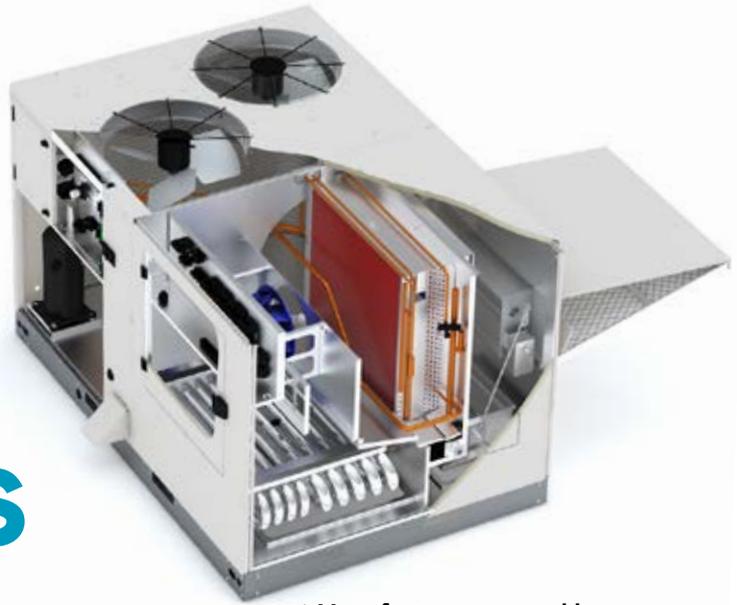


# NEW CONFIGURABLE EQUIPMENT GIVES CONTRACTORS ENTRY INTO DOAS PROFITS

BY JOHN MCKISSACK, P.E.

*Images courtesy of Nortek*



Manufacturers are making configurable RTUs with DOAS that can be drop in replacements for older RTUs at the end of their lifecycle.

**H**VACR contractors can potentially gain a windfall of additional business and profits in 2019 thanks to the emerging trend of configurable dedicated outdoor air systems (DOAS).

Contractors with light commercial and commercial customers many times install standard rooftop units (RTU) without the aid of a consulting engineer, but they probably wouldn't install a DOAS without a consulting engineer.

Contractors install RTUs because manufacturers make them relatively design-friendly. This is especially true for RTU replacement. A contractor can easily replace a 1980s RTU that has reached the end of its lifecycle, especially if it's a "drop-in" of the same brand, CFMs and capacity. The existing roof curb can remain, so there's no roof penetration or resurfacing work required. The contractor can use the replacement RTU's supply and return air connections, as well as the natural gas piping and electrical connections, in the same positions as its predecessor. Consequently, there's little ductwork and piping required. The result is very little engineering, easy installation and a very profitable equipment sale margin for the contractor.

Unfortunately, there are several problems with this scenario. The original tenant from the 1980s has probably moved

to a larger headquarters or gone out of business. Now there's a tenant with totally different occupant requirements. For example, maybe the 1980s tenant was a tax preparation office that never had more than 10 people in it at one time. Besides the occupants, the heat load might have been a few personal computers and a photocopy machine.

## Tenant requirements will change

Now, the space is a daycare with a capacity of 30 people. Besides the heat load of dozens of children and employees, now there's additional heat with bakery ovens and other cooking equipment for meals, plus other unprecedented ventilation requirements. In other words, the new tenant is not going to be very happy with the current RTU or a new drop-in replacement RTU the contractor installed even though the tonnage and CFMs match the original.

Besides poor indoor comfort, due to the new RTU's inability to handle the new and increased outdoor air quantities, space humidity will also be uncontrollable. The inability of a simple thermostat to handle large outdoor loads will cause wide space temperatures swings.

The tax preparation office to a daycare conversion example isn't a unique situation, only the applications change. Almost any tenant change is going to

require a host of different requirements versus the original application. Outdoor air is the most significant difference between yesterday's units and today's IAQ codes. For example, a veterinarian office, a nail salon and even an apparel store will require additional outdoor air to offset a host of volatile organic compound (VOC) contaminants and CO<sub>2</sub>. Actually any indoor space, especially those that are renovated, will require upgraded outdoor air to offset paint, carpet formaldehydes, furniture adhesives and a host of VOCs that off-gas continuously for years.

The solution is to provide better IAQ and thermal comfort by replacing an older RTU with a combination RTU/DOAS and configuring the unit with options that ultimately provide the end-user with the best environment and energy savings. Or, when an existing RTU still has plenty of lifecycle left, the contractor can supplement it with a DOAS.

Ten years ago, few contractors would ever consider specifying a DOAS without a consulting engineer because of the design challenges of outdoor air calculations. Today, however, the process has been significantly streamlined. Manufacturers can configure virtually anything and provide a price for what's close to being an off-the-shelf system. Besides the aforementioned curb adap-

tion, supply/return ductwork and utility positioning compatibility, option specification has also been simplified.

