

**INSTALLER and INSPECTOR QUICK-REFERENCE:
2022 NRCA-MCH-06-A
Demand Control Ventilation (DCV) Systems**

Purpose and Scope of the Test

The purpose of the test is to verify that systems required to employ demand-controlled ventilation as required by the Energy Code can vary outside ventilation flow rates based on maintaining interior carbon dioxide (CO₂) concentration setpoints. Demand controlled ventilation refers to an HVAC system's ability to reduce outdoor air ventilation flow below design values when the space served is at less than design occupancy. CO₂ is a good indicator of occupancy load and is the basis used for modulating ventilation flow rates.

Test trigger

Newly Constructed and Additions/Alterations: All new DCV controls installed on new or existing HVAC systems must be tested.

DCV systems are required on all spaces with a design occupancy of 40 square feet/person or less and includes at least one of the following:

- Air economizer.
- Modulating outside air control.
- Design outdoor airflow rate > 3,000 cfm.

Exceptions:

- The space exhaust is greater than the ventilation rate – 0.2 cfm/ft².
- Spaces that have processes or operations that generate dusts, fumes, vapors, or gases and do not have local exhaust.
- Spaces with an area less than 150 ft² or design occupancy < 10 people.

Relevant Energy Code References and Required Compliance Documents

Title 24, Part 6 of the California Building Code, Building Energy Efficiency Standards (Energy Code) sections 120.1, 120.1(d)3, 120.1(d)4, 160.3(d)1E, 160.2(c)5C, 160.2(c)5D; NA7.5.5; NRCC-MCH-E.

Who Can Perform the Test

This test must be performed by an acceptance test technician certified by a CEC-approved Acceptance Test Technician Certification Provider, using compliance document NRCA-MCH-06-A.

Required Tools

To perform the test, it may be necessary to vary and possibly measure (if calibration is necessary) ambient CO₂ levels. The instrumentation needed to perform the test may include, but is not limited to:

- Hand-held reference CO₂ probe calibrated to ±10 ppm.
- Manufacturer's calibration kit.
- Calibrated CO₂/air mixtures.

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Estimated Time to Complete Test

Construction Inspection: 0.5 to 1 hours (depending on CO₂ sensor calibration)
Functional testing: 1 to 2 hours (depending on how ambient CO₂ concentration levels are manipulated, system response time to variations in CO₂).

Potential Issues and Cautions

Lock out the economizer control during the test. Outdoor air damper may not modulate correctly if the economizer control strategy is controlling damper operation.
Overall test time may be reduced (especially for rooftop HVAC units) if two people perform the test - one to vary the CO₂ concentration while someone else verifies operation of the outdoor air dampers.
During the testing of the DCV controls, the outside damper will modulate open. Care should be taken to prevent freezing of coils if testing with cold temperatures outside.

Inspection Enforcement

Interior CO₂ concentration setpoint is ≤ 600 ppm plus outdoor air CO₂ value if outside concentration is measured dynamically. Otherwise, setpoint is ≤ 1000 ppm.
Outdoor air CO₂ concentration can be determined by three methods:

1. Assume a value of 400 ppm without any direct measurement.
2. Measure outside concentration dynamically to continually adjust interior concentration setpoint.
3. Measure outside concentration one time during system checkout and use this value continually to determine inside concentration setpoint.

Acceptance Criteria

- Each CO₂ sensor is factory calibrated (with calibration certificate) or field calibrated.
- Each CO₂ sensor is wired correctly to the controls to ensure proper control of the outdoor air damper.
- Each CO₂ sensor is located correctly within the space 3 to 6 feet above the floor.
- Interior CO₂ concentration setpoint is ≤ 600 ppm plus outdoor air CO₂ value if dynamically measured or ≤ 1000 ppm if no outside air (OSA) sensor is provided.
- A minimum OSA setting is provided whenever the system is in Occupied mode regardless of space CO₂ readings.
- A maximum OSA damper position for DCV control can be established, regardless of space CO₂ readings.

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Acceptance Criteria (cont.)

- The outdoor air damper modulates open when the CO₂ concentration within the space exceeds setpoint.
- The outdoor air damper modulates closed (toward minimum position) when the CO₂ concentration within the space is below setpoint.