# Fresh-Air & Ventilation for High Performance Homes

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A high performance home is inherently tight. If we expect a house to be energy efficient, it MUST be tightly constructed. A tight building envelope is what keeps the conditioned air inside the envelope and keeps the pollutants out of the living space. The idealistic goal (in regards to efficiency) is to have a home that is 100% air tight, preventing random air movement throughout the house (drafts) while also leading to lower utility bills.

Houses are built much tighter today than they were 30 years ago. Today, a home is sheathed with 4x8 sheets of OSB or plywood instead of diagonal 1x6's. This transition alone has reduced the natural airflow through a house tremendously. This is a good thing for efficiency, but not-so-good for air quality. The average new home (from our experience) changes its entire volume of air (naturally) once every 1 _ - 2 hours. This seems like a large amount of air that enters and exits the house every day, doesn't it? This average house is very inefficient due to this leakage. How many times do we want to pay to heat/cool our air every day?

The question that must be asked is: From where does this "leakage air" originate? Can you tell where it comes from? Would it be okay if this "natural ventilation" originated from the crawlspace…from the attic…from the attached garage? My point here is that if you leave holes in your homes, it creates airflow that you might not desire. For this reason, it is important to build a tight house and NOT to rely on natural ventilation to provide your client with a healthy living environment.

For reasons stated above, we've decided to build tight. But, we fill this tight box with all sorts of materials and finishes that off-gas Volatile Organic Compounds (VOC's) for extended periods of time. Homeowners are not opening their windows as much as they used to for security reasons. So, we frequently end up with the same stale air in our homes. Breathing this air over and over and over again does not make for a healthy living environment.

Mechanical introduction of fresh air into the home has many advantages over "natural" ventilation. We can control the location, quantity, quality, and frequency of mechanically introduced fresh air. Not to mention, we can also filter it and/or pre-condition it before it reaches the living space. There are a few simple ways to accomplish this.

The low-cost method of fresh air introduction requires a 6" duct that runs from outside to the return plenum of the air distribution system. This duct should pull in air from a *clean source*. Typically, this location should be high off the ground, away from other exhaust vents, and definitely NOT on the roof. A damper is placed in the duct at the return plenum, so the volume can be set accurately. When the air handler turns on, air is pulled in from the outside and distributed by the existing duct system. When combined with a device called an "Air Cycler," the operation of the fan can be set on a timer that controls

the introduction of this fresh air, regardless of whether the thermostat calls for heating or cooling.

The high-end version of fresh air introduction requires an additional piece of machinery. An Energy Recovery Ventilation (ERV) machine or a Heat Recovery Ventilation (HRV) machine is used to pre-condition (and in some models, filter) the incoming air, transferring heat and/or moisture from the outgoing to the incoming (or vice-versa). The HRV transfers heat only, while the ERV transfers moisture also. There are many brands of these machines, so do your homework before deciding on a manufacturer.

How much fresh air does the house need? That's a question that is hard to answer. It really depends on the occupants. Generally speaking, a home should have roughly 15 cubic feet per minute (cfm) of fresh air introduced for every person in the home. Since you can't predict how many people will live in the home, the current standard is to supply 15cfm for each bedroom and 30cfm for the master.

Removing moisture in the kitchen and bathrooms also requires special attention. Since moisture leads to comfort issues and health issues alike, it is good practice to install high-volume, low-sone bath fans that are on delay-timers in every bathroom. Kitchen exhaust fans should, first of all, truly exhaust to the exterior…not simply blow the air back into your face. Secondly, they should remove between 100-200cfm of air. Beware of the larger commercial units! *These should only be installed if you have provided for adequate means of "make-up" air*. Otherwise, the homeowner could easily depressurize the living space, which may cause back drafting or increase infiltration from a source that is not desirable.