



Ductless Mini-Splits

In certain spaces, this type of system can ease the demand on a facility manager's time and budget.

By John Vastyan

Single and multi-zone ductless “mini-splits” are typically installed when ductwork is not an ideal choice. Used in light commercial HVAC applications (typically less than 10 tons), these systems can be installed and operated for substantially less than traditional ducted HVAC systems, while offering easy maintenance in most cases.

So what is a mini-split? Like a refrigerator, heat pumps in a mini-split system use electricity to pump refrigerant and transfer heat from one space to another. Because refrigerant is naturally much colder than outdoor temperatures, it absorbs heat from the outside and transfers that heat via heat pumps to the indoors. The refrigerant's physical properties do this naturally, so the user pays for the electricity to pump refrigerant via copper tubing from outdoors to indoors. Because heat is moved, rather than created (as with electric baseboard or resistant heat), these systems offer energy consumption efficiencies. For cooling a facility, the process is reversed, with heat transferred from the inside to the outside.

High efficiency operation is a key advantage of ductless mini-splits. “This technology is well suited for many commercial facilities,” says Dave Yates, president of F.W. Behler, Inc., a full service mechanical contracting firm based in York, PA. “New systems are now reaching SEER [Seasonal Energy Efficiency Ratios] of up to 26.”

The multi-zone aspect of these mini-splits also contributes to efficiency; lesser used facility areas aren't cooled or heated unnecessarily. And at night, energy is saved by conditioning only the rooms used during those hours.

Installation of a ductless mini-split involves running copper tubing through a 3" or 4" opening in the wall or ceiling in order to connect the indoor and outdoor components. Once installed, routine maintenance for multi-zone ductless systems includes six key stages:

- It is important to keep the primary filters clean. Some indoor units (“evaporator units” or “air handlers”) will require only annual cleaning of the mesh filters. In warehouse spaces or laundry areas, it may be important to clean them monthly. Facility managers (fms) should consider the environment, the presence of airborne dust and debris, and hours of operation.
- The indoor air quality (IAQ) filtration components on most systems can be easily removed and cleaned. Some systems are programmed to alert an fm to clean the IAQ filter after 400 hours of operation. When present, it is also important to keep plasma IAQ filtration clean.
- It is very important to make sure evaporator coils are clean. Though indoor air handler coils are amply protected by various filtration levels, it is good to examine coil cleanliness annually. If evaporator units are mounted where pollutants and airborne debris are common, it may be necessary to clean coils every year or two; coils typically require cleaning every other year.

Most often, evaporator coil cleaning entails removal of the front cover and visual inspection of the coil. It may be necessary to vacuum the coil with a soft bristle brush attachment; this will remove most accumulated dust. Chemicals such as household bleach can be used but should be diluted with water so that fluid solutions will not damage nearby materials or electronic components. (The technician should turn off main power to the equipment.)



Indoor evaporator unit filters are typically easy to access, remove, and clean. Just behind the removed filter is an indoor air quality (IAQ) filter cartridge.

The next step is to see that the drain pan is free of moisture (if the drain line is sloped properly and kink free, the drain pan should be dry). Accumulated moisture in the drain pan can encourage mold growth and mildew. Here, too, a diluted bleach solution can be used. Finally, the technician should be sure all equipment is dry before reactivation.

- Are the fan wheel and blower assembly in balance? It is very uncommon for this to be a problem, but units can be challenged by heavy accumulations of airborne grime and debris, such as in kitchens of fast food restaurants.
- Is the condensing unit in top shape? Refrigerant lines should be checked for apparent bumps or dents. Are the insulation wraps in good condition, or have they deteriorated from exposure to UV radiation? Is the unit mounted solidly on its base? Has the base moved, or is it slipping for any reason?
- Finally, technicians need to check the operation and cleanliness of the outdoor condensing unit. If cleaning is required, electrical power to the entire system should be shut off. This can be done at a main panel or at the outdoor disconnect located near the condensing unit.

Those performing maintenance should also make sure the unit's horizontal discharge coil is free of debris. These systems rarely attract debris, but if grass clippings enter them due to mowing nearby, or if an abundance of wet leaves collects around the unit, these should be removed.

To clean condenser coil fins, a garden hose and soft nylon brush can be used. The two copper tubes that exit the system carry refrigerant to and from the indoor evaporators. These tubes should be wrapped separately with $\frac{3}{8}$ " pipe insulation. The technician can inspect insulation for signs of wear or damage. If signs of refrigerant or oil leakage are visible, that needs to be repaired.

Ductless mini-splits can provide ample space conditioning without requiring a major renovation. And to heat and cool multiple zones in their buildings, fms may find multi-zone, ductless mini-splits to be a suitable solution. **TFM**

Vastyan, a journalist whose work focuses on the plumbing and mechanical, HVAC, geothermal, solar, and radiant heat industries, owns Common Ground, a trade communications firm based in Manheim, PA. He can be reached at (717) 664-0535 or cground@ptd.net.

Do you use ductless mini splits for HVAC needs? Send an e-mail to avazquez@groupc.com.