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

Public Review Draft

Proposed Addendum aa to Standard 62.1-2022, Ventilation and Acceptable Indoor Air Quality

First Public Review (July 2025)
(Draft shows Proposed Changes to Current Standard)

This draft has been recommended for public review by the responsible project committee. To submit a comment on this proposed standard, go to the ASHRAE website at www.ashrae.org/standards-research--technology/public-review-drafts and access the online comment database. The draft is subject to modification until it is approved for publication by the Board of Directors and ANSI. Until this time, the current edition of the standard (as modified by any published addenda on the ASHRAE website) remains in effect. The current edition of any standard may be purchased from the ASHRAE Online Store at www.ashrae.org/bookstore or by calling 404-636-8400 or 1-800-727-4723 (for orders in the U.S. or Canada).

This standard is under continuous maintenance. To propose a change to the current standard, use the change submittal form available on the ASHRAE website, www.ashrae.org.

The appearance of any technical data or editorial material in this public review document does not constitute endorsement, warranty, or guaranty by ASHARE of any product, service, process, procedure, or design, and ASHRAE expressly disclaims such.

ASHRAE, 180 Technology Parkway, Peachtree Corners, Georgia 30092

(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 of 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 down 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 2,125 CFM to 1,125 CFM, the resultant concentration would be 30.7 µg/m3 which is below the design limit of 33 µg/m3, 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 proposed addendum 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 re-testing 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 2-year recommended change, and annual building operating hours of 3,744 hr/year 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.

[Note to Reviewers: This addendum makes proposed changes to the current standard. These changes are indicated in the text by underlining (for additions) and ~~strikethrough~~ (for deletions) except where the reviewer instructions specifically describe some other means of showing the changes. Only these changes to the current standard 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 changes.]

Addendum aa to 62.1-2022

Add new Section 6.3.4.1 under Section 6.3.4 in Addendum n to Standard 62.1-2022. Addenda to Standard 62.1-2022 are available for free download on the ASHRAE website at https://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 6-13. The E_{EOL} shall then be determined by repeating the test from Section 6.3.4 on a gas-phase filter that has been pre-loaded to the expected accumulated mass value. The E_{EOL} shall be used in Appendix F in place of E_f when calculating mass-balance removal efficiency for formaldehyde. All inputs used in Equation 6-13, along with third-party test reports, shall be provided upon request.

$$M_{ACC} = T_y P C_{bz} V_c E_f \qquad (6\text{-}13)$$

where:

M_{ACC} = Accumulated mass of contaminants, g

T_y = Annual building operating hours (Assume 3,744 hours based on 72 hours per week, unless otherwise specified) in hrs/year

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

C_{bz} = Design limit for target contaminant per Table 6-5

V_c = Airflow rate through the gas-phase filter or air cleaner, m^3/hour

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

For technologies not covered above, 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.