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Air Conditioning

Short communication
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Author Details
*Joseph Laquatra PhD**
Cornell University, USA

*Corresponding author
Cornell University, USA

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Short Communication

A central air conditioner is either a split-system unit or a packaged unit. In a split-system central air conditioner, an outdoor metal cabinet contains the condenser and compressor, and an indoor cabinet contains the evaporator. In many split-system air conditioners, this indoor cabinet also contains a furnace or the indoor part of a heat pump. The air conditioner's evaporator coil is installed in the cabinet or main supply duct of this furnace or heat pump. If a home already has a furnace but no air conditioner, a split-system is the most economical central air conditioner to install.

In a packaged central air conditioner, the evaporator, condenser, and compressor are all located in one cabinet, which usually is placed on a roof or on a concrete slab next to the house's foundation. This type of air conditioner also is used in small commercial buildings. Air supply and return ducts come from indoors through the home's exterior wall or roof to connect with the packaged air conditioner, which is usually located outdoors. Packaged air conditioners often include electric heating coils or a natural gas furnace. This combination of air conditioner and central heater eliminates the need for a separate furnace indoors.

Proper sizing and installation are key elements in determining air conditioner efficiency. Too large a unit will not adequately remove humidity. Too small a unit will not be able to attain a comfortable temperature on the hottest days. Improper unit location, lack of insulation, and improper duct installation can greatly diminish efficiency.

Central air conditioners are rated according to their seasonal energy efficiency ratio (SEER). SEER indicates the relative amount of energy needed to provide a specific cooling output. Many older systems have SEER ratings of 6 or less. Federal standards require air conditioners to have a SEER of 13 or higher. SEER 13 is 30% more efficient than the previous minimum SEER of 10. The standard applies only to appliances manufactured after January 23, 2006. Equipment with a rating less than SEER 13 manufactured before this date may still be sold and installed.

Other features to look for when buying an air conditioner include

a. A thermal expansion valve and a high-temperature rating (EER) greater than 11.6, for high-efficiency operation when the weather is at its hottest

b. A variable speed air handler for new ventilation systems

c. A unit that operates quietly

d. A fan-only switch, which can be used for nighttime ventilation to substantially reduce air-conditioning costs

e. A filter check light to remind a homeowner to check the filter after a predetermined number of operating hours

f. An automatic-delay fan switch to turn off the fan a few minutes after the compressor turns off.

g. Installation and Location of Air Conditioners

When installing a new central air conditioning system, a contractor should

A. Allow adequate indoor space for the installation, maintenance, and repair of the new system, and install an access door in the furnace or duct to provide a way to clean the evaporator coil

B. Uses a duct-sizing methodology such as the Air Conditioning Contractors of America (ACCA) *Manual D*

C. Ensure there are enough supply registers to deliver cool air and enough return air registers to carry warm house air back to the air conditioner

D. Install duct work within the conditioned space, not in the attic, wherever possible

E. Seal all ducts with duct mastic and heavily insulate attic ducts

F. Locate the condensing unit where its noise will not keep you or your neighbors awake at night, if possible

G. Locate the condensing unit where no nearby objects will block airflow to it

H. Verify that the newly installed air conditioner has the exact refrigerant charge and airflow rate specified by the manufacturer

I. Locate the thermostat away from heat sources, such as windows or supply registers.

This paper is adapted from the U.S. Department of Energy, 2012. Central air conditioning. Available at: http://energy.gov/energysaver/articles/central-air-conditioning