# Your guide to indoor air quality

by Glen Salas

An energy-efficient home is a well-sealed and well-insulated home, but too much air sealing and not enough controlled ventilation can lead to trouble. Moisture condensation on the interior of windows, musty odors, stuffy air, dirty registers and return air grills, mold, mildew and occupant discomfort are all possible signs of poor indoor air quality (IAQ), which is often caused by poor construction.

***The Partnership for Advancing Technology in Housing recently released Tech Set 9 on IAQ to help builders navigate the waters. The PATH Tech Sets put all the most important innovations together in one package, taking the guesswork out of how to choose effective — and cost-effective — technologies that can deliver a market advantage.***

The IAQ Tech Set covers the three basic steps that ensure a healthy and comfortable indoor environment:

1. Design and build the home so that it performs properly after construction is complete.
2. Control contaminants at their source.
3. Maintain the home and its surroundings.

## The IAQ Tech Set

Follow PATH's five steps to a healthy indoor environment:

1. Select materials with no or low volatile organic compounds (VOCs).
2. Properly size the heating, ventilation and air conditioning system, and design it to correctly filter and ventilate the air and control humidity.
3. Use building envelope best practices, such as redundant flashing and weather barriers, to keep a home watertight.
4. Seal combustion appliances so that burning byproducts can't back-draft into the home.
5. Advise occupant vigilance: Maintenance is obviously up to residents, but a little education from the builder can put homeowners on the right track.

## The lowdown on VOCs

VOCs include a wide range of compounds that evaporate easily at room temperature, often have a sharp smell and may be detrimental to your health. Many conventional paints, finishes and glues, stains, sealers, carpeting and plastic-based products contain high levels of VOCs, as do plywood and most OSB sheathing.

Today, low- and no-VOC products are available almost anywhere. Also, low- and no-VOC latex paints use water as their solvent and carrier, which eases cleanup and is generally less toxic. Note, however, that not every latex-based paint is low in VOCs.

## Custom HVAC

To control indoor air effectively, the HVAC system should be custom designed for each home you build. Don't rely on rule-of-thumb sizing, which often results in a costly and drafty system that delivers too much air conditioning and uncertain humidity control. Look to ACCA's Manual J to right-size the system.

Ventilation may be as simple as installing well-placed spot ventilation fans

## PATH Tech Set: Indoor Air Quality


## Resources

- Find the PATH Tech Sets at www.pathnet.org. Click on "Tools."
- Visit PATH's Technology Inventory at www.toolbase.org for detailed descriptions of innovative technologies that can help improve indoor air.
- Learn more about indoor air quality at www.epa.gov/iaq.

that augment the space heating system or control bathroom moisture. Or you may need to integrate whole-house ventilators and humidity control to provide a measured amount of outdoor air for conditioning at regular intervals.

Don't rely on air leaks to deliver outdoor air. ASHRAE Standard 62.2 – 2001 specifies the ventilation requirements for single-family and multifamily buildings three stories or less.

All HVAC systems contain some method for filtering room air. Generally, the better the filter, the higher the cost, even though a high-quality filter isn't likely to cost as much at your local home improvement store.

Since HVAC system maintenance and filter replacement should be performed at regular intervals, make these areas easily accessible.

All outdoors air intakes should be at least 10 feet away from exhaust outlets and areas where vehicles idle.

Test for radon. If you find it, there are simple construction techniques that will mitigate this dangerous gas. Find a local radon remediation subcontractor to conduct this work.

## Build to last

A well-built home repels moisture and air with good design features like covered entries, redundant weather barriers and grading that moves water away from the structure. (Follow PATH's Tech Set 2, Durable Building Envelope, to eliminate moisture intrusion, which can lead to mold and, over time, damage structural integrity.)

In homes with attached garages, completely seal the boundary between the home and garage. One study found that 75 percent of the benzene in the home is introduced from the garage. Connecting doors between the garage and living space should be gasketed and weather-stripped. Attached garages should have a 100 cfm exhaust fan continuously venting outdoors.

Heating equipment that burns any fuel that relies on an open flame inside the home should be vented outdoors. Seal the vent per manufacturer recommendations so that burning byproducts such as carbon monoxide can't vent back into the home.

Install a kitchen exhaust fan over the stove and oven to vent cooking odors, moisture and combustion byproducts.

## Now it's theirs

While quality building practices make a huge difference, the occupants of the home control the quality of their indoor air long after the builder is gone.

Remind your buyers to close the windows while mowing the lawn, wash and brush pets regularly outdoors, control insects and pests indoors, wipe or remove shoes worn outdoors upon entering the home, and regularly dust, damp mop and vacuum.

Now you can breathe easy, knowing you've done all you can to help your customers breathe easy, too.

*(Glen Salas writes about better building practices on behalf of the Partnership for Advancing Technology in Housing. PATH is administered by the U.S. Department of Housing and Urban Development. Learn more at www.pathnet.org.)* **VAB**