



**Addendum j to  
ASHRAE Guideline 36-2018**

**Public Review Draft**

# **Proposed Addendum j to Guideline 36-2018, High-Performance Sequences of Operation for HVAC Systems**

**First Public Review (November 2019)  
(Draft shows Proposed Changes to Current Guideline)**

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**(This foreword is not part of this guideline. It is merely informative and does not contain requirements necessary for conformance to the guideline. Unresolved objectors on informative material are not offered the right to appeal at ASHRAE.)**

## **FOREWORD**

This addendum revises the zone ventilation control logic in Sections 5.2.1.4 for projects that are to comply with the ventilation control requirements in the California Title 24 Building Energy Efficiency Standards, in order to make the logic consistent with changes to the 2019 version of Title 24.

When zones are detected to be unpopulated based on occupancy sensing, Title 24 previously required the ventilation rate to be maintained at 25% of the area-based ventilation requirement. The so-called occupied-standby mode added to the 2019 version of Title 24 simplifies the requirement by allowing ventilation to that zone to be reduced to zero in this condition, for certain occupancy types, and makes it consistent with the requirement in ASHRAE Standard 62.1.

Section 3.1.1.2 b. is also revised to add an additional requirement for the designer to indicate which zones are to employ occupied-standby mode. This is analogous to the same requirement for projects complying with Standard 62.1 in Section 3.1.1.2 a. 5.

**Note: In this addendum, changes to the current guideline are indicated in the text by underlining (for additions) and strikethrough (for deletions) unless the instructions specifically mention some other means of indicating the changes. Only these changes are open for review and comment at this time. Additional material is provided for context only and is not open for comment except as it relates to the proposed substantive changes.**

## **Addendum j to Guideline 36-2018**

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*(IP and SI Units)*

**Revise Section 3.1.1.2 b. as follows:**

b. For projects complying with California Title 24 Ventilation Standards:

1. Vocc-min: Zone minimum outdoor airflow for occupants, per Title 24-~~2019~~ prescribed airflow-per-occupant requirements.
2. Varea-min: Zone minimum outdoor airflow for building area, per Title 24-~~2019~~ prescribed airflow-per-area requirements.
3. Indicate where occupied-standby mode is allowed based on the zone occupancy category per Title 24-2019, Table 120.1-A.

*Occupied-standby mode applies to individual zones, is considered a zonal subset of Occupied Mode, and is not considered a Zone Group Operating Mode. See 5.4.6 for Zone Group Operating Modes.*

**Revise Section 5.2.1.4 as follows:**

5.2.1.4. For compliance with California Title 24-~~2019~~, outdoor air setpoints shall be calculated as follows:

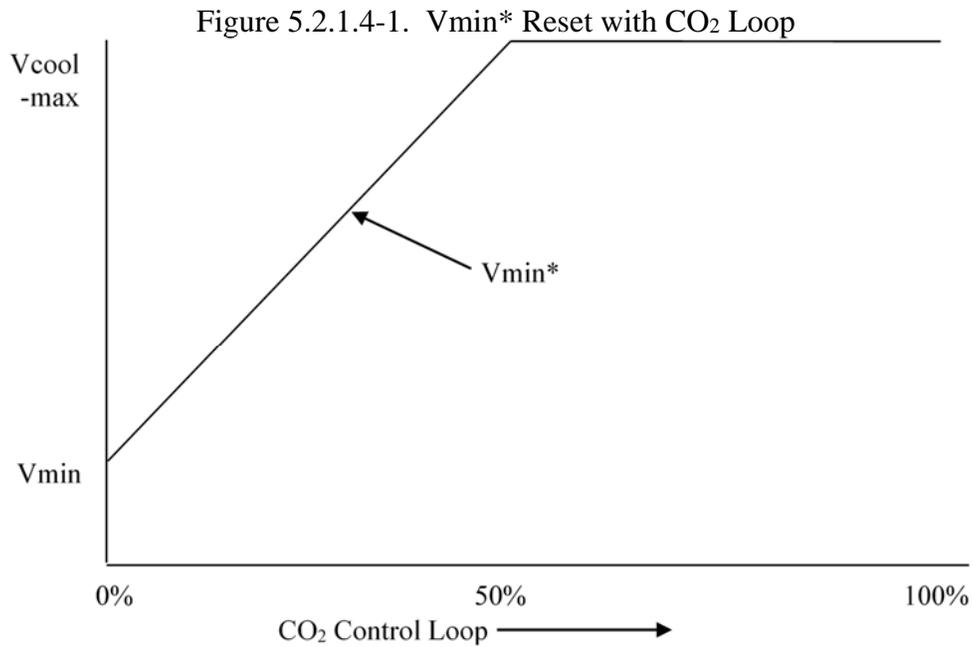
- a. See 3.1.1.2.2 for zone ventilation setpoints.
- b. Determine the zone minimum outdoor air setpoints Zone-Abs-OA-min and Zone-Des-OA-min.

