

## Choosing an Efficient Heating, Ventilation and Air Conditioning System

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Everyone is looking for ways to save money. However, we seldom think about how saving energy can help us save money. One big way to save money in our homes is by having an efficient Heating, Ventilation and Air Conditioning (HVAC) system.

The biggest user of energy in homes in Florida is the cooling system. Roughly 30% of the typical energy bill in Florida is devoted to keeping us and our homes cool. Therefore, paying attention to our HVAC system is vitally important. In addition, HVAC systems should be partnered with efficient and properly sealed air distribution systems. Practices to keep warm air out of the home to begin with and proper use and maintenance are also necessary. So, where do we begin?

A key to effective and efficient air conditioning operation is proper sizing. Air conditioning systems serve two purposes - cooling and dehumidification. Proper sizing of the unit allows for adequate cycles that help reduce the temperature and remove humidity. Air conditioners that are oversized cause short-cycling in the system. When this occurs, the air is cooled and the unit is shut off before enough humidity is removed. This can cause a house to feel clammy and can waste energy. If you are building a home or are considering replacing your HVAC unit, make sure that the contractor uses ACCA Manual J or another approved manual or computer program designed to calculate a load analysis for proper sizing of your unit.

In addition to proper sizing of the unit, choosing the correct location of the air handler is necessary for effective and efficient operation. Ideally, air handlers should be located inside the home in conditioned space. The purpose of the air handler is to cool the air that is then distributed throughout the home. When the air handler is located in an unconditioned space, such as the garage, the unit must work harder to cool the air, therefore increasing operating costs. In addition, fumes, dirt and other air pollutants can enter the system when the air handler is located in areas such as the garage, which can contribute to poor indoor air quality. Moving the air handler indoors eliminates these issues. Air handlers located indoors also allow for easier access for maintenance (your AC man will thank you) and minimize duct lengths, which allows for optimal air flow.

A properly sized and located HVAC system is only part of the equation to an effective and efficient unit. It must be partnered with an efficient and properly sealed duct system in order to be whole. Old or improperly designed duct systems waste 30-40% of the cold air produced by the air conditioning system. A properly designed duct system must be sealed with mastic to ensure a tight seal. Though duct tape has many uses, sealing a duct system is not one of them. In addition, the best location for a duct system is in conditioned space. When a disconnect occurs in a duct system that is located in an unconditioned space (your attic for example), hot, humid and dirty air is pulled into the system. This can cost you money and can, once again, lead to poor indoor air quality. Duct material selection, sizing and layout also affect the efficiency of the system.

When shopping for a HVAC system, two important numbers to look at are the SEER and the SHR. SEER stands for Seasonal Energy Efficiency Ratio and indicates the unit's efficiency in removing heat per kilowatt of power used. National standards now mandate a minimum SEER 13 for all units manufactured after January 2006. The higher the SEER, the more efficient the unit. SHR stands for Sensible Heat Ratio and indicates the portion of the cooling load that reduces indoor temperatures. The remaining portion goes towards removing moisture. Units should have a SHR of approximately .7. This means that 70% of the energy used by the unit goes toward cooling and 30% goes towards removing moisture.

Two other items warrant consideration when discussing HVAC systems - high performance windows and a tight building envelope. Poorly chosen windows can increase the cost of keeping a house cool and are a major liability in home construction. To help reduce cooling costs, select windows that are well-built, reduce solar heat gain and have good weather stripping. When comparing windows, it's important to compare apples to apples. The National Fenestration Rating Council (NFRC) offers a voluntary testing and certification program for thermal performance of windows and residential door products with glass. This allows a consumer to compare window against window based on certain energy performance criteria for the whole window, not just individual components, such as the glass. The criteria that are tested are the Solar Heat Gain Coefficient (SHGC), U-Factor, Visible Light Transmission, and Air Leakage. In Florida, SHGC is critical, as it measures how well a product blocks heat caused by sunlight. Select a product with a SHGC of .40 or less. U-Factor measures the amount of heat that escapes through the product. In Florida, you'll want to select a window with a U-Factor at least as low as .65 (the lower the rating the better). Visible Transmittance (VT) measure how much light comes through a product. The higher the VT, the lighter is transmitted. Air Leakage (AL) is indicated by an air leak rating which is expressed as the equivalent cubic feet of air passing through a square foot of window area. The lower the AL, the less air will pass through cracks in the window assembly. When shopping for windows, be sure to look for the NFRC label. If you cannot afford new windows, be sure to take steps to reduce heat gain through the ones you have. This can be done through the use of window tints and films, overhangs, external shades and shutters, internal shades and shutters, and landscaping and trees. And, of course, proper maintenance, including caulking and weather-stripping, is always necessary.

A tightly constructed home is also important in insuring the efficiency of your HVAC system. Air leaks through breaks in the building envelope contribute to over 30% of the cooling and heating costs and can create moisture and comfort problems, poor indoor air quality and serve as easy entry for rodents and insects. To help control air leaks, be sure to caulk and seal any holes in the building envelope. Common areas include windows, doors, walls, behind sophist for cabinets, bath fixtures, dropped ceilings, and recessed lighting fixtures and attic access openings. If you believe that you have a "leaky" home, you can have a blower door test done which measures air changes per hour. The leakier the house, the higher the number of air changes per hour. This increases heating and cooling costs plus increases the chances for moisture, comfort and health problems.

Finally, no matter what type of system you have, proper use and regular maintenance of your HVAC system is critical. Cooling temperatures should be kept between 78 and 80 degrees F and should be turned up if you are going to be away from home for four hours or more. You may want to consider installing a programmable thermostat that turns the temperature up during periods when you are away and then back down 30 minutes to one hour before you get home. Heating temperatures should be kept between 65 and 68 degrees F. Maintaining your system includes changing the filter regularly and having the system serviced at least once a year. Most filters need to be changed monthly, though some can go up to 3 months. When choosing filters, pleated is better than flat, and the more pleats the better the filter is at trapping dust particles, as there is more surface area available to do so.

Whether you're building a new home, looking to replace an existing system, or just looking to increase the efficiency of your current system, having an understanding of how HVAC systems work can help you in making the best decision for your comfort and your pocket book.