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CHAPTER 21: ROCHESTER, NY

HIGH EFFICIENCY ROOFTOP HVAC

STATIC CONTROL FLOORING PROTOCOLS

Advances in High Efficiency ROOFTOP HVAC Units

Custom quality now available at mid-range prices

WILLIAM ATKINSON

HVAC manufacturers are constantly pushing the boundaries and breaking through barriers when it comes to improving the efficiency, quality and flexibility of their rooftop units, providing many new features that offer facilities engineers numerous options and other benefits.

One of the many manufacturers pushing the boundaries is AAON Heating and Cooling Products (Tulsa, OK). "AAON has always offered very innovative and sophisticated lines," said Lew Cohen, CEO of Aercon Corp. (Cheshire, CT), a manufacturers' rep firm serving the Northeast. "The company is headed by a visionary whose goal has always been to provide a custom quality product at a mid-range price. They are able to offer a product that cannot be beaten at the price."

One of the most impressive things about AAON's rooftop lines is that they have the ability to deliver precise temperature and humidity control, and high efficiency at the same time, according to Art Strenkert, sales engineer - national accounts, for Aercon.

"In fact, the units are so effective that, in many cases, when engineers think they need chilled water plants, which are very expensive, they can actually achieve the

same results with AAON rooftop units," said Cohen.

CABINET CONSTRUCTION

The units feature double-wall rigid polyurethane foam insulated cabinet construction. "A lot of times, a building will require an R-30 insulated roof, but the conventional rooftop units will have an R-2 insulation, usually a single piece of sheet metal with a half-inch piece of foil-faced fiberglass as insulation," said Eric Taylor, Marketing Manager for AAON. "The biggest difference between our rooftop units and other traditional rooftop units is the construction. We provide double wall with an R-13 thermal resistance."

All of AAON's rooftop units are built with two-inch thick double-walled construction with foam-injected insulation. "These are similar to refrigerator construction," said Taylor. There is also a thermal break in between the interior panel and the exterior panel. The units also contain additional gaskets and seals



Factory installed energy recovery wheels save heating and cooling energy.



Cutaway of an AAON panel showing thermal break and foam core.

to reduce air leakage and to reduce heat transfer through the gaskets.

"All of these features reduce the amount of energy that is lost through the cabinet—either heat transferring out of the cabinet or into the cabinet, depending on the season," said Taylor. As a result, the units reduce energy costs year round by preventing all of that lost energy.

COMPRESSOR FEATURES

All units are available with variable capacity compressors. "Our units also have modulating capabilities," said Taylor. Whether the unit is being used for heating, cooling, or just fan ventilation, everything is available with available with energy saving modulating capabilities.

"With compressors on conventional rooftop units, there will be a couple of stages of cooling capacity," said Taylor. There may be a single compressor that you can turn on or turn off, or it may have a couple of different stages, or there may be two compressors. "In any case, there

are not a lot of modulating capabilities, so you are either running full cooling, or the system is off," said Taylor. "The way you satisfy your load with a system like this is modulating how long the unit is on and how long it is off."

AAON features variable capacity digital scroll compressors on its units. "On a conventional scroll compressor, there are two scrolls, one fixed and one orbiting" said Taylor. "Variable capacity digital scroll compressors have the ability to separate the two scrolls for capacity control." When the two scrolls separate, there is no flow of refrigerant to the system, which results in energy savings. "Our units allow the compressor to modulate all the way from 10 to 100 percent," said Taylor. "This will vary, based on how much cooling capacity is needed on any given day." For example, if your system is designed for 100 degree conditions, but you only have that condition a few days out of the year, this unit allows a lot of energy savings on all of the other days in the cooling season.

FAN FEATURES

AAON units are available with variable speed, direct-drive, backward-curved plenum fans. "Conventional rooftop units have fans that turn on and turn off," said Taylor. "With variable speed fans, you can modulate the fans during the hours when you don't need as much cooling or heating and save energy."

