



E-Conservation

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What About the Air Conditioning System?

The size, efficiency and placement of an air conditioning system are all important. Equally critical is the air conditioning contractor selected. The operating efficiency of a system relies on proper installation to achieve its performance rating. Keys to obtaining the designed efficiency of a system in the field include: sizing the system for the specific cooling load of the home; selection and proper installation of thermostats or controls; a ductwork system designed to deliver the correct amount of conditioned air to each space within the building; and sealing and insulating all ductwork.

How is the AC Size Determined?

Heating, ventilation and air conditioning load calculations have been required for new homes in many municipalities for a number of years. These design loads are usually performed for each zone in a dwelling in accordance with *ACCA Manual J*, *ACCA Manual N* or the *ASHRAE Cooling and Heating Load Calculation Manual*. (ACCA stands for Air Conditioning Contractors Association.) Some firms have acceptable in-house procedures based on the same methodology.

The load calculations should be based on the exact area and type of construction for each component of the building envelope, as well as the heat given off by the lights, people, and equipment inside the building. If a zoned heating and cooling system is used, the loads in each zone should be calculated. An accurate load analysis will help to prevent problems that occur when a house is equipped with an oversized system.

How Do I Determine the Energy Efficiency of a Central AC System?

The cooling efficiency of a heat pump or an air conditioning system is rated by the Seasonal Energy Efficiency Ratio (SEER), a ratio of the average amount of electricity used. Federal regulation mandates a minimum SEER 13.0 for most residential air conditioners manufactured after January 23, 2006. Efficiencies of some units can be as high as SEER 17.0 or more. (Chances are that older homes have units with SEERs less than 10.) Note that it is important to understand that even though the SEER may be high, overall or *system* efficiency includes the air distribution system as well.

What About Removing Moisture?

The Sensible Heat Ratio or SHR describes the moisture removing capability of air conditioning systems. A SHR on HVAC equipment of 0.7 means that 70% of the air conditioning load is devoted to cooling and 30% to removing humidity. It is critical that the HVAC contractor accurately estimate the humidity, or latent load. It is important to note that many high SEER units have poorer humidity removal capacity, so verify system performance before purchasing and ask the HVAC contractor to provide written confirmation.

Why are Size, SEER and SHR Important?

This is where it gets a bit complex. The SEER, the SHR and the system tonnage must be in balance so difficulties don't occur with indoor air quality. Systems without an adequate SHR, or with inaccurate

tonnage, cool without removing moisture. An oversized air conditioner will cool your home too quickly to remove moisture very effectively.

This results in a home that is cool and “clammy.” If units are not providing sufficient dehumidification, the typical owner response is to lower the thermostat setting. Since every degree the thermostat is lowered increases cooling bills 3% to 5%, systems that have nominally high efficiencies, but inadequate dehumidification, may suffer from higher than expected cooling bills.

Where Should the Components be Located?

Central heating and air conditioning systems have a component called an air handling unit or AHU. The advantages of placing the AHU in conditioned space include: it is in a more benign environment; a central location can minimize duct lengths and optimize air flow; there is easier access for maintenance; and any leaks occur in conditioned space.

Another often-neglected area of installation concerns the placement of the outside unit (condenser). Manufacturer’s recommendations for proper clearance distances should be followed to ensure there is no blockage of airflow from the unit. Also, do not vent a clothes dryer within 10 feet of the outdoor unit as dryer lint will cling to the condensing coil, lowering both the system’s efficiency and service life.

What Should the HVAC Contractor Ask You?

The HVAC contractor should ask *you* the following questions to help them do a comfort analysis and system design for your family and home:

- Is there anything you would like to change about your present air conditioning and/or heating system?
- What do you like most about your present system?

- What benefits do you expect from your new system?
- Does your existing system heat and cool your home to your satisfaction?
- Are there any rooms that are too hot or too cold?
- What temperature do you set your thermostat on during the summer? Winter?
- Do you have a scheduled lifestyle that encourages adjusting the thermostat frequently, or while you’re not at home?
- Do you set the thermostat at different temperatures for the hours that you’re awake and the hours you’re asleep?
- What types of heating or cooling problems have you experienced?
- Have you had any problems with condensate drainage?
- What is your average summer electric bill?
- Who performs your regular energy-savings check-ups?
- How long do you plan on residing in this home?
- Do you plan to remodel and/or add on in the future?
- Have you made any changes to your home since the existing air conditioning and/or heating system was originally installed?
- How many people reside in your home?
- Does anyone residing in your home have allergies?
- Do you understand ratings like SEER and SHR?
- Do you understand how HVAC systems work or, more specifically, do you understand how the system I’m recommending placing in your home, works?

You should realize that many of the same questions listed above should be asked when determining what HVAC system should go in a new home as well. In addition...

- **Be sure your contractor is licensed, well trained, and experienced.** Ask to see a valid license, proof of coverage for workers' compensation, and certificate of insurance coverage for liability and property damage. Inquire about references and membership in contractor associations. Ask for proof that your contractor is certified to handle refrigerant in cooling systems. Make certain your licensed contractor pulls the proper permits when replace or adding a system.

- **Request a calculation of your savings.** Heating and cooling equipment comes with two price tags: the cost to buy the equipment and the cost to run it. Your contractor should be able to calculate your utility bill savings and total lifetime costs

- **Request a load calculation.** Ask your contractor to calculate equipment size using computer software or professional guidelines. This will require taking measurements in your house and asking questions. Don't use a contractor who wants to size your unit solely on the square footage of your house.

- **Inspect ducts.** Ask your contractor to inspect your ducts for leaks, incomplete connections and compatibility with the rest of your system. Evaluate your system's performance. Ideally, your contractor should use diagnostic equipment, and, if necessary, fix leaks using a quality duct sealant. In some cases, proper duct repairs may include actual duct modifications to ensure proper supply and return airflow.

- **Consider a house pressurization test.**

Test your house and appliances for "backdrafting," which occurs when the fumes from the combustion process are pulled back into the home, threatening the health and safety of occupants.

- **Replace both indoor and outdoor coils.**

If you're replacing an air conditioner or heat pump, be sure to replace both indoor and outdoor coils on a matched system for maximum efficiency and reliability.

- **Obtain a written contract.** Always obtain a written contract or proposal before allowing your contractor to install a new system. Be sure to ask about warranties for labor and parts.

- **Weigh the costs.** Remember that the lowest price may not always be the best price. Carefully evaluate a contractor's proposal to ensure you get the equipment and service that best meets your needs. Paying slightly more now may get you better equipment, service and save you money in the years to come due to lower costs of ownership.

- **Install for easy maintenance.** Make sure the inside coil can be reached for its annual cleaning. The air filter(s) should also be easily removed, cleaned or changed when dirty. Check it monthly during peak season.

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