



## HVAC CONSIDERATIONS FOR ENERGYCOMPLETE™ SYSTEM HOMES

# TECHNICAL BULLETIN HVAC Considerations

### Introduction

The EnergyComplete™ System is a whole-house system that reduces the energy losses through residential walls and ceilings. Owens Corning is recognized for its trusted and proven insulation. The EnergyComplete™ System compliments the insulation with breakthrough air-sealing technology. The air sealant – EnergyComplete™ Air Infiltration Barrier with Flexible Seal Technology – is a safe, low-expanding foam material that penetrates to fill seams, gaps and holes in the building envelope, which significantly reduces air infiltration and the problems associated with it.

While incorporating the EnergyComplete™ System into the design of new homes will significantly reduce the energy transport through walls and ceilings, the design, installation, and operation of heating, ventilation, and air conditioning systems (HVAC) remains an important consideration for minimizing energy consumption in residences.

### Right-Sizing Equipment

The EnergyComplete™ System reduces the heating and cooling loads on homes. This translates to lower operating costs for heating and cooling. It also presents the opportunity to downsize to smaller HVAC equipment. “Right-sized” equipment will operate more efficiently and improve thermal comfort. Temperature swings will be minimized and, in the summer, humidity levels will generally be reduced due to longer equipment run-times.

As an example, studies have shown that the EnergyComplete™ System can reduce peak cooling loads by up to 20%, which, for typical size homes, would translate to roughly ½ to 1 ton smaller air conditioners. With installed costs of cooling equipment ranging up to \$500 per ton, the savings in first costs can be significant. Similar capacity reductions in heating systems may be possible.

It is important to point out that these savings will not be realized if traditional “rules of thumb” are used for equipment sizing. HVAC designers should utilize Manual J<sup>1</sup> or other accepted calculation procedures to estimate design heating and cooling loads.

### Mechanical Ventilation

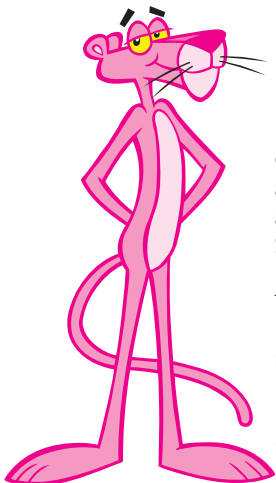
It is essential that EnergyComplete™ System houses utilize mechanical ventilation to ensure adequate ventilation rates<sup>2</sup>. Traditionally, ventilation in residences has been by operable windows and occupant controlled exhaust fans in combination with natural infiltration through openings, joints and cracks in the building envelope. As houses are built tighter, concerns over the ability of these methods to provide adequate ventilation on a consistent basis have led to increased utilization of mechanical ventilation in residential construction. For more information, see the Owens Corning Technical Bulletin “Ventilation of EnergyComplete™ System Homes”.

### Equipment Efficiencies

HVAC designers should consider specifying high efficiency HVAC equipment. Current minimum energy performance standards for residential appliances are regulated by the Federal Government and administered by the Department of Energy (DOE). These standards represent minimum requirements and HVAC designers should consider exceeding these minimum requirements by utilizing ENERGY STAR<sup>®3</sup> rated appliances.

The DOE standard for new residential air-conditioning systems requires Seasonal Energy Efficiency Ratings (SEER) of 13 or greater. Higher efficiency units are available and should be considered for energy efficient homes, especially in cooling dominated climates. ENERGY STAR<sup>®</sup> units have a minimum SEER of 14.

For heat pumps, the DOE standard requires that Heating Seasonal Performance Factors (HSPF) for new heat pump systems be greater than 7.7. ENERGY STAR<sup>®</sup> units have a minimum HSPF of 8.0.





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Fossil-fuel fired furnace performance minimums are characterized by the Annual Fuel Utilization Efficiency (AFUE). The current DOE minimum AFUE for furnaces is 78%. ENERGY STAR® gas furnaces have a minimum AFUE of 90% while oil-fired ENERGY STAR® furnaces have a minimum AFUE of 85%. Higher efficiency units should be considered in heating dominated climates

**Equipment Location and Duct Systems**

Air handlers should be centrally located if possible to minimize the length of duct runs. An efficient building envelope and efficient HVAC equipment allow for a compact air distribution system. Each room should be equipped with return air ducting to minimize system imbalance. As a minimum, consider using jump ducts and transfer grills to maintain balanced pressures in rooms that are isolated from the rest of the house.

Avoid placing ductwork in exterior walls. All ducts, air handlers, filter boxes and building cavities used as return ducts must be sealed. Joints of duct systems should be made substantially airtight by means of tapes, mastics, gasketing or other closure systems. Ducts that are located in unconditioned spaces must be properly insulated and sealed. Most building codes require R-6 to R-8 for ductwork located outdoors and R-3.5 to R-6 for ductwork in unconditioned spaces.

**HVAC Inspections and Commissioning**

HVAC inspections and commissioning activities should take place throughout the construction phase of the project to ensure that:

- All HVAC equipment, systems and assemblies are provided and installed as specified
- All equipment and systems are started and function properly
- Acceptance testing occurs
- Occupants receive specified training and orientation

It is recommended that duct pressure testing be conducted using the services of a certified energy rater<sup>4</sup>. The rater can also conduct whole-house pressure tests and assist with training. Other commissioning activities should include duct flow testing and system balancing.

**Summary**

The EnergyComplete™ System provides a state-of-the-art envelope system. While the EnergyComplete™ System significantly reduces the energy transport through walls and ceilings, the design, installation, and operation of the home's HVAC equipment remains an important consideration for minimizing energy consumption and improving occupant comfort. Right-sizing high-efficiency equipment, providing the right amount of ventilation air, locating and installing air handlers and ductwork properly, and carefully inspecting and commissioning the HVAC system all play a role. Talk to your HVAC contractor about how to take maximum advantage of EnergyComplete™ System in your energy efficient homes.

<sup>1</sup> Available from the Air Conditioning Contractors of America  
<sup>2</sup> Ventilation of Energy Complete™ Homes, Owens Corning Technical Bulletin Pub. No.10011116, June, 2009  
<sup>3</sup> ENERGY STAR® Appliances meet the energy efficiency guidelines set by the US EPA and DOE.  
<sup>4</sup> See for example Home Energy Rating System, www.natresnet.org

