation can help control moisture-related problems such as window condensation, rot, mold and other indoor air quality issues.

Whole House Ventilation Sizing Chart:

This chart will help you size a whole house ventilation system (such as an upgraded bathroom fan) for your home. Fan size is in CFM (Cubic Feet per Minute). Use an energy-efficient fan designed for continuous duty with a sound rating of one sone or less.

House Square Footage	0-1 Bedrooms	2-3 Bedrooms	4-5 Bedrooms	6-7 Bedrooms	>7 Bedrooms
<1500 sq. ft.	35 cfm	55 cfm	75 cfm	95 cfm	115 cfm
1501-3000 sq. ft.	50 cfm	70 cfm	90 cfm	110 cfm	125 cfm
3001-4500 sq. ft.	65 cfm	85 cfm	105 cfm	125 cfm	145 cfm
4501-6000 sq. ft.	80 cfm	100 cfm	120 cfm	140 cfm	160 cfm
6001-7500 sq. ft.	95 cfm	115 cfm	135 cfm	155 cfm	175 cfm
>7500 sq. ft.	110 cfm	130 cfm	150 cfm	170 cfm	190 cfm

For more complete information on this and other energy questions, classes and information resources, contact the AHFC Research Information Center at 800-478-4636 or 907-330-8166 or visit us online at www.ahfc.us.

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