



Air Conditioning

Save money by using high efficiency AC units

There are several important factors that contribute to the efficiency of a cooling system. Since air conditioning costs typically account for 65% of total electric consumption, it is very important to make a wise decision when selecting equipment.

Larger Units (5 tons and more)

The performance of unitary air conditioning units is typically given as the Energy Efficiency Ratio (EER) which is defined as the net heat removal in Btus divided by energy input (Watt-Hours). This value is measured in a laboratory under design-day, or worst case conditions. Typical EER's range from 8.5 to 12.0. The recommended rating for higher efficiency air conditioning units in this category is 12.0.

Smaller Units (5 tons and less)

Manufacturers are required by law to give a separate rating, known as a Seasonal Energy Efficiency Ratio (SEER) to all single phase equipment less than 65,000Btuh. The SEER is also defined as Btus removed divided by energy input (Watt-Hours). Unlike the EER, the SEER takes into account the seasonal variations in weather. As of January 1, 1992, the minimum SEER rating allowed on units made in the U.S. is 10. Some units have SEER ratings as high as 16.9. The recommended high efficiency rating for units in this category is 12.0.

In addition to high EER/SEER ratings, there are many other energy saving features that increase the efficiency of an air conditioning system. A few are listed below:

- **Efficient controls** – programmable thermostats can control the cooling system even when the building is unoccupied. Overnights and weekends, for example, the air conditioning can be turned off or “set back”, and then automatically turned on a short time before the building is next occupied.
- **Efficient motors** – air handling devices have fans which should be equipped with energy efficient motors to reduce energy consumption.
- **Variable Air Volume** – this air handling system saves energy by providing only the amount of cool air needed in each zone at any given time.
- **Heat Recovery Option**– may be appropriate for a facility that has large demands for hot water during the same time the air conditioning system is operating. Rather than reject heat outside this option puts heat into hot water tank.
- **Condenser Fin Coating** – A factory coating is the best type of coating to protect the delicate aluminum fins on a condenser coil. An after market dip or spray coating is less effective at protecting the fins from the highly corrosive ambient air in Hawaii.

The total air-conditioning system has an important effect on overall cost and performance. Some of the other factors that affect total system performance include:

1. Thermal integrity (insulation levels) of conditioned space
2. Proper sizing and selection of equipment
3. Equipment maintenance, such as coil cleaning and filter replacement
4. Location and insulation level of ductwork
5. Air tightness of ducts
6. Amount of air flow around condenser

Maintenance

Proper maintenance of an air conditioning system is one of the least expensive methods of conserving energy and money. Implementing the measures listed below can significantly reduce the consumption of the cooling system.

Air Handling Equipment

- Clean fan blades and check for balanced operation
- Check belts for proper tension. When pressed down midway between pulleys, the belt should depress a distance equal to the width of the belt.
- Check ducts for leaks or cracks, especially at connection points.
- Insulate any duct work passing through unconditioned spaces.
- Have interior of ducts cleaned periodically
- Check registers for obstructions
- Check air filters regularly. Replace when dirty.
- Check damper blades for proper operation
- In chiller systems, insulate chilled water pipes
- Insulate refrigerant lines

Evaporators and Air Cooled Condensers

- Clean coils with mild detergent once per year
- Provide adequate air flow to condenser: Straighten fins or remove obstructions if necessary
- Insulate refrigerant lines

Cooling Towers

- Check for plugged spray nozzles in cooling tower
- Keep intake strainer free of obstructions
- Clean heat exchanger surfaces
- Periodically test water quality. Concentrations of solids should be kept as low as possible