With the help of manufacturer's representatives and factory engineers, specification is as easy as selecting from a menu of HVACR options. Most importantly, the end-user gets superior IAQ and thermal comfort compared with the old unit or a direct drop-in replacement of an RTU that doesn't offer dehumidification, energy recovery or other easily-configurable options.

### AHRI 920 Test Standard for DOAS

Adding DOAS either in a combination RTU/DOAS or a separate DOAS unit does require knowledge of recent test standards and code compliance. Contractors need to understand the difference between conventional air conditioning and DOAS.

AHRI 340/360, *Performance Rating of Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment* has been the air conditioning test standard for decades. As DOAS emerged, specifiers used AHRI 340/360 in the absence of a DOAS-specific test standard. Now AHRI 920 *Performance Rating of DX Dedicated Outdoor Air System Units* is the DOAS test standard for DOAS units.

This is important because DOAS units will soon require certification under AHRI 920 to meet the minimum requirements of ASHRAE 90.1 *Energy Standard for Buildings, Except Low-Rise Residential Buildings*, which will be enforced eventually by the U.S. Department of Energy (DOE). Contractors will want to assure the DOAS unit they choose is AHRI 920 compliant. The main difference between AHRI 340/360 and AHRI 920 is the energy calculation.

Air conditioning units are rated by Energy Efficiency Ratio (EER), Co-efficient of Performance (COP) and IEER). Instead, AHRI 920 uses Integrated Seasonal Moisture Removal Efficiency (ISMRE) ratings. ISMRE is more appropriate for DOAS because it focuses primarily on the water removal and the amount of power required in reaching a leaving dew point condition of less than 55°F, while IEER focuses on delivery capacity at a given power requirement.

In light of these standards, what contractors need to know is that today



» Contractors installing VRF/VRV can take advantage of configurable DOAS to supply ASHRAE 62.1 outdoor air compliances.

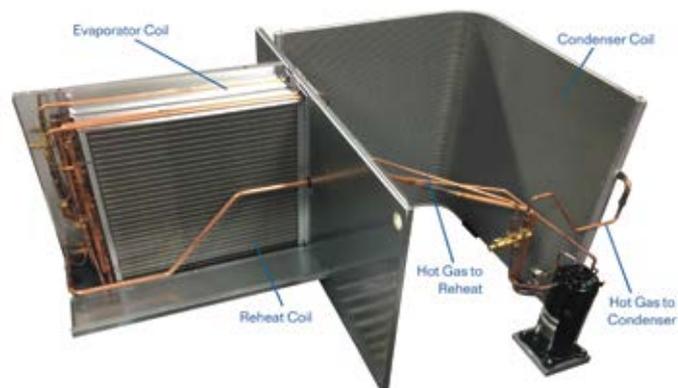
ASHRAE 90.1 sets target ISMRE values of 5.2 for DOAS with energy recovery and 4.0 for units without energy recovery. Choosing units at or surpassing those ISMRE levels will assure the application will comply with ASHRAE 90.1.

### New Developments

A common shortcoming of hot gas reheat circuits in all brands of DOAS is the potential for evaporator freezing in colder climates. To offset this challenge, DOAS controllers in the past were forced to cycle the reheat, add low ambient condenser cycling and limit reheat to no more than 50% of the available heating capacity. Therefore, a new HVAC industry development uses direct digital control (DDC) algorithms to intelligently modulate hot gas reheat circuits to eliminate inefficient evaporator freezing challenges. The hot gas reheat system allows uninterrupted dehumidification down to 52°F outside air conditions without freezing, loss of control or a compressor burnout.

Nobody knows what the minimum requirements will be for ASHRAE 90.1 five to 10 years from now and whether older equipment today will be grandfathered in if it doesn't comply. However, combining RTUs with today's DOAS technology and adding air comfort and energy-efficiency options will almost assuredly help today's installation surpass 90.1 requirements, while also giving the end-user designer IAQ and energy savings, but without the price of custom equipment. ☺

*John McKissack, P.E., has been a product manager for the last 12 years at Nortek Global HVAC, St. Louis, Missouri. His area of expertise includes configurable DOAS/ high efficiency DOAS systems, and he has been instrumental in the evolution of the Reznor brand of make-up air units. McKissack has served on the AHRI 920 committee for five years. He can be reached at [john.mckissack@nortek.com](mailto:john.mckissack@nortek.com).*



» The HVAC industry has a new hot gas reheat modulation that will appear on future DOAS systems. It uses DDC algorithms to intelligently modulate hot gas reheat circuits to eliminate inefficient evaporator freezing challenges.