



Washington State Building Code Council
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STATE BUILDING CODE INTERPRETATION NO. 17-25

CODE: 2015 Washington State Energy Code - Commercial

SECTION: **C403.6/C403.2.6.3, Ventilation controls and DOAS**

QUESTION: If a zone is served by a DOAS unit for ventilation air and an indoor VRF fan coil unit for heating/cooling, does the term “serving equipment” correspond to the DOAS unit, the fan coil unit, or both? Please note that if serving equipment refers to (or includes) the DOAS unit, then this would require DOAS units serving multiple zones to be variable-air-volume (VAV) with VAV terminal units at each zone in order to turn off ventilation air at unoccupied zones while still maintaining ventilation air at occupied zones. Requiring DOAS units to be VAV would be an interesting approach given the recent shift away from standard VAV systems within the 2015 WSEC. It’s also important to note that the occupancy sensor section (C403.2.6.3) was not updated in the 2015 code, even though DOAS (C403.6) is a new prescriptive requirement.

ANSWER: The reference in Section C403.2.6.3 to “serving equipment” refers to the ventilation unit as this section is a subsection of C403.2.6 “Ventilation.” Per C403.6.2 the heating and cooling fan coil is already required to cycle on load. Since C403.2.6.3 is a prescriptively required section per C401.2, the DOAS ventilation system control would need to comply with this section.

If the DOAS ventilation unit serves only a single classroom, gym, auditorium or conference room that is larger than 500 square feet of floor area then the DOAS ventilation unit would cycle off based on the occupancy status of the room served. Note that an ERV is not required in the DOAS unit if Exception 1 of C403.6.1 applies to the room but a variable volume DOAS system supplying air in parallel with the heating and cooling system is required.

If the central DOAS ventilation unit serves multiple zones that include multiple classrooms, gyms, auditoriums or conference rooms that are each larger than 500 square feet of floor area, then per C403.2.6.3 each room would be required to have shutoff controls based on the occupancy status of each room.

If the central DOAS ventilation unit serves multiple zones, then the requirements of C403.4 and C403.4.4 would apply based on the following:

- Per C403.4 it would be considered part of an “HVAC system” that serves “multiple zones” as ventilation is the “V” in “HVAC”
- Additionally, per C403.4.4 it is a “mechanical system” that serves “multiple zones” and based on the definition of “ventilation air” as being part of a supply air system that is required to comply with this section

Next, the system designer and/or code official would have to consider the configuration of the central DOAS ventilation system to determine if the provisions of Section C403.4.4 would apply to the system or if one of the exceptions would apply.

The following factors would have to be considered to make this determination:

- Does the DOAS ventilation system supply only 100% OA?

- Does the DOAS ventilation system have reheating or recooling of the central supply air at the zone level?
- Does the DOAS ventilation system have energy recovery or is it exempt from energy recovery per one of the exceptions to C403.6.1?

These system design parameters would then be used to evaluate the following exceptions to C403.4.4:

- Do the zones comply with Exception 3 to C403.4.4 and are therefore exempt from being VAV? Exception 3 requires a supply airflow less than 300 CFM to each zone and each zone being less than 10% of the total system supply airflow?
- Do the zones comply with Exception 4 to C403.4.4 and are therefore exempt from being VAV? Exception 4 is for zones without DDC and Item 4.2 is for zones only providing the required ventilation air per IMC and C403.2.6.
- Do the zones comply with Exception 5 to C403.4.4 and are therefore exempt from being VAV? Exception 5 is for zones with DDC that can utilize Item 5.2 by only providing the required ventilation air per IMC and C403.2.6, and are configured per Item 6 to prevent reheating, recooling, etc.

If one or more of these exceptions are met then a VAV system would not be required at each zone of the central DOAS ventilation system.

Note that even though there is no specific requirement for a system with VAV boxes (DDC or non-DDC) at each zone the system would still be required per the IMC to properly ventilate each zone. The system designer could therefore utilize other means to balance, vary the airflow, and shutoff airflow by zone at the variable central DOAS ventilation system to meet the minimum ventilation requirements for each zone per Chapter 4 of the IMC.

This gets increasingly complex as constant volume, variable volume, and shutoff zones are combined on the same central DOAS ventilation system.

For example the designer could meet the code minimum ventilation requirements of the IMC and requirements of C403.4.4 by using pressure independent balancing dampers for constant volume ventilation zones, pressure dependent motorized dampers for demand control ventilation per C403.2.6.2, and a combination of pressure dependent balancing dampers and motorized dampers for occupancy shutoff per C403.2.6.3.

Additionally, the zone isolation requirements of C403.2.4.4, the outside airflow reduction requirements by zone per C403.4.4.3, and the supply-air temperature reset control requirements of C403.4.4.4 may apply to the system.

SUPERSEDES: None

REQUESTED BY: City of Bellevue