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Top 10 Air Leaks in Existing Homes – Part 1

"Do you know how much you are spending due to Air Leaks in your Home?"

The caulk and spray foam are ready — where are the leaks?

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Chimney chases are a top area of air leakage in many existing homes. This chimney, going through an insulated roof, has drywall and insulation close to, but not touching it. The large gap allow plenty of room for hot air to come off the roof and into the room in the summer, and for heated air to get pulled out of the house and sent into the rafters in the winter.

Whenever we're working on the outside of a home—the roofing, siding, or site—my uncle Chris will remind me to think like a drop of water. Mentally tracing how a raindrop is likely to travel down a building and including details to move it off and away, is a simple exercise that is too often ignored. Today, though, we're going to talk not about water but about air. I have a new exercise to propose to Chris: think like a wisp of air.

Air leaks through the building envelope—the walls, foundation, and roofs—can have a significant effect on durability, even when compared with water leaks. Not only can air leaks carry moisture into framing cavities, leading to condensation that causes mold and rot, but it is typically responsible for a large portion of a home's energy use and indoor air quality problems.

Where are the leaks?

When building a new home or addition, paying close attention to a tight and continuous [air barrier](#) should be a top priority. There are well-established (and often-neglected) best practices for "building tight," but finding leaks in existing buildings is a different problem. Your caulk and spray foam can be ready to go—where to look for leaks?

You have to think like the air, and air molecules are like mice: it is unbelievable what they can fit through. Here, in no particular order, are my ten most likely suspects for air leaks on existing homes. One key concept is that air leakage pathways are often interconnected—and so are some of these ten.

Here is the list:

1) The chimney chase. From the basement all the way up through the roof, the chimney chase is a perfect venue for the "stack effect," in which warm, buoyant air floats up and out of the house, with cold outside air being pulled in at the bottom to replace it.

An unfilled gap between a brick chimney and the wood framing is common in old houses, creating a jet engine of air leakage. Seal it wherever you can access it—in the basement and attic, at least—using fire-safe materials. Many old homes have unused chimneys. Check that the cleanout door and any other chimney openings are properly sealed.

2) Light fixtures and plumbing. Plumbing is often routed in "chases" running from the basement up through the first and second stories. Although not usually running through the attic like the chimney does, this again represents a great opportunity for [stack effect](#) air leakage, which air will never fail to capitalize on.

When the air movement reaches the second story and is looking for a path through to the attic and beyond, it turns to light fixtures, wiring penetrations, smoke detectors, and bath fans, all of which are often cut through the attic floor. It may look like that globe light is firmly attached to the ceiling, but air can easily find some cracks through. To make matters worse, these holes are often buried under attic insulation, making them harder to fix. Applying spray foam from the attic side, and only then piling on insulation, is the best solution.

3) Interior wall cavities. That's right: interior walls may be among your home's worst culprits for air leakage. An [energy audit](#) including a blower door test, can prove the point, but if you're still putting that off, find a place in your home where there is some cracked or missing plaster or an old wall register that's not hooked up anymore. On a cold, windy day, put the back of your hand or a lit match up against the crack and feel the cold breeze.

Because of how houses are framed, particularly balloon-frame houses (built up until the mid-1950s), interior walls communicate with the floor structure, which communicates with the exterior wall, often at a location with no insulation or air seal. Plaster repair, spray foam, or caulk can be appropriate fixes depending on the setting.

4) Windows and doors. Remember, we ask a lot from windows and doors. We put these holes in the building to let in light and air—but then we put up blinds to keep the light out and we get upset when the windows are drafty in the winter.

New, good quality windows should not be leaky, but most existing homes don't have new, good quality windows. Older windows can be reconditioned, and doing so is usually cost-effective. Through an energy audit I found significant leaks at the bottom of my double-hung windows, and at the point in the middle where the sashes meet. I installed new weather-stripping, which cut off the leakage almost completely.

We hope that the door started out airtight, but with all the opening and closing, putting stress in the middle of the door, they easily get warped out of shape a bit, pulling away from the weather-stripping—and the weather-stripping gets old. New weather-stripping can often fix the problem, but if the door is really bent out of shape, it may not be enough.

5) Basement masonry and sills. The above-grade portion of basement walls, and the junction between the foundation and the wooden sill are typically big air leakage holes. (As a rule, any junction between systems or materials is a weak point.) A foam "sill seal" is typically used here in new construction, but in existing homes the wooden framing is commonly sitting on a brick or block foundation, and the slight crack between the two, multiplied by the building perimeter, is enough to leak a lot of air.

Add to that the masonry itself: cracks in the stone, brick, or block will leak. Also, concrete blocks may look solid, but all those little pores can let a lot of wind through. Use of either spray-applied foam, rigid foam, or a combination, is a common way to defeat these problems.

I'll cover the second half of my top ten leakage points in my next post. In the meantime, post your favorite air leakage points below.