ADDENDA

ANSI/ASHRAE Addendum c to
ANSI/ASHRAE Standard 62.2-2022

Ventilation and Acceptable Indoor Air Quality in Residential Buildings

Approved by ASHRAE and the American National Standards Institute on May 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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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 c adds the new indoor air quality (IAQ) procedure as new Normative Appendix D. This procedure is an alternative compliance method to the ventilation rate procedure described in Section 4; thus, the requirements of Normative Appendix D shall be applicable where selected by the designer as the compliance path for Section 4. For example, with low contaminant levels, the IAQ procedure would allow the dwelling unit to be operated at lower ventilation rates than the ventilation rate procedure. It could also be used to improve IAQ when sources are unusually high.

Normative Appendix D contains two independent control requirements that must be met, described in Sections D1 and D2. Because local and acute odors are presumed controlled by Section 5 of the standard, Section D1, "Bioeffluent Control System," is based on bioeffluents and sets a minimum ventilation rate. This requirement can be met using the "people" measurement of Section 4 (7.5 cfm [3.5 L/s] per person based on bedrooms) or using a CO_2 based (DCV) system that adjusts for the actual occupancy. This section also provides a minimum ventilation rate to provide oxygen and dilute low-impact contaminants but is not intended to provide sufficient control of contaminants of concern (COCs) alone.

Section D2, "Contaminant Control System," uses a normalized harm (DALY) metric on the CoCs. For each CoC, the user has the choice of making real-time measurements or using deemed values based on design or commissioning of the dwelling. It is possible to comply with this section using no real-time measurements, but if real-time measurements are used, there must be a controlled element such as a filter, air cleaner, or ventilation system. In any case, the user must show compliance with a harm budget. This section uses a harm budget approach rather than contaminant thresholds.

The project committee has determined that only three CoCs need to be included in the harm budget: PM2.5, formaldehyde, and nitrogen dioxide. This selection was primarily based on harm intensities and typical indoor concentrations in homes (Morantes et al). Some contaminants that might have been considered were not included because they are principally outdoor contaminants or are otherwise not addressed by the existing ventilation rate procedure and thus would not be included in a method intended to be equivalent. Examples of such contaminants include ozone, radon, sulfur dioxide, mold, and the coarse fraction of PM10.

The harm budget coefficients are derived from two sources: the Morantes work on harm intensities provides the relative weighting of each contaminant, and the absolute scale of the coefficients is set to provide equivalence (on average) between the ventilation rate procedure and the IAQ procedure. That is, the scale is set such that the median home meeting the existing standard (i.e., the ventilation rate procedure) would just meet the harm budget.

This is accomplished using the median concentration from field studies performed by LBNL and PNNL. The data continues to be extended and analyzed; for now, the reference concentrations used for PM2.5, formaldehyde, and nitrogen dioxide are 8, 20, and 6 micrograms per cubic meter, respectively.

Real-time measurement for the three CoCs is allowed, but there are a variety of deemed values options provided, depending on the design. These values are generally higher than the median home but can be lower should the design warrant. Sections D2.3 to D2.5 delineate how to determine these values. For these sections, the committee used the best available published data and applied engineering judgment for the situations described.

Compliance with the IAQ procedure may include contaminant measurements either for real-time or commissioning purposes. Section D3 lists the specifications for such contaminant measurements.

Compliance with the IAQ procedure may include air cleaning to reduce some contaminants. Section D4 lists the requirements for such air cleaning.

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 c to Standard 62.2-2022

Revise Section 10, "References," as shown. The remainder of Section 10 is unchanged.

10. REFERENCES

ASHRAE
180 Technology Pkwy.
Peachtree Corners, GA 30092
(800) 527-4723; www.ashrae.org

ANSI/ASHRAE Standard 145.2-2016
Laboratory Test Method for Assessing the Performance of Gas-Phase Air-Cleaning Systems: Air-Cleaning Devices
D4.2

ASTM International 100 Barr Harbor Drive
P.O. Box C700
West Conshohocken, PA 19428-2959
(610) 832-9500

ASTM D5197 (2016)
Standard Test Method for Determination of Formaldehyde and Other Carbonyl Compounds in Air (Active Sampler Methodology)
D3.1

International Organization for Standardization (ISO)
Ch. de Blandonnet 8, CP 401
CH-1214 Vernier, Geneva, Switzerland
+41 22 749 01 11; www.iso.org

ISO 10121-2:2013
Test Methods for Assessing the Performance of Gas-Phase Air Cleaning Media and Devices for General Ventilation—Part 2: Gas-Phase Air Cleaning Devices (GPACD)
D4.2