In addition, a conventional rooftop unit uses forward-curved, belt-driven fans. "We use sturdier, direct-drive, backward-curved plenum fans," said Taylor. "The direct drive feature provides energy savings associated with not having a belt, so no belt energy loss or belt noise. Also, if you have 15 or 20 rooftop units on your building, belt maintenance cost savings can be huge over the life of the equipment."

COMPRESSOR AND FAN VARIABILITY BENEFITS

The combination of variable capacity compressors and variable speed fans allows for what AAON calls a single-zone VAV (variable air volume) system. "Instead of having to construct a complex variable air volume system, with a lot of dampers in the ducting that modulate,

open and close, a single zone VAV system doesn't require a complicated duct system," said Taylor. You simply modulate the fan based on the space temperature, and with the modulating compressor, you can modulate it based on the supply air temperature. Combining both of these provides cooling energy savings and fan energy savings. "If you add a modulating heating system, you can have that same kind of energy savings year-round," said Taylor.

ENERGY RECOVERY WHEELS

While not standard on all units, AAON can also provide factory-installed AAONNAIRE Energy Recovery Wheels as an energy recovery feature. "When you have a building that requires some air to be exhausted, instead of just exhausting it out of the building, you can exhaust it through the wheel located in the rooftop unit," said Taylor. This wheel recovers the heating or cooling from the exhaust air, which provides energy savings in the winter and the summer. In the winter, you are pre-heating and humidifying the ventilation air with this energy recovery wheel. In the summer, you are pre-cooling and dehumidifying the ventilation air. "There are some energy costs involved in spinning the wheel, but the cost savings from energy recovery are much greater," said Taylor.

HOT GAS RE-HEAT OPTION

AAON also offers modulating hot gas re-heat. This can be useful for buildings that require some form of dehumidification, which is common in a humid climate, or when you have a lot of people in the building who increase humidity levels. Modulating hot gas re-heat uses the waste heat that is normally sent out of the HVAC system through the condenser as re-heat within the air handler portion of it. "This allows you to overcool the air as it comes through the system and then reheat it back up to a more moderate temperature before it is delivered to the space," said Taylor. The overcooling feature allows you to pull more water out of the air and thus dehumidify the air that is flowing through the system. Then the modulating control allows you to reheat it back to a desired temperature, and you won't end up with large temperature swings in the

ROOFTOP UNIT SIZES

- **RL Series (45-240 ton capacity).** The RL line makes sense if you need a large unit that serves a lot of spaces in a building, or an extremely large space, such as an auditorium.
- **RN Series (6-140 ton capacity).** The standard size rooftop HVAC unit.
- **RQ Series (2-6 ton capacity).** A unit that can be used for a small building, a classroom or a strip mall where you just need to cool only a small portion of the building.

building. "This not only makes things more comfortable for the people in the building, but helps protect the structural components of the building and reduces mold and mildew," said Taylor.

PAINT DURABILITY

"In terms of paint, ASTM's 500-hour salt-spray test is considered to signify that the paint will be good for about 20 years," said Cohen. "However, because AAON's units are so sturdily built and last 30 to 40 years, AAON uses aircraft-quality paint, which is 2500-hour salt-spray-tested paint, which is five times better than the standard paint that most rooftop manufacturers use."

FLEXIBILITY AND CUSTOM FEATURES

One satisfied customer is Controlled Air (Brandford, CT), a commercial HVAC company. While Vincent Chiochio, President of Controlled Air, values the efficiency and quality of AAON units, what is even more important to him is the flexibility they offer. "They offer custom features at conventional HVAC pricing," he said. "This gives us a lot of flexibility when it comes to design."

According to Chiochio, most of the units being offered these days by most other manufacturers tend to be standard. "They are pretty much cookie-cutter units," he said. "However, the list of options with AAON units is immense. Because of these options, we can almost customize a unit any way that is necessary in order to meet a customer's requirements. This is especially important when it comes to specialty applications." ■