

WAC 51-11C-40360 Section C403.6—Requirements for mechanical systems serving multiple zones.

C403.6 Requirements for mechanical systems serving multiple zones. Sections C403.6.1 through C403.6.10 shall apply to mechanical systems serving multiple zones.

C403.6.1 Variable air volume (VAV) and multiple zone systems. Supply air systems serving multiple zones shall be VAV systems that have zone controls configured to reduce the volume of air that is reheated, re-cooled or mixed in each zone to one of the following:

1. Twenty percent of the zone design peak supply for systems with DDC and 30 percent of the maximum supply air for other systems.
2. Systems with DDC where items 2.1 through 2.3 apply.
 - 2.1. The airflow rate in the deadband between heating and cooling does not exceed 20 percent of the zone design peak supply rate or higher allowed rates under Items 3, 4, or 5 of this section.
 - 2.2. The first stage of heating modulates the zone supply air temperature setpoint up to a maximum setpoint while the airflow is maintained at the deadband flow rate.
 - 2.3. The second stage of heating modulates the airflow rate from the deadband flow rate up to the heating maximum flow rate that is less than 50 percent of the zone design peak supply rate.
3. The outdoor airflow rate required to meet the minimum ventilation requirements of Chapter 4 of the *International Mechanical Code*.
4. Any higher rate that can be demonstrated to reduce overall system annual energy use by offsetting reheat/recool energy losses through a reduction in outdoor air intake for the system, as approved by the code official.
5. The airflow rates to comply with applicable codes or accreditation standards such as pressure relationships or minimum air change rates.

EXCEPTION:

The following individual *zones* or entire air distribution systems are exempted from the requirement for VAV control:

1. Zones or supply air systems where not less than 75 percent of the energy for reheating or for providing warm air in mixing systems is provided from a site-recovered source, including condenser heat.
2. Systems that prevent reheating, recooling, mixing or simultaneous supply of air that has been previously cooled, either mechanically or through the use of economizer systems, and air that has been previously mechanically heated.
3. Ventilation systems complying with Section C403.3.5, DOAS, with ventilation rates comply with Section C403.2.2.

C403.6.2 Single duct variable air volume (VAV) systems, terminal devices. Single duct VAV systems shall use terminal devices capable of and configured to reduce the supply of primary supply air before reheating or recooling takes place.

C403.6.3 Dual duct and mixing VAV systems, terminal devices. Systems that have one warm air duct and one cool air duct shall use terminal devices which are capable of and configured to reduce the flow from one duct to a minimum before mixing of air from the other duct takes place.

C403.6.4 Supply-air temperature reset controls. Multiple zone HVAC systems shall include controls that automatically reset the supply-air temperature in response to representative building loads, or to outdoor air temperature. The controls shall be configured to reset the supply air temperature at least 25 percent of the difference between the design supply-air temperature and the design room air temperature.

EXCEPTIONS:

1. Systems that prevent reheating, recooling or mixing of heated and cooled supply air.
2. Seventy-five percent of the energy for reheating is from a site-recovered source.
3. Zones with peak supply air quantities of 300 cfm (142 L/s) or less.

C403.6.5 Multiple-zone VAV system ventilation optimization control. Multiple-zone VAV systems with direct digital control of individual zone boxes reporting to a central control panel shall have automatic controls configured to reduce outdoor air intake flow below design rates in response to changes in system ventilation efficiency (E_v) as defined by the *International Mechanical Code*.

EXCEPTIONS:

1. VAV systems with zonal transfer fans that recirculate air from other zones without directly mixing it with outdoor air, dual-duct dual-fan VAV systems, and VAV systems with fan-powered terminal units.
2. Systems where total design exhaust airflow is more than 70 percent of total design outdoor air intake flow requirements.

C403.6.6 Parallel-flow fan-powered VAV air terminal control. Parallel-flow fan-powered VAV air terminals shall have automatic controls configured to:

1. Turn off the terminal fan except when space heating is required or where required for ventilation.
2. Turn on the terminal fan as the first stage of heating before the heating coil is activated.
3. During heating for warmup or setback temperature control, either:
 - 3.1. Operate the terminal fan and heating coil without primary air.
 - 3.2. Reverse the terminal damper logic and provide heating from the central air handler by primary air.

C403.6.7 Hydronic and multiple-zone HVAC system controls and equipment. Hydronic and multiple-zone HVAC system controls and equipment shall comply with this section.

For buildings with a total equipment cooling capacity of 300 tons and above, the equipment shall comply with one of the following:

1. No one unit shall have a cooling capacity of more than 2/3 of the total installed cooling equipment capacity;
2. The equipment shall have a variable speed drive; or
3. The equipment shall have multiple compressors.

C403.6.8 Set points for direct digital control. For systems with direct digital control of individual zones reporting to the central control panel, the static pressure setpoint shall be reset based on the zone requiring the most pressure. In such cases, the set point is reset lower until one zone damper is nearly wide open. The direct digital controls shall be capable of monitoring zone damper positions or shall have an alternative method of indicating the need for static pressure that is configured to provide all of the following:

1. Automatically detecting any zone that excessively drives the reset logic.
2. Generating an alarm to the system operational location.
3. Allowing an operator to readily remove one or more zones from the reset algorithm.

C403.6.9 Static pressure sensor location. Static pressure sensors used to control VAV fans shall be located such that the controller setpoint is no greater than 1.2 inches w.c. (299 Pa). Where this results in one or more sensors being located downstream of major duct splits, not less than one sensor shall be located on each major branch to ensure that static pressure can be maintained in each branch.

EXCEPTION: Systems complying with Section C403.6.8.

[Statutory Authority: RCW 19.27A.025, 19.27A.045 and chapter 19.27 RCW. WSR 20-21-080, § 51-11C-40360, filed 10/19/20, effective 2/1/21.

Statutory Authority: RCW 19.27A.020, 19.27A.025, 19.27A.160 and chapter 19.27 RCW. WSR 19-24-040, § 51-11C-40360, filed 11/26/19, effective 7/1/20. Statutory Authority: RCW 19.27A.025, 19.27A.045, 19.27A.160, and 19.27.074. WSR 17-10-062, § 51-11C-40360, filed 5/2/17, effective 6/2/17; WSR 16-13-089, § 51-11C-40360, filed 6/15/16, effective 7/16/16. Statutory Authority: RCW 19.27A.025, 19.27A.160, and 19.27.074. WSR 16-03-072, § 51-11C-40360, filed 1/19/16, effective 7/1/16. Statutory Authority: RCW 19.27A.020, 19.27A.025 and chapters 19.27 and 34.05 RCW. WSR 13-04-056, § 51-11C-40360, filed 2/1/13, effective 7/1/13.]