

Demystifying HVAC

Maintaining PTAC Units by Ron Prager

Almost all hotels and motels built within the last ten years utilize packaged terminal air conditioners to heat and cool the individual guest accommodations. These overgrown window air conditioners fit well into the curtain wall systems often found in this type of facility. Each room is served by its own individual unit. This insures maximum reliability. Unlike chilled water systems where a single component failure can leave an entire building without cooling, every PTAC unit is its own self contained system. On an initial cost basis, these units cost less than half of what a conventional system would cost. They are available as cooling only, heatpump, and cooling with electric resistance heat models. Some of these units are available with sub bases that accommodate steam or hot water coils that allow the use of fossil fuel central heating plants in combination with individual PTAC units.

Like most things, PTACS have some disadvantages. They must have access to outdoor air and so they cannot be used below grade or in interior rooms. Well maintained PTACS have a lifespan of eight to ten years, which is about half the lifespan of a conventional system. PTAC units are also noisier than conventional systems as each unit contains a compressor.

Most of the required maintenance on PTAC units is cleaning in one form or another. The motors in most PTACS are permanently lubricated. Air filters must be washed or replaced on a monthly basis. Most of these units use a foam filter that can be vacuumed or washed in a janitor's sink. Within a couple of years they fall apart and must be replaced, so it is a good idea to keep lots of spare filters on hand.

These units pass room air over an indoor coil to heat and cool the air and they pass outdoor air over an outdoor coil to reject heat to and draw heat from the outdoor air. These coils consist of aluminum fins bonded to copper tubing. The cleanliness of these coils affects the operating efficiency of the equipment as well as the longevity of its components.

The most expensive component in a PTAC unit is the compressor. The compressor is a pump that is designed to pump a vapor. If the compressor is forced to pump a mixture of liquid and vapor, the stress on its internal components becomes tremendous and the compressor can be damaged. If the compressor is forced to operate at higher temperatures and pressures than those it was designed for, its life will be shortened significantly.

To make certain that the compressor only pumps a vapor, we must do the following.

1. Make certain that the air filter is kept clean, so that we maintain proper air flow over the indoor coil.
2. Remove the unit from the wall sleeve, disassemble the unit and pressure wash the indoor coil at least once every other year. Dirt on the indoor coil reduces the amount of air flow over the coil. This reduces the heat load on the coil, so the coil temperature drops. If the coil temperature drops below the freezing point,

the coil can frost over. The frost acts as an insulator and further reduces the heat load. The result is that the compressor sees pure liquid refrigerant rather than refrigerant vapor and will be damaged.

3. Make certain that the thermostat that controls the unit will not let the room temperature go below 70°F. If the room temperature goes below this value in the cooling mode, once again, there is not enough heat load on the indoor coil and the coil can frost over. The frost acts as an insulator and further reduces the heat load. The result, as above is that the compressor sees pure liquid refrigerant rather than refrigerant vapor and will be damaged.

To make certain that the compressor operates efficiently and is not overloaded, we must make certain that the outdoor coil is kept clean. It is prudent to remove the PTAC unit from its wall sleeve, disassemble the unit and pressure wash the outdoor coil at least every other year. Once each year is even better. If the outdoor coils collect dirt, the air flow through these coils will be reduced and the transfer of heat to and from the outdoor air will be reduced.

Whenever one pressure washes a PTAC unit, great care must be taken to protect the fan motors and electrical components from the water and detergent being used. This work is best left for a professional who knows what components must be protected and how to best protect them.

The greatest enemy of most mechanical devices is hours of run time. As we reduce the number of hours of usage each year, we extend the life of the mechanical device, thereby reducing the cost of ownership and maintenance. The most cost effective thing a manager can do to reduce wear and tear on his units is to make certain that the PTAC units in guest rooms do not operate when the rooms are not occupied. Most units are available with an energy management option. This allows some sort of occupancy sensor to be tied into the unit controls. This sensor can be as simple as a door switch or as complex as an infrared motion detector. When the room is unoccupied, the unit will allow room temperatures to reach 80°F in the cooling mode and 50°F in the heating mode. During occupied periods, the unit maintains the setpoint selected by the guest. Utilizing a system such as this can save huge amounts of utility expense as well as reduce the number of hours of unit operation.

While PTAC units are extremely reliable, there are times when a unit must be removed for service or maintenance. I normally recommend that a manager keep twelve spare units for each one hundred units in use. This allows for six spares on site and six being serviced at any one time. It is far easier and less expensive to work with a service contractor when you deliver six defective units and pick up six units that have been repaired. By maintaining a sufficient number of spare units, you are giving the contractor the time he needs to order parts and make the repairs properly. You are also ensuring that you will never lose a room rental due to a malfunctioning PTAC unit.

