ADDENDA

ANSI/ASHRAE Addendum aa to
ANSI/ASHRAE Standard 62.1-2022

Ventilation and Acceptable Indoor Air Quality

Approved by ASHRAE and the American National Standards Institute on September 30, 2025.

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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ASHRAE obtains consensus through participation of its national and international members, associated societies, and public review.

ASHRAE Standards are prepared by a Project Committee appointed specifically for the purpose of writing the Standard. The Project Committee Chair and Vice-Chair must be members of ASHRAE; while other committee members may or may not be ASHRAE members, all must be technically qualified in the subject area of the Standard. Every effort is made to balance the concerned interests on all Project Committees.

The Senior Manager of Standards of ASHRAE should be contacted for

a. interpretation of the contents of this Standard,
b. participation in the next review of the Standard,
c. offering constructive criticism for improving the Standard, or
d. permission to reprint portions of the Standard.

(This foreword is not part of this standard. It is merely informative and does not contain requirements necessary for conformance to the standard. It has not been processed according to the ANSI requirements for a standard and may contain material that has not been subject to public review or a consensus process. Unresolved objectors on informative material are not offered the right to appeal at ASHRAE or ANSI.)

FOREWORD

Addendum n to Standard 62.1-2022 requires that when particulate matter or gas-phase air cleaning is included in the Indoor Air Quality Procedure (IAQP) design that the efficiencies utilized are in accordance with defined testing standards or a custom efficiency test performed by a third-party lab. However, Addendum n only requires manufacturers to provide initial removal efficiencies and does not require or account for the performance of the air cleaner or filter over its operational life. Some technologies decrease in efficiency over time as they become loaded with contaminants. This can lead to a mass balance design that results in a concentration for a given contaminant that is below the design limit when using the initial efficiency of a technology but may exceed the limit as its performance degrades during operation over time.

Formaldehyde has both a low design limit and a moderate/high generation rate in the space. Of the design compounds (DCs) and PM2.5, the limiting factor in most IAQP calculations is formaldehyde, meaning formaldehyde drives the resultant required outdoor airflow, which is why it was selected for use in calculating end-of-useful-life efficiency in the mass balance equations. The nonpolar volatile organic compound is included to check for consistency of performance with contaminants that are chemically dissimilar to formaldehyde. If the removal efficiency of the air cleaner for the test contaminants decreases over time, then it is possible that the concentration of contaminants in the occupied space will increase to levels above the design limit.

For example, an air cleaner might have a first-pass removal efficiency of 60% for formaldehyde, but the removal efficiency drops to 20% by the time when the manufacturer recommends replacement. In a typical 20,000 ft^2 office building where the outdoor air was decreased from the VRP rate of 2125 cfm to 1125 cfm, the resultant concentration would be 30.7 $\mu g/m^3$, which is below the design limit of 33 $\mu g/m^3$. However, at the end of life of the air cleaner, the resultant outdoor airflow requirement would only be 41.2 $\mu g/m^3$, well above the specified design limit of 33 $\mu g/m^3$.

To prevent this mismatch between design assumptions and real-world conditions, this Addendum aa introduces the requirement to use the end-of-useful-life efficiency (E_{EOL}) for formaldehyde. The E_{EOL} reflects the removal performance of a gas-phase cleaner at the point of recommended replacement, determined by preloading the filter to its expected accumulated contaminant mass (M_{ACC}) and in either the initial test or retesting per Section 6.3.4.1. This ensures that the IAQP design maintains compliance with exposure limits throughout the actual service life of the cleaner.

Using the same example, assuming a sorbent-based gas-phase removal technology, a two-year recommended change, annual building operating hours of 3744 hours per year, and the airflow through the air cleaner is 1000 cfm (V_c = 1699 m^3/h), the M_{ACC} calculated per Equation 6-13 would be 251.9 grams. The E_{EOL} would be the efficiency of the air cleaner when loaded with 251.9 grams of formaldehyde, which, for this example, would be 20%. Using the E_{EOL} versus the initial efficiency in the mass balance equation would indicate that the current design outdoor air would result in a formaldehyde concentration greater than the specified design limit. Therefore, either the outdoor air would need to be increased or a shorter replacement period would need to be recommended.

Using the E_{EOL} for formaldehyde will ensure that the formaldehyde concentrations remain below the design limit for the lifetime of the air cleaner.

