



# ***Maintaining the Home***

## ***Air Conditioners***

# ***Maintaining the Home:***

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Air conditioners cool the air in a home fairly quickly. For economical operation, turn your unit on only when your home is occupied. Consider installing a programmable thermostat. This will allow you to set the time when the air conditioner will turn on, such as 30 minutes before you arrive home from work on a hot day. During the day, keep the drapes or blinds closed on windows that face east, south and west. This will help reduce solar heat gain into your home.

### **How air conditioners work**

Air conditioners use the same operating principles and basic components as a home refrigerator. An air conditioner cools your home with a cold indoor coil called the evaporator. The condenser, a hot outdoor coil, releases the collected heat outside. The evaporator and condenser coils are serpentine tubing surrounded by aluminum fins. This tubing is usually made of copper. A pump, called the compressor, moves a heat transfer fluid (or refrigerant) between the evaporator and the condenser. The pump forces the refrigerant through the circuit of tubing and fins in the coils. The liquid refrigerant evaporates in the indoor evaporator coil, pulling heat out of indoor air and thereby cooling the home. The hot refrigerant gas is pumped outdoors into the condenser where it reverts back to a liquid giving up its heat to the air flowing over the condenser's metal tubing and fins.

### **Types of air conditioners**

The basic types of air conditioners are room air conditioners, split-system central air conditioners and packaged central air conditioners.

#### **Room air conditioners**

Room air conditioners cool rooms rather than the entire home. If they provide cooling only where they are needed, room air conditioners are less expensive to operate than central units, even though their efficiency is generally lower than that of central air conditioners.

Smaller room air conditioners (those drawing less than 7.5 amps of electricity) can be plugged into any 15 or 20-amp, 115-volt household circuit that is not shared with any other major appliances. Larger room air conditioners (those drawing more than 7.5 amps) need their own 115-volt circuit. The largest models require a 230-volt circuit.

#### **Central air conditioners**

Central air conditioners circulate cool air through a system of supply and return ducts. Supply ducts and registers (openings in the walls, floors or ceilings covered by grills) carry cooled air from the air conditioner to the home. This cooled air becomes warmer as it circulates through the home; then it flows back to the central air conditioner through return ducts and registers. 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 your 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 home'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 to 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.

### **Maintaining existing air conditioners**

Older air conditioners may offer years of relatively efficient use. However, making an older air conditioner last requires proper operation and maintenance.

#### **Air-conditioning problems**

One of the most common air conditioning problems is improper operation. If your air conditioner is on, be sure to close your home's windows and outside doors.

Other common problems with existing air conditioners result from faulty installation, poor service procedures and inadequate maintenance. Improper installation of your air conditioner can result in leaky ducts and low air flow. Many times, the refrigerant charge (the amount of refrigerant in the system) does not match

the manufacturer's specifications. If a correct refrigerant charging is not performed during installation, the performance and efficiency of the unit is impaired. Service technicians often fail to find refrigerant charging problems or even worsen existing problems by adding refrigerant to a system that is already full. Air conditioner manufacturers generally make rugged, high quality products. If your air conditioner fails, it is usually for one of the common reasons listed below:

- Refrigerant leaks. If your air conditioner is low on refrigerant, either it was undercharged at installation or it leaks. If it leaks, simply adding refrigerant is not a solution. A trained technician should fix any leak, test the repair and then charge the system with the correct amount of refrigerant. Remember that the performance and efficiency of your air conditioner is greatest when the refrigerant charge exactly matches the manufacturer's specification.
- Inadequate maintenance. If filters and coils are dirty, the air conditioner will not work properly, and the compressor or fans are likely to fail prematurely.
- Electric control failure. The compressor and fan controls can wear out, especially when the air conditioner turns on and off frequently, as is common when a system is oversized. Because corrosion of wire and terminals also is a problem in many systems, electrical connections and contacts should be checked during a professional service call.

### **Regular maintenance**

An air conditioner's filters, coils and fins require regular maintenance for the unit to function effectively and efficiently throughout its years of service. Neglecting necessary maintenance will mean a steady decline in performance and an increase in energy use.

## Filters

The most important maintenance task to ensure the efficiency of an air conditioner is to routinely replace or clean filters. Clogged, dirty filters block normal air flow and reduce a system's efficiency significantly. With normal air flow obstructed, air that bypasses the filter may carry dirt directly into the evaporator coil and impair the coil's heat-absorbing capacity. Filters are located somewhere along the return duct's length. Common filter locations are in walls, ceilings, furnaces, or in the air conditioner itself.

Some types of filters are reusable; others must be replaced. Filters are available in a variety of types and efficiencies. Clean or replace your air conditioning system's filter or filters every month or two during the cooling season. Filters may need more frequent attention if the air conditioner is in constant use, is subjected to dusty conditions or there are pets in the house.

## Coils

The air conditioner's evaporator coil and condenser coil collect dirt over months and years of service. A clean filter prevents the evaporator coil from soiling quickly. In time, however, the evaporator coil will still collect dirt. This dirt reduces air flow and insulates the coil which reduces its ability to absorb heat. Therefore, your evaporator coil should be checked every year and cleaned as necessary.

Outdoor condenser coils also can become very dirty if the outdoor environment is dusty or if there is foliage nearby. You can easily see the condenser coil and notice if dirt is collecting on its fins.

Minimize dirt and debris near the condenser unit. Dryer vents, falling leaves and lawn mowers are all potential sources of dirt and debris. Cleaning the area around the coil, removing any debris, and trimming foliage back at least 2 feet (0.6 meters) allow for adequate air flow around the condenser.

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## Coil fins

The aluminum fins on evaporator and condenser coils are easily bent and can block airflow through the coil. Air conditioning wholesalers sell a tool called a "fin comb" that will comb these fins back into nearly original condition.

## Sealing and insulating air ducts

An enormous waste of energy occurs when cooled air escapes from supply ducts or when hot attic air leaks into return ducts. Recent studies indicate that 10 percent to 30 percent of the conditioned air in an average central air conditioning system escapes from the ducts.

For central air conditioning to be efficient, ducts must be airtight. Hiring a competent service technician to detect and correct duct leaks is a good investment, since leaky ducts may be difficult to find without experience and test equipment. Ducts must be sealed.

Obstructions can impair the efficiency of a duct system almost as much as leaks. Be careful not to obstruct the flow of air from supply or return registers with furniture, drapes or tightly fitted interior doors. Dirty filters and clogged evaporator coils can also be major obstructions to air flow.

With proper and regular maintenance, air conditioners can provide many years of service.

This material was adapted from publications produced by the U.S. Department of Energy. DOE publications can be found on the Web at <http://www.eere.energy.gov/>.

*This resource is one in a series on **Maintaining the Home** which include:*

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