



ADDENDA

**ASHRAE Addendum g to
ASHRAE Guideline 36-2021**

High-Performance Sequences of Operation for HVAC Systems

Approved by ASHRAE and the American National Standards Institute on February 29, 2024.

This addendum was approved by a Standing Standard Project Committee (SSPC) for which the Standards Committee has established a documented program for regular publication of addenda or revisions, including procedures for timely, documented, consensus action on requests for change to any part of the standard. Instructions for how to submit a change can be found on the ASHRAE® website (www.ashrae.org/continuous-maintenance).

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Cognizant TC: 1.4, Control Theory and Application

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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.)

FOREWORD

This addendum addresses an issue with the minimum outdoor airflow control sequence for multiple zone VAV AHUs with a single common damper for minimum outdoor air and economizer functions and airflow measurement. The current sequence sets the maximum return air damper position, MaxRA-P to zero when either the supply fan is not proven on or the AHU is in any mode other than Occupied Mode. This causes the AHU to operate at 100% outdoor air during Setback, Setup, Warm-up, and Cool-down mode which will often lead to increased heating energy use when the outdoor air is cold or increased cooling energy use when the outdoor air is warm.

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.

Addendum g to Guideline 36-2021

(IP and SI Units)

Revise Section 5.16.6.3 as follows:

5.16.6.3. Minimum Outdoor Air Control Loop

- ~~a. Minimum outdoor air control loop is enabled when the supply fan is proven ON and the AHU is in Occupied Mode, and disabled and output set to zero otherwise.~~

The engineer must specify whether the unit has a return fan, relief damper or relief fans.

If there is a return fan, keep subsection (ab**) and delete subsection (b**e**).**

If there are relief damper or relief fans, keep subsection (bc**) and delete subsection (a**b**).**

Delete this flag note after selections have been made.

- b. For units with return fans:

1. The minimum outdoor air control loop is enabled when the supply fan is proven ON and the AHU is in Occupied Mode and disabled with output set to 100% otherwise.

The following logic limits the return damper position to ensure that minimum outdoor air is maintained ~~at all times~~ during Occupied Mode, while the actual return damper position is modulated by the SAT control loop.

2. The outdoor airflow rate shall be maintained at the minimum outdoor ~~damper outdoor~~ airflow setpoint MinOAsp by a direct-acting control loop whose output is mapped to the return air damper maximum position endpoint MaxRA-P.

The following logic directly controls the return damper position to ensure that exactly the minimum outdoor air – and no more – is provided when economizer lockout conditions are exceeded. When economizer lockout no longer applies, return damper control reverts to the SAT control loop.

3. While the unit is in Occupied Mode, if the economizer high limit conditions in Section 5.1.17 are exceeded for 10 minutes, outdoor air shall be controlled to the minimum outdoor airflow. When this occurs, the normal sequencing of the return air damper by the SAT

control loop is suspended, and the return air damper position shall be modulated directly to maintain measured airflow at MinOAsp (i.e. return damper position shall equal MaxRA-P). The economizer damper shall remain open.

4. If the economizer high limit conditions in Section 5.1.17 are not exceeded for 10 minutes, or the unit is no longer in Occupied Mode, release return damper to control by the SAT control loop (i.e. return damper position is limited by MaxRA-P endpoint, but is not directly controlled to equal MaxRA-P).

c. For units with relief dampers or relief fans:

1. The minimum outdoor air control loop is enabled when the supply fan is proven ON and the AHU is in Occupied Mode and disabled with output set to zero otherwise.

The following logic limits the return and economizer damper positions to ensure that minimum outdoor air is maintained at all times during Occupied Mode, while the actual damper positions are modulated by the SAT control loop.

2. The outdoor airflow rate shall be maintained at the minimum outdoor air setpoint MinOAsp by a reverse-acting control loop whose output is mapped to economizer damper minimum position MinOA-P and return air damper maximum position MaxRA-P as indicated in Figure 5.16.6.3.

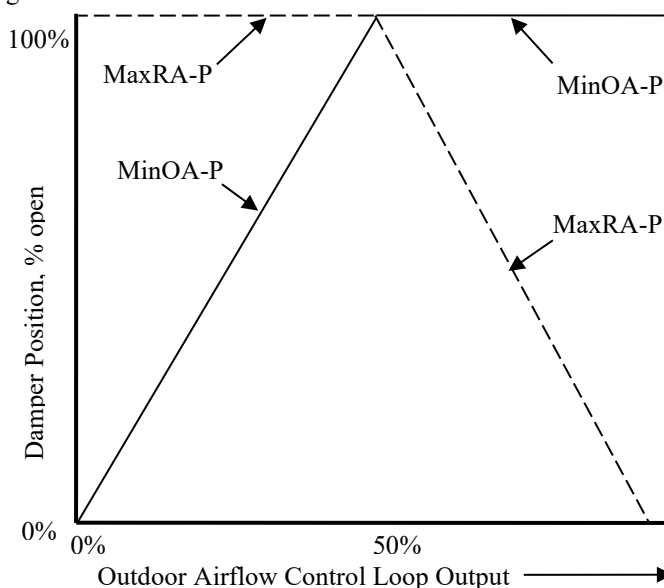


Figure 5.16.6.3 Minimum outdoor airflow control mapping with single damper.

The following logic directly controls the return and economizer damper positions to ensure that exactly the minimum outdoor air – and no more – is provided when economizer lockout conditions are exceeded. When economizer lockout no longer applies, return damper control reverts to the SAT control loop.

3. While the unit is in Occupied Mode, if the economizer high limit conditions in Section 5.1.17 are exceeded for 10 minutes, outdoor airflow shall be controlled to the minimum outdoor airflow setpoint, MinOAsp. When this occurs, the normal sequencing of the return air damper by the SAT control loop is suspended as follows:
 - i. Fully open the return air damper
 - ii. Wait 15 seconds, then set MaxOA-P equal to MinOA-P

- iii. Wait 3 minutes, then modulate the return air damper to maintain the measured airflow at MinOAsp (i.e. return air damper position shall equal MaxRA-P).
4. If the economizer high limit conditions in Section 5.1.17 are not exceeded for 10 minutes, or the unit is no longer in Occupied Mode, set MaxOA-P = 100% and release the return air damper to control by the SAT control loop (i.e. return air damper position is limited by the MaxRA-P endpoint, but is not directly controlled to equal MaxRA-P).

This concludes the section where the minimum outdoor air control logic is selected.

When the sequences are complete, only one of Section 5.16.4, 5.16.5, and 5.16.6 should remain. The other two sections should be deleted along with these flag notes.

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