ANSI/ASHRAE Addenda a, c, d, and e to
ANSI/ASHRAE Standard 62.1-2010

ASHRAE ADDENDA

2011 SUPPLEMENT

Ventilation for Acceptable Indoor Air Quality

See Appendix for approval dates.

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NOTE

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FOREWORD

Research data were presented to the SSPC through the continuous maintenance process that showed that adjustments to Table 6-2 – Zone Air Distribution Effectiveness were warranted. This addendum specifies that an underfloor air distribution system that provides low velocity air at 4.5 ft above the floor (less than 50 fpm) provides improved ventilation effectiveness, allowing them to be assigned a value of 1.2 for E_z, rather than the previous value of 1.0. Related language in Table 6-2 was clarified.

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 a to 62.1-2010

Revise Table 6-2 as follows:

(The rest of Table 6-2 remains unchanged.)

TABLE 6-2 Zone Air Distribution Effectiveness

Air Distribution Configuration	E_z
Floor supply of cool air and ceiling return provided that the ~~150 fpm (0.8 m/s) supply jet reaches~~ vertical throw is greater than 50 fpm (0.25 m/s) at a height of 4.5 ft (1.4 m) or more above the floor. ~~***Note:*** Most underfloor air distribution systems comply with this proviso.~~	1.0
Floor supply of cool air and ceiling return, provided low-velocity displacement ventilation achieves unidirectional flow and thermal stratification or underfloor air distribution systems where the vertical throw is less than or equal to 50 fpm (0.25 m/s) at a height of 4.5 ft (1.4 m) above the floor.	1.2

1. "Cool air" is air cooler than space temperature.
2. "Warm air" is air warmer than space temperature.
3. "Ceiling supply" includes any point above the *breathing zone.*
4. "Floor supply" includes any point below the *breathing zone.*
5. As an alternative to using the above values, E_z may be regarded as equal to air change effectiveness determined in accordance with ANSI/ASHRAE Standard 129[16] for all air distribution configurations except unidirectional flow.

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FOREWORD

This addendum clarifies Section 5.9.2, regarding the conditions under which the ventilation system must be operated to provide exfiltration. It also changes the definition of "exfiltration" in Section 3 and modifies Section 6.2.7.1.4 to require compliance with Section 5.9.2, rather than restating requirements that may possibly become inconsistent with Section 5.9.2.

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 62.1-2010

[Revise the definition in Section 3 as follows.]

exfiltration: uncontrolled outward air leakage from conditioned spaces through unintentional openings in ceilings, floors, and walls to unconditioned spaces or the outdoors caused by pressure differences across these openings due to wind, inside-outside temperature differences (stack effect), and imbalances between ~~supply~~ outdoor and exhaust airflow rates.

[Revise Section 5.9.2 as follows.]

5.9.2 Exfiltration. For a building, the ventilation system(s) shall be designed to ensure that the minimum outdoor air intake equals or exceeds the maximum exhaust airflow ~~whenever the mechanical air conditioning systems are dehumidifying~~.

Exceptions:

a. Where excess exhaust is required by process considerations and approved by the authority having jurisdiction, such as in certain industrial facilities.

b. When outdoor air dry-bulb temperature is below the indoor space dew-point design temperature.

Note: Although individual zones within a building may be neutral or negative with respect to outdoors or to other zones, net positive mechanical intake airflow for the building as a whole reduces infiltration of untreated outdoor air.

[*Revise Section 6.2.7.1.4 as follows.]*

6.2.7.1.4 ~~When the mechanical air conditioning system is dehumidifying, t~~The current total outdoor air intake flow with respect to the coincident total exhaust airflow for the building shall comply with Section 5.9.2. ~~be no less than the coincident total exhaust airflow.~~

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FOREWORD

Standard 62.1 currently includes alternate paths for determination of ventilation supply quantities—the Ventilation Rate Procedure (VRP) and the Indoor Air Quality Procedure (IAQP). Exhaust rates, on the other hand, are specified by Table 6-4, and no performance- or demand-controlled alternative exists. This addendum was developed in response to a change proposal requesting that demand-controlled exhaust systems be allowed for enclosed garages. The SSPC was not comfortable specifying means of controlling such variable exhaust rates. The SSPC did, however, conclude that it was appropriate to add an alternate exhaust rate design procedure that allows the designer a performance path. This new performance path is similar to the IAQP but has significant differences, particularly the requirement that contaminant levels be monitored and the exhaust system be controlled to maintain contaminant concentrations at acceptable levels.