Informative Note: In this addendum, changes to the current standard 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 aa to Standard 62.1-2022

Add new Section 6.3.4.1. Note that this section should appear under the new Section 6.3.4 in Addendum n to Standard 62.1-2022. ASHRAE addenda are available for free download at www.ashrae.org/technical-resources/standards-and-guidelines/standards-addenda.

6.3.4.1 End-of-Useful-Life Efficiency. Gas-phase filters and air cleaners that capture contaminants shall report an end-of-useful-life removal efficiency (E_{EOL}) for formaldehyde and at least one nonpolar volatile organic compound (VOC) from Table 6-5 that accounts for the expected accumulated mass of captured

contaminant (M_{ACC}) at the specified replacement period. The expected M_{ACC} at the specified replacement period shall be determined in accordance with Equation 6-13a (I-P) or 6-13b (SI). The E_{EOL} shall then be determined by repeating the test from Section 6.3.4 on a gas-phase filter that has been preloaded to the expected accumulated mass value. In Informative Appendix F, the E_{EOL} shall be used in place of E_f when calculating mass-balance removal efficiency for formaldehyde. All inputs used in Equation 6-13a or 6-13b, along with third-party test reports, shall be provided upon request.

$$M_{ACC} = T_y P C_{bz} V_c E_f / 266{,}974{,}172 \quad \text{(6-13a)}$$

$$M_{ACC} = T_y P C_{bz} V_c E_f / 1{,}000{,}000 \quad \text{(6-13b)}$$

where

M_{ACC} = accumulated mass of contaminants, lb (g)

T_y = annual building operating hours (assume 3744 hours based on 72 hours per week, unless otherwise specified), h/year

P = replacement period of the gas-phase filter or air cleaner as specified by the manufacturer for design purposes, years

C_{bz} = design limit for target contaminant per Table 6-5, µg/m^3

V_c = airflow rate through the gas-phase filter or air cleaner, cfm (m^3/h)

E_f = initial contaminant removal efficiency of the gas-phase filter or air cleaner

For technologies other than gas-phase filters and air cleaners, the E_{EOL} shall be depreciated from the initial removal efficiency to the manufacturer-certified E_{EOL} to account for degradation over the service life of the air cleaner. This depreciation shall be determined in accordance with the manufacturer's instructions and shall be tested and verified by a third party. Any custom efficiency test procedure or test description shall be documented and approved by the authority having jurisdiction. All test results, including relevant equipment settings, shall be provided upon request.

POLICY STATEMENT DEFINING ASHRAE'S CONCERN FOR THE ENVIRONMENTAL IMPACT OF ITS ACTIVITIES

ASHRAE is concerned with the impact of its members' activities on both the indoor and outdoor environment. ASHRAE's members will strive to minimize any possible deleterious effect on the indoor and outdoor environment of the systems and components in their responsibility while maximizing the beneficial effects these systems provide, consistent with accepted Standards and the practical state of the art.

ASHRAE's short-range goal is to ensure that the systems and components within its scope do not impact the indoor and outdoor environment to a greater extent than specified by the Standards and Guidelines as established by itself and other responsible bodies.

As an ongoing goal, ASHRAE will, through its Standards Committee and extensive Technical Committee structure, continue to generate up-to-date Standards and Guidelines where appropriate and adopt, recommend, and promote those new and revised Standards developed by other responsible organizations.

Through its *Handbook*, appropriate chapters will contain up-to-date Standards and design considerations as the material is systematically revised.

ASHRAE will take the lead with respect to dissemination of environmental information of its primary interest and will seek out and disseminate information from other responsible organizations that is pertinent, as guides to updating Standards and Guidelines.

The effects of the design and selection of equipment and systems will be considered within the scope of the system's intended use and expected misuse. The disposal of hazardous materials, if any, will also be considered.

ASHRAE's primary concern for environmental impact will be at the site where equipment within ASHRAE's scope operates. However, energy source selection and the possible environmental impact due to the energy source and energy transportation will be considered where possible. Recommendations concerning energy source selection should be made by its members.

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As an industry leader in research, standards writing, publishing, certification, and continuing education, ASHRAE and its members are dedicated to promoting a healthy and sustainable built environment for all, through strategic partnerships with organizations in the HVAC&R community and across related industries.

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