

Choosing Heating & Cooling Equipment

■ Importance ■ Standards ■ Equipment Efficiencies

Many people want to know which brand of furnace, heat pump or air conditioner they should buy. While quality varies between brands, the more important considerations are choosing equipment that is properly sized and has a good efficiency rating. If either the sizing or the efficiency of your system is wrong, it matters little what name is on the case.

Sizing

Many times heating and cooling equipment is installed that is too big. Equipment that is too big costs more to buy, wastes energy, may wear prematurely, and can actually provide less comfort.

Standard guidelines for sizing equipment for today's homes often result in a mismatch. Insist that equipment be sized according to the Air Conditioning Contractors Association of America (ACCA) Manual J, or similar procedures. Do not accept simple rules-of-thumb methods for sizing equipment such as so many tons of air conditioning per square foot of living area.

A house's heating and cooling needs vary dramatically according to orientation, shade, window area, air leakage, and insulation levels. Sizing the equipment for your home using Manual J is important and is often provided as a free service by utilities or contractors. Request that the default values in Manual J (such as outdoor design temperatures) be followed consistently.

Proper sizing is particularly important for air conditioning in the Southeast. Units that are too large cycle on and off quickly and do not run long enough to wring moisture from the air. The result can be cool but clammy air and high moisture levels inside the home. Moisture levels affect indoor air quality. Mold and mildew start to grow at 70%RH. Dust mites thrive above 50%RH. Remember, comfort is a function of both temperature and humidity.

Efficiency

The efficiency of heating and cooling equipment measures how much energy is effectively converted by the equipment into heated or cooled air distributed throughout your home. The efficiency measures are much like the miles per gallon rating for your car's fuel economy.

If you reduce your home's need for heating or cooling, then investing in higher efficiency equipment may be less cost effective. Often, the highest efficiency equipment is not the best choice, as the payback may be fairly long (5 to 10 years). However, medium efficiency units offer attractive paybacks over the minimum efficiency units available. Most utilities or contractors can calculate the savings offered by higher efficiency products when they size the equipment.

Cooling Equipment

The efficiency of an air conditioner or heat pump to provide cooling is measured by the Seasonal Energy Efficiency Ratio or SEER rating. The minimum SEER rating allowed is 10; mid-efficiency units have 12-14 SEER ratings, and high-efficiency models over 15.

Dehumidification

Air conditioners and heat pumps cool air temperatures and wring humidity from the air. In our humid climate, it is important to have at least 25% of the total cooling be dedicated to moisture removal. The Sensible Heat Ratio should be around 75% and is usually not presented in standard product literature, so make sure your contractor consults with the technical specifications for the particular model you are buying to ensure it will provide good moisture removal.

Heat Pumps

The heating efficiency for an electric heat pump is measured by the Heating System Performance Factor (HSPF). This wintertime counterpart of the SEER rating varies from a minimum of 6.8 to 7.5 for mid-efficiency equipment to over 8.0 for high efficiency. Typically, as the SEER rating increases, so does the HSPF. For the longer heating season of colder climates, this number is more important than the SEER.

Furnaces

The efficiency of a furnace is measured by the Annual Fuel Utilization Efficiency (AFUE). The minimum efficiency allowed is 78%. Mid-efficiency units range between 80-82%, and high-efficiency units between 90-98%. Remember that gas furnaces use electricity to power blowers, vents and dampers. This electricity usage can be the primary difference between different brand furnaces with the same efficiency rating.

Proper Installation

Systems must be properly installed to optimize their performance. Three common problems are: improper charging of the system, reduced air flow within the system, and inadequate air flow to the outdoor unit. Any one of these problems can dramatically reduce the performance of your system.

Duct Sealing and Insulation

All ducts running through exterior spaces, such as attics and crawl spaces, should be thoroughly sealed and insulated. Improperly sealed ducts can penalize a system up to 30%. Ducts should be sealed with duct sealing mastic and not duct tape of any kind. Most energy codes require minimum duct insulation levels of R-6. Duct insulation can have a major impact on the comfort of your home by keeping the air in the ducts much closer to the temperature that the system is designed to supply.

Ventilation Fans

Removing moisture and other pollutants at the source is the best way to maintain good IAQ. Extremely quiet (<1.0 sones), energy efficient (<20 W), and highly durable fans are now available to remove moisture from bathroom showers; this is many times better than making the air conditioning work harder. Use kitchen fans which vent to the outside. Vent hoods which recirculate room air do little to improve its quality.