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 d to 62.1-2010

[Revise Section 6.5 as follows:]

6.5 Exhaust Ventilation. The Prescriptive Compliance Path or the Performance Compliance Path shall be used to meet the requirements of this section. Exhaust makeup air may be any combination of outdoor air, recirculated air, and transfer air.

6.5.1 Prescriptive Compliance Path. The design exhaust airflow shall be determined in accordance with the requirements in Table 6-4.

6.5.2 Performance Compliance Path. The exhaust airflow shall be determined in accordance with the following:

6.5.2.1 Contaminant Sources. Contaminants or mixtures of concern for purposes of the design shall be identified. For each contaminant or mixture of concern, indoor sources (occupants, materials, activities, and processes) and outdoor sources shall be identified, and the emission rate for each contaminant of concern from each source shall be determined.

Note: Appendix B lists information for some potential contaminants of concern.

6.5.2.2 Contaminant Concentration. For each contaminant of concern, a concentration limit and its corresponding exposure period and an appropriate reference to a cognizant authority shall be specified.

Note: Appendix B includes concentration guidelines for some potential contaminants of concern.

6.5.2.3 Monitoring and control systems shall be provided to automatically detect contaminant levels of concern and modulate exhaust airflow such that contaminant levels are maintained at no greater than the specified contaminant concentration limits.

[Revise the following contaminants in Table B-2 of Informative Appendix B as shown:]

TABLE B-2 Concentration of Interest for Selected Contaminants

(Note: References numbers that are followed by [c] and [m] list the concentrations of interest [c] and measurement methods [m].)
(Note: The user of any value in this table should take into account the purpose for which it was adopted and the means by which it was developed.)

Contaminant	Sources	Concentrations of Interest	Comments	References
Carbon Monoxide (CO)	Leaking vented combustion appliances Unvented combustion appliances Parking garages Outdoor air	9 ppm (8 h)	Based on effects on persons with coronary artery disease, average exposure for eight hours. Sustained indoor concentrations exceeding outdoor concentrations may merit further investigation. Many carbon monoxide measuring instruments have limited accuracy at low levels. Sources—burning of gasoline, natural gas, coal, oil, etc. (Note, CO is unlikely to be the only contaminant of concern in parking garages or other spaces where vehicles operate.) Health Effects—reduces ability of blood to bring oxygen to body cells and tissues; cells and tissues need oxygen to work. Carbon monoxide may be particularly hazardous to people who have heart or circulatory problems and people who have damaged lungs or breathing passages.	B-4 [c] B-9 [m]
Nitrogen Dioxide (NO_2)	Leaking vented combustion appliances Unvented combustion appliances Outdoor air Parking garages	100 μg/m^3	Based on providing protection against adverse respiratory effects, average exposure for one year. Sources—burning of gasoline, natural gas, coal, oil, etc. Cars are an important source of NO_2 outdoors and cooking and water- and space-heating devices are important sources indoors. Health Effects—lung damage, illnesses of breathing passages and lungs (respiratory system). Environmental Effects—Nitrogen dioxide is a component of acid rain (acid aerosols), which can damage trees and lakes. Acid aerosols can reduce visibility. Property Damage—Acid aerosols can eat away stone used on buildings, statues, monuments, etc.	B-4 [c] B-9 [m] B-18
		470 μg/m^3	24-hour average to prevent high exposures during use of combustion appliances such as space-heating devices and gas stoves.	B-41
Particles ($PM_{2.5}$)	Combustion products, cooking, candles, incense, resuspension, ~~and~~ outdoor air, diesel exhaust, parking garages	15 μg/m3		B-4
Volatile Organic Compounds (VOCs) (See Table B-3 for a list of selected compounds)	New building materials and furnishings Consumable products Maintenance materials Outdoor air Parking garages Refueling stations	Must be determined for each individual compound (See Table B-3 for a list of selected compounds)	Individual volatile organic compounds may be contaminants of concern in the application of the IAQ Procedure. Concentrations of concern range from less than 1 part per billion (ppb) for some very toxic compounds or for compounds having very low odor thresholds up to concentrations several orders of magnitude higher. Not all compounds can be identified, and toxicological data are incomplete for many compounds.	B-22-26, 28, 42, 43, 44 [c] B-9, 10, 21 [m] B-15, 36, 38, 39, 11

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FOREWORD

This addendum has been issued in response to a change proposal and is intended to clarify requirements for system control needed to ensure that provided ventilation rates meet the standard at all conditions.

