



Ventilation: A Different Issue in the World Of Energy Codes

In a recent conversation, I was expressing concern about the intent of the energy codes and the response by builders and remodelers to the concept of “makeup air.” In discussions with various folks about how we build today, I am left feeling much more education is necessary to properly implement the technology driving code development. The question of how to properly ventilate air tight buildings is being debated by experts and practitioners alike.

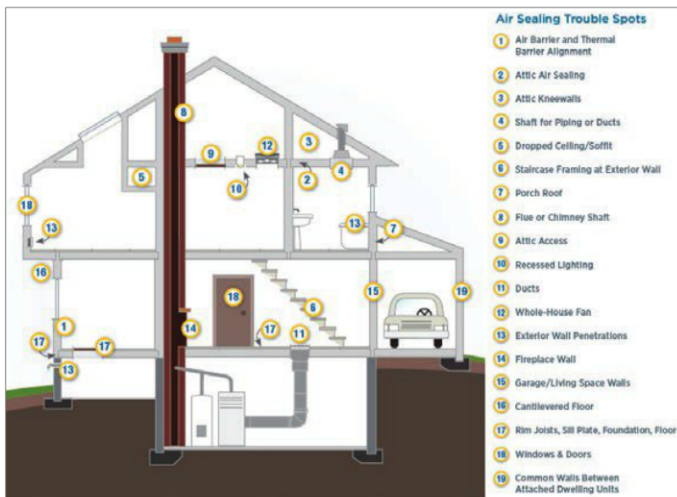
lights to be blown out, or for other undesirable consequences. Such potential changes the impact of makeup air as a concern about life safety as well as air infiltration. A balanced ventilation system is the optimal design.

I have explained in presentations to builders and homebuyers the importance of drawing air from a single known and controlled location rather than several unknown, uncontrolled and undesirable places. I encourage installation of heat exchange systems (ERV, HRV), but see facial expressions change when cost and operation are discussed.

Some builders insist on a heat exchanger and wire the control of the heat exchanger to thermostats, humidistats and other sources so occupants cannot turn off or unplug them. Other builders believe in wall dampers, open windows, and other methods that allow unconditioned outside air to replace conditioned exhausted air. My point is that builders and homebuyers alike have a broad range of perceptions about the subject.

Looking down the road, I envision all electric homes with renewable energy sources replacing today’s fuel-burning heating systems. However, many homes will rely on wood-burning equipment as the backup system. Therefore, balanced ventilation systems (combustion and makeup) will continue to be critical.

The efforts to move energy efficiency and green building to the forefront include the topic of makeup air (a major element in ICC700 National Green Building Standard, Ch. 8). I believe that



From “Air Leakage Guide”, Building Technologies Program, U.S. Dept. of Energy, Energy Efficiency & Renewable Energy, Sept. 2011

The energy codes have stabilized on the subject of heat transfer such that indoor conditioned air is maintained at a constant temperature with reduced demand for reheating. With the maturity of those code minimum insulation levels, the next point of attack became air infiltration. Research says up to 30% of home energy consumption used to heat indoor air is due to uncontrolled air entering the home through openings in the building envelope. In response, the 2015 codes will require blower door testing to validate the air tightness of each building. Air tight is defined as allowing no more than 5 air changes per hour when depressurized to 50 Pascals of pressure (ACH50). The 2015 codes call for 3 ACH50 in predominately heating climates (Climate Zones 4 through 8).

This requirement for air-tight construction also means there must be an exhaust system in place to rid the indoor environment of excessive moisture and common household pollutants. Kitchen and bathroom fans on standard switches may be sufficient to exhaust indoor air at required flow (see the 2012 IRC, Section M1507.3), but what is the consequence of that depressurization? If outside combustion air provided to fuel-burning appliances and heating equipment is the “least resistant” source of makeup air, there is potential for carbon monoxide to be drawn through the living space, for pilot

RESULTS METRICS		OPTIMUM PERFORMANCE	POOR PERFORMANCE
Cubic feet per minute	CFM@50Pa	< 450 CFM@50Pa	> 2,000 CFM@50Pa
	CFM/ft ²	< 0.15 CFM/ft ²	> 0.6 CFM/ft ²
Air changes per hour	ACH@50Pa	< 2.0 ACH@50Pa	> 7.0 ACH@50Pa
Equivalent leakage area	ELA@10Pa	< 80 in ²	> 300 in ²
Normalized leakage area	NLA	< 1.5 in ² per 100 ft ²	> 6.0 in ² per 100 ft ²

From “Putting Tightness to the Test”, Gord Cooke, May/June 2010, Ecohomemagazine.com

as building professionals, it is our responsibility to educate others about this subject, but the homebuyer is the trump card. In a tight budget, the installation/operation cost of an HRV/ERV is seen as an item that can be deleted. My hope is that we can change that perception. ■



This article was written jointly by Rob Pickett, Rob Pickett & Associates, LLC and contributors from the Building Systems Councils of NAHB for Build Green NH Council. For Build Green NH or the NGBR, please visit buildgreennh.com. Use the Contact Us link to ask how you can build above code!