*Zone-Abs-OA-min is used in terminal unit sequences and air handler sequences. Zone-Des-OA-min is used in air handler sequences only.*

1. Zone-Abs-OA-min shall be reset based on the following conditions in order from highest to lowest priority:
  - i. Zero if the zone has a window switch and the window is open
  - ii. ~~Zero Twenty-five (25%) of Varea-min~~ if the zone has an occupancy sensor ~~and~~, is unpopulated, and is permitted to be in occupied-standby mode per Section 3.1.1.2.b.3.

*The term “populated” is used instead of “occupied” to mean that a zone occupancy sensor senses the presence of people because the term “occupied” is used elsewhere to mean “scheduled to be occupied”.*

- iii. Varea-min if the zone has a CO<sub>2</sub> sensor
  - iv. Zone-Des-OA-min otherwise
2. Zone-Des-OA-min is equal to, in order from highest to lowest priority:
- i. Zero if the zone has a window switch and the window is open.
  - ii. ~~Zero Twenty five (25%) of Varea-min~~ if the zone has an occupancy sensor, and is unpopulated, and is permitted to be in occupied-standby mode per Section 3.1.1.2.b.3.
  - iii. The larger of Varea-min and Vocc-min otherwise.
- c. The occupied minimum airflow Vmin\* shall be equal to Vmin except as noted below, in order from higher to lower priority:
- 1. If the zone has an occupancy sensor and is permitted to be in occupied-standby mode per Section 3.1.1.2.b.3, Vmin\* shall be equal to ~~zero~~ 25% of Varea-min when the room is unpopulated.
  - 2. If the zone has a window switch, Vmin\* shall be zero when the window is open.
  - 3. If the zone has a CO<sub>2</sub> sensor
    - i. See **Error! Reference source not found.** ~~3.1.1.3~~ for CO<sub>2</sub> setpoints.
    - ii. During Occupied Mode, a P-only loop shall maintain CO<sub>2</sub> concentration at setpoint; reset from 0% at (setpoint minus 200 PPM) and to 100% at setpoint.
    - iii. Loop is disabled and output set to zero when the zone is not in Occupied Mode.
    - iv. For cooling-only VAV terminal units, reheat VAV terminal units, constant volume series fan powered terminal units, dual duct VAV terminal units with mixing control and inlet airflow sensors, dual duct VAV terminal units with mixing control and a discharge airflow sensor, or dual duct VAV terminal units with cold duct minimum control:
      - (a) The CO<sub>2</sub> control loop output shall reset the occupied minimum airflow setpoint (Vmin\*) from the zone minimum airflow setpoint Vmin at 0% up to maximum cooling airflow setpoint Vcool-max at 50%, as shown below. The loop output from 50% to 100% will be used at the system level to reset outdoor air minimum; see AHU controls. See Figure 5.2.1.4-1.



v. For parallel fan-powered terminal units:

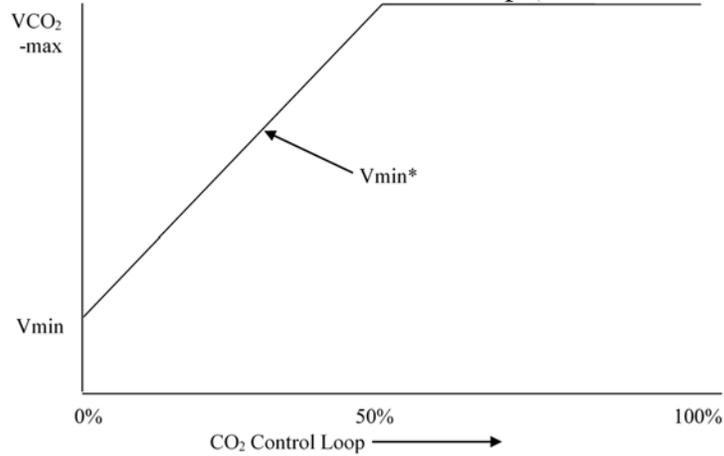
(a) Determine  $V_{CO_2-max}$  as follows:

- (1) When the zone state is cooling,  $V_{CO_2-max}$  is equal to the maximum cooling airflow setpoint  $V_{cool-max}$ .
- (2) When the zone state is heating or deadband,  $V_{CO_2-max}$  is equal to  $V_{cool-max}$  minus the parallel fan airflow

*This logic prevents the total supply airflow from exceeding  $V_{cool-max}$ , which could create diffuser noise problems.*

(b) The CO<sub>2</sub> control loop output shall reset the occupied minimum airflow setpoint ( $V_{min}^*$ ) from the zone minimum airflow setpoint  $V_{min}$  at 0% up to maximum cooling airflow setpoint  $V_{CO_2-max}$  at 50%, as shown below. The loop output from 50% to 100% will be used at the system level to reset outdoor air minimum; see AHU controls. See Figure 5.2.1.4-2.

Figure 5.2.1.4-2.  $V_{min}^*$  Reset with CO<sub>2</sub> Loop (Parallel Fan-Powered)



vi. For SZVAV AHUs:

- (a) The minimum outdoor air setpoint  $MinOAsp$  shall be reset based on the zone CO<sub>2</sub> control loop signal from Zone-Abs-OA-min at 0% signal to Zone-Des-OA-min at 100% signal. See Figure 5.2.1.4-3.

Figure 5.2.1.4-3.  $V_{min}^*$  Reset with CO<sub>2</sub> Loop (SZVAV)