ISO Standard 16000-3 (2011)
Indoor Air—Part 3: Determination of Formaldehyde and Other Carbonyl Compounds in Indoor Air and Test Chamber Air—Active Sampling Method
D3.1

ISO 16890 (2016)
Air Filters for General Ventilation
D4.1

United States Environmental Protection Agency (EPA)
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1200 Pennsylvania Avenue, NW
Washington, DC 20460, United States
1-919-541-0800; www.epa.gov
ENERGY STAR® 1-888-782-7937
WaterSense 1-866-987-7367 and 1-202-564-2660

EPA IP-6 (1990)
Determination of Formaldehyde or Other Aldehydes in Indoor Air [in Compendium of Methods for the Determination of Air Pollutants in Indoor Air]
D3.1

EPA TO-11 (1999)
Determination of Formaldehyde in Ambient Air Using Adsorbent Cartridge Followed by High Performance Liquid Chromatography (HPLC) [Active Sampling Methodology] [in Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Second Edition]
D3.1

Add new Normative Appendix D as shown. Note that this is a completely new appendix and not underlined for ease of reading. Reletter the existing appendices accordingly.

(This is a normative appendix and is part of the standard.)

NORMATIVE APPENDIX D
INDOOR AIR QUALITY PROCEDURE

The requirements of this appendix shall be applicable where selected by the designer as the compliance path for Section 4.

The dwelling unit systems shall meet the requirements for Sections D1 and D2. Where air cleaning efficiencies or contaminant measurements are part of the design, the appropriate Sections of D3 and D4 are also required.

D1. BIOEFFLUENT CONTROL SYSTEM

A mechanical ventilation system shall be installed and operated that meets either Section D.1.1 or D.1.2.

D1.1 Base Ventilation System. A dwelling unit mechanical ventilation system in compliance with Sections 4.1 through 4.4 or Section 4.5 is required. It shall be operated at a rate no less than that specified in Section 4.1, calculated with a floor area of zero. Use of Section 4.1.4, "Ventilation Rate Reduction for Particle Filtration," is not permitted.

D1.2 CO_2 Controlled Ventilation System. A dwelling unit mechanical ventilation system shall be provided that complies with Section 4.2 or Section 4.4 and that limits the carbon dioxide concentration to not more than 1600 ppm.

If air mixing is provided that supplies air to most of the habitable spaces, the measurement is permitted to be at a single central location provided that the air handling system or equipment operates at least 15 minutes per hour; otherwise, the measurement shall be the maximum of those made within each room of the habitable space.

This section shall not be used in the presence of air cleaning technology that would remove carbon dioxide.

D2. CONTAMINANT CONTROL SYSTEM

A contaminant control system that maintains an annual average contaminant rating (CR) of no more than 100 shall be installed and operated in accordance with the requirements of this section. Such a system shall be permitted to provide air cleaning, filtration, or other forms of source control as well as additional ventilation. It shall be permitted to be integrated with other HVAC equipment or to be independent.

D2.1 Contaminant Control Equation. Equation D-1 shall be used to determine the contaminant rating:

$$CR = W_{PM2.5}C_{PM2.5} + W_{NO2}C_{NO2} + W_{HCHO}C_{HCHO} \quad \text{(D-1)}$$

where

CR = contaminant rating (—)

$C_{PM2.5}$ = concentration of PM2.5 ($\mu g/m^3$), as determined in accordance with Section D2.2 or D2.3

C_{NO2} = concentration of nitrogen dioxide ($\mu g/m^3$) as determined in accordance with Section D2.2 or D2.5

C_{HCHO} = concentration of formaldehyde ($\mu g/m^3$) as determined in accordance with Section D2.2 or D2.4

$W_{PM2.5}$ = PM2.5 weighting, 10.3 $m^3/\mu g$

W_{NO2} = nitrogen dioxide weighting, 1.0 $m^3/\mu g$

W_{HCHO} = formaldehyde weighting, 0.7 $m^3/\mu g$

D2.2 Real-Time Concentration Measurements. Use of real-time concentration measurement methods shall be permitted for use in Equation D-1. If any real-time measurements are in use, the contaminant control system shall calculate the contaminant rating in real time, at least once every 15 minutes, and have appropriate means of reducing it, such as through increased ventilation, particle filtration, or air cleaning. If real-time concentrations are not being used for a particular contaminant, one of the alternative concentration determinations shall be used.

D2.3 Alternative Concentration Determination for PM2.5. Unless real-time measurement is being used, the concentration of PM2.5 in Equation D-1 shall be 12 $\mu g/m^3$ divided by the particle reduction factor based on the daily average filtered air delivery rate, determined in accordance with Section 7.6.

D2.4 Alternative Concentration Determination for Formaldehyde. Unless real-time measurement is being used, the concentration of formaldehyde in Equation D-1 shall be determined by default values in accordance with Section D2.4.1 or a commissioning study in accordance with Section D2.4.2.