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 e to 62.1-2010

[Add the following new definition in Section 3:]

air, primary: air supplied to the ventilation zone prior to mixing with any locally recirculated air.

[Revise Section 5.3 as follows:]

5.3 Ventilation System Controls. Mechanical ventilation systems shall include controls~~, manual or automatic, that enable the fan system to operate whenever the spaces served are occupied.~~ in accordance with the following:

5.3.1 All systems shall be provided with manual or automatic controls ~~The system shall be designed~~ to maintain no less than the ~~minimum~~ outdoor air intake flow (V_{ot})~~outdoor airflow as~~ required by Section 6, under ~~any~~all load conditions or dynamic reset conditions.

5.3.2 Systems with fans supplying variable primary air (V_{ps}), including single-zone VAV and multiple-zone-recirculating VAV systems, shall be provided with one or more of the following:

a. Outdoor air intake, return air dampers, or a combination of the two that modulate(s) to maintain no less than the outdoor air intake flow (V_{ot})
b. Outdoor air injection fans that modulate to maintain no less than the outdoor air intake flow (V_{ot})
c. Other means of ensuring compliance with Section 5.3.1

~~***Note:*** Variable Air Volume (VAV) systems with fixed outdoor air damper positions must comply with this requirement at minimum system primary airflow.~~

(This appendix 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.)

INFORMATIVE APPENDIX—
18-MONTH SUPPLEMENT: ADDENDA TO ANSI/ASHRAE STANDARD 62.1-2010

This supplement includes Addenda a, c, d, and e to ANSI/ASHRAE Standard 62.1-2010. The following table lists each addendum and describes the way in which the standard is affected by the change. It also lists the ASHRAE and ANSI approval dates for each addendum.

Addendum	Section(s) Affected	Description of Change(s)*	ASHRAE Standards Committee Approval	ASHRAE BOD Approval	ANSI Approval
a	Table 6-2, Zone Air Distribution Effectiveness	This addendum specifies that an underfloor air distribution system that provides low velocity air at 4.5 ft above the floor (less than 50 fpm) provides improved ventilation effectiveness, allowing it to be assigned a value of 1.2 for E_z rather than the previous value of 1.0. Related language in Table 6-2 was clarified.	June 26, 2010	June 30, 2010	July 1, 2010
c	3 Definitions; 5.9.2 Exfiltration; 6.2.7.1.4	This addendum clarifies Section 5.9.2 regarding the conditions under which the ventilation system must be operated to provide exfiltration. It also changes the definition of "exfiltration" in Section 3 and modifies Section 6.2.7.1.4 to require compliance with Section 5.9.2 rather than restating requirements that may possibly become inconsistent with Section 5.9.2.	January 29, 2011	February 2, 2011	February 3, 2011
d	6.5, Exhaust Ventilation; Table B-2, Concentration of Interest for Selected Contaminants	Exhaust rates are specified by Table 6-4 and no performance or demand-controlled alternative exists in the standard. This addendum was drafted in response to a change proposal requesting that demand-controlled exhaust systems be allowed for enclosed garages. The SSPC was not comfortable with specifying means of controlling such variable exhaust rates but did conclude that it was appropriate to add an alternate exhaust rate design procedure that allows the designer a performance path.	June 25, 2011	June 29, 2011	June 30, 2011
e	3 Definitions; 5.3 Ventilation System Controls	This addendum was issued in response to a change proposal and is intended to clarify requirements for system control in Section 5.3 needed to ensure that provided ventilation rates meet the standard at all conditions.	June 25, 2011	June 29, 2011	June 30, 2011

* These descriptions may not be complete and are provided for information only.

NOTE

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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.