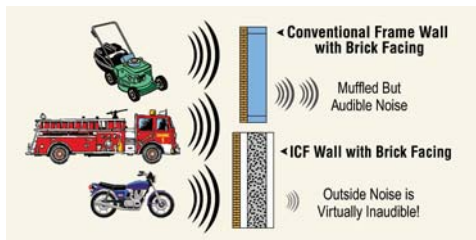


Improve Indoor Air Quality with ICF

Build Tight - Ventilate Right

Most homeowners like their houses to be affordable, comfortable, healthy and durable. To accomplish that, random natural infiltration should be minimized and controlled mechanical ventilation should be employed. Building with ICF (Insulated Concrete Forms) offers the opportunity to build a very air-tight building. The seamless concrete shell, combined with attention to construction detail at the windows and roof connection can reduce air exchanges per hour (ACH) down to less than .15. This means that unintentional air infiltration is reduced, existing air can be kept clean and additional air can be introduced in a controlled fashion.



Sources of Pollution

Within the building envelope, there are several sources of air pollution -

- ♦ Building materials (formaldehyde and other) - VOC's, water vapor
- ♦ combustion equipment, such as hot water heaters
- ♦ occupant, human respiration (primarily CO₂), body odor, water vapor
- ♦ activities, cooking, cleaning, hobbies (like painting), water vapor, odors
- ♦ furnishings (odor and CO₂)
- ♦ mold and other biologicals.

There are an equal number of pollutants outside the building structure:

- ♦ attached garages with car fumes, paint, pesticides
- ♦ radon and other soil gasses
- ♦ insecticides sprayed on lawns and trees
- ♦ pollution from factories, automobiles, etc.

Control Strategies

Control strategies fall into a three basic categories: remove the source, dilute with clean air and filter the existing air. One of the best methods of controlling areas such as the bathroom and kitchen is source control by way of a fan ventilated to the outdoors (not the attic). Other source con-

trol is to remove the pollutant - ie store paint in a ventilated garage, choose low VOC furnishings, cleaners, etc.

Outside air is not always fresh or clean. By building an airtight building, the unintentional leakage of this exterior air into the building is minimized, and air can be brought through a mechanized, filtered system. ICF further contributes to the quality of the existing indoor air it does not off-gas, nor is it susceptible to mold.

Garages

ICF is often used as the wall dividing the residence from the attached garage. This provides not only excellent fire protection, but also an air barrier. Care should be given to continue the air barrier into the attic space above the partition wall, to prevent fumes from being pulled into the house through the attic and via recessed light cans (and other gaps), when the house goes into negative pressure.

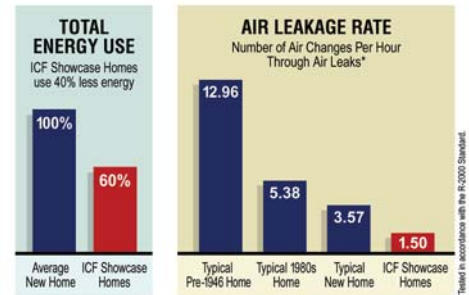
Positive Pressure and Air Balancing

It is generally recommended that the replacement air system be set up to compensate for the steady state CFM leakage of the house and just enough extra to put the house in a state of slight positive pressure. A good system will allow the system to adjust for the extra CFM outflow caused by activity-related use of fans, range hoods, and such.

For houses without central air system (ie radiant heat floor), care should be taken to provide air flow between rooms. This can be done with air gaps under the doors, "jumpering" two rooms with some flex duct run in the attic, or a length of duct pulling in air from one room (low) and feeding it into an adjacent room (high).

Sealed Combustion Appliances

The consequences of a negatively pressured building could be significant. Air will seek the easiest route, so a house in negative pressure can lead to the back drafting and spillage of gasses from combustion appliances such as fireplaces, wood stoves, combustion water heaters and furnace. The only way to protect from any possibility of this happening is to install only sealed combustion, power vented, induced draft or direct vented combustion appliances. Fireplaces should have a



direct vent supply of combustion air.

Sealed combustion appliances are particularly recommended for any air-tight building envelopes such as those created by ICF, and are required by the American Lung Association in their Health House^a Performance Standards.

Replacement Air Systems

Most replacement air systems involve bringing in outside air into the return side of the ductwork, so that it can be filtered and conditioned prior to being introduced into the living space. This can be as simple as a duct with a flow regulator tied in with a fan flow controller on the air handler; a balancing damper; or an energy recovery ventilator. Excellent information and recommendations for climate specific solutions is available at the Building Science Corporation website, under Technical Resources

Air Filtration Systems

Filtration systems can cleanse both the incoming "fresh" air and the existing indoor air. Central air HVAC systems designed with two phases can have one set to cycle on periodically and maintain the indoor air quality and humidity level. In the absence of central air, a number of whole house filters can effectively be sized for the space.

Remember: HVAC stands for Heat, VENTILATE, Air Condition! ⬆

Ventilation Questions Posed by Home Energy Magazine, Building Science Corporation

Did you Know that by putting a dry hand towel in with your wet laundry you can cut drying time .. and therefore costs... by more than 50%?