D2.4.1 The default value for a dwelling unit in which composite wood products covered by EPA TSCA Title VI are certified to TSCA Title VI shall be 25 μg/m^3. Otherwise, the default value shall be 50 μg/m^3.

D2.4.2 The commissioning study shall be conducted post-occupancy as follows:

a. The systems intended to comply with this appendix shall be run for at least 24 hours according to the proposed system design and with the dwelling unit thermal conditioning systems operating to provide thermal comfort. The dwelling shall be occupied or unoccupied, and exterior doors and windows shall be closed. Furniture shall be present within the dwelling unit.
b. For the subsequent time period of not less than 24 hours, under the same conditions specified in Section D2.4.2a, the average concentration shall be measured and then used in Equation D-1. For direct measurement, samples shall be taken not less than every 30 minutes.

D2.5 Alternative Concentration Determination for Nitrogen Dioxide. Unless real-time measurement is being used, the concentration of nitrogen dioxide in Equation D-1 shall be determined as follows:

a. Where there is no combustion equipment in the dwelling unit, the concentration shall be set to 10 μg/m^3.
b. Where all the combustion equipment in the dwelling unit is either in the kitchen or vented, the concentration shall be set to 20 μg/m^3.
c. Where Sections D2.5.a and D2.5.b are not met and Section D.1.2 is being complied with, the concentration shall be set to 40 μg/m^3.

Otherwise, Section D2.5 shall not be used.

D3. CONTAMINANT MEASUREMENTS

Devices used to determine concentrations inside the dwelling unit shall comply with Section D3.1, D3.2, or D3.3. Where calibration is not addressed by Section D3.1, D3.2, or D3.3, devices shall be calibrated in accordance with device manufacturer's recommendations. The reported value shall not be less than instrument resolution.

D3.1 Formaldehyde. Formaldehyde concentrations shall be measured using the following test methods: ISO 16000-3, EPA TO-11, EPA IP-6, ASTM D5197, or equivalent. It is permitted to measure formaldehyde using an instrument that has an accuracy of 5 μg/m^3 at a reading of 25 μg/m^3 provided it has a cross-sensitivity to ethanol less than 1.5%.

D3.2 Carbon Dioxide. Where CO_2 sensors are used in the dwelling unit, the CO_2 sensors shall be certified by the manufacturer to be accurate within ±100 ppm at concentrations of 1600 ppm when measured at sea level at 77°F (25°C). Sensors shall be factory calibrated and certified by the manufacturer to require calibration not more frequently than once every five years.

D3.3 Other Contaminants. Devices that measure contaminants other than formaldehyde or carbon dioxide shall have a minimum accuracy of 5 μg/m^3 plus 15% of reading at the default concentration in Section D2.

D4. AIR CLEANING

Removal efficiencies shall be determined and reported in accordance with Section D4.1 or D4.2, as applicable.

D4.1 Particulates. Particulate matter filters shall report an efficiency in accordance with ANSI/ASHRAE Standard 52.2, AHRI 680, or ISO 16890.

D4.2 Gases. Gas-phase air cleaners shall report a removal efficiency for any compound they claim to address included in the design in accordance with any of the following test methods:

a. ANSI/ASHRAE Standard 145.2
b. ISO 10121-2
c. Testing by methods in Sections 6.1.2, 10.4, and 10.5 and reported as required in Section 11 of ASHRAE Standard 145.2
d. Testing to a consensus standard approved by the authority having jurisdiction
e. For technologies with compounds not covered by Sections D4.2.1, D4.2.2, D4.2.3, or D4.2., tests developed to demonstrate the removal efficiency shall be performed by a third party. The custom efficiency test shall be conducted for all compounds included in the design and shall comply with the following:
    1. Test of the background concentration without the air cleaning in operation
    2. Test of the output concentration with the air cleaning in operation
    3. Be conducted under air cleaning operating conditions that match the intended design operating conditions

    Informative Note: Air cleaning operating conditions include fan voltage, flow rate, and other settings that are consistent with the manufacturer's operating specifications.

4. Be conducted using the relevant laboratory methods for analysis and quantification as specified in Section D3

Any custom efficiency test description covering Sections D4.2.1, D4.2.2, D4.2.3, or D4.2.4 and challenge test concentration shall be documented and approved by the authority having jurisdiction. All test results along with relevant equipment settings shall be provided upon request.

D5. FAULT DETECTION

On the failure of any sensor, air cleaner, or active controller, the dwelling-unit ventilation system shall automatically revert to a Section 4-compliant mode within one hour unless the system would continue to meet the requirements of Sections D1 and D2 without that component.

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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