

# STANDARD

**ANSI/ASHRAE/IES Addendum av to  
ANSI/ASHRAE/IES Standard 90.1-2022**

# Energy Standard for Sites and Buildings Except Low-Rise Residential Buildings

Approved by ASHRAE and the American National Standards Institute on December 31, 2024, and by the Illuminating Engineering Society on December 19, 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 (<https://www.ashrae.org/continuous-maintenance>).

The latest edition of an ASHRAE Standard may be purchased from the ASHRAE website ([www.ashrae.org](http://www.ashrae.org)) or from ASHRAE Customer Service, 180 Technology Parkway, Peachtree Corners, GA 30092. E-mail: [orders@ashrae.org](mailto:orders@ashrae.org). Fax: 678-539-2129. Telephone: 404-636-8400 (worldwide), or toll free 1-800-527-4723 (for orders in US and Canada). For reprint permission, go to [www.ashrae.org/permissions](http://www.ashrae.org/permissions).

© 2024 ASHRAE

ISSN 1041-2336



**ASHRAE Standard Project Committee 90.1**

**Cognizant TC: 7.6 Systems Energy Utilization**

**SPLS Liaison: Jennifer Isenbeck · ASHRAE Staff Liaison: Emily Toto · IES Liaison: Mark Lien**

Richard Lord*, <i>Chair</i>	Kurt Fester	Andrew Klein	Robert Ross*
Thomas Culp*, <i>Co-Vice Chair</i>	Francisco Flores	Vladimir Kochkin*	Armin Rudd
Leonard Sciarra*, <i>Co-Vice Chair</i>	D. Andrew Fous	Toby Lau	Marty Salzberg*
Rahul Athalye*	Phillip Gentry*	Chonghui Liu	Christopher Schaffner
William Babbington	Jason Glazer*	Emily Lorenz	Greg Schluterman
John Bade*	Melissa Goren*	Samuel Mason*	Kelly Seeger*
Sean Beilman*	David Handwork*	Merle McBride*	Wayne Stoppelmoor*
Daniel Bersohn	Rick Heiden	Benjamin Meyer*	Matthew Swenka*
Paula Cino*	David Herron*	Julian Mills-Beale	Christian Taber*
Glen Clapper	Armin Hauer	Nazme Mohsina	Steven Taylor*
Ernest Conrad*	Gary Heikkinen	Frank Morrison*	Kevin Teakell
Shannon Corcoran*	Mark Heizer*	Michael Myer	Douglas Tucker
Jay Crandell*	Emily Hoffman	Frank Myers*	Jason Vandever
Kelly Cunningham	Mike Houston*	Michael Patterson*	Martha VanGeem*
Brandon Damas*	Harold Jepsen	Timothy Peglow*	Michael Waite*
Thomas Deary	Greg Johnson*	Christopher Perry*	McHenry Wallace*
Darryl Dixon	Zac Johnson	Laura Petrillo-Groh*	Theresa Weston
Julie Donovan*	Duane Jonlin*	Michael Rhodes	Jerry White*
Craig Drumheller*	Michael Jouaneh*	Patrick Riley	Jeffrey Whitelaw
James Earley	Nathan Kahre	Michael Rosenberg*	Jeremiah Williams
Benjamin Edwards	Maria Karpman*	Steven Rosenstock*	

\* Denotes members of voting status when the document was approved for publication

---

**ASHRAE STANDARDS COMMITTEE 2024–2025**

Douglas D. Fick, <i>Chair</i>	Jaap Hogeling	Kenneth A. Monroe	Paolo M. Tronville
Adrienne G. Thomle, <i>Vice Chair</i>	Jennifer A. Isenbeck	Daniel H. Nall	Douglas K. Tucker
Hoy R. Bohanon, Jr.	Satish N. Iyengar	Philip J. Naughton	William F. Walter
Kelley P. Cramm	Phillip A. Johnson	Kathleen Owen	David P. Yuill
Abdel K. Darwich	Paul A. Lindahl, Jr.	Gwelen Paliaga	Susanna S. Hanson, <i>BOD ExO</i>
Drake H. Erbe	Julie Majurin	Karl L. Peterman	Wade H. Conlan, <i>CO</i>
Patricia Graef	Lawrence C. Markel	Justin M. Prosser	
William M. Healy	Margaret M. Mathison	Christopher J. Seeton	

Ryan Shanley, *Senior Manager of Standards*

---

**SPECIAL NOTE**

This American National Standard (ANS) is a national voluntary consensus Standard developed under the auspices of ASHRAE. *Consensus* is defined by the American National Standards Institute (ANSI), of which ASHRAE is a member and which has approved this Standard as an ANS, as “substantial agreement reached by directly and materially affected interest categories. This signifies the concurrence of more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that an effort be made toward their resolution.” Compliance with this Standard is voluntary until and unless a legal jurisdiction makes compliance mandatory through legislation.

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

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

---

**DISCLAIMER**

ASHRAE uses its best efforts to promulgate Standards and Guidelines for the benefit of the public in light of available information and accepted industry practices. However, ASHRAE does not guarantee, certify, or assure the safety or performance of any products, components, or systems tested, installed, or operated in accordance with ASHRAE's Standards or Guidelines or that any tests conducted under its Standards or Guidelines will be nonhazardous or free from risk.

---

**ASHRAE INDUSTRIAL ADVERTISING POLICY ON STANDARDS**

ASHRAE Standards and Guidelines are established to assist industry and the public by offering a uniform method of testing for rating purposes, by suggesting safe practices in designing and installing equipment, by providing proper definitions of this equipment, and by providing other information that may serve to guide the industry. The creation of ASHRAE Standards and Guidelines is determined by the need for them, and conformance to them is completely voluntary.

In referring to this Standard or Guideline and in marking of equipment and in advertising, no claim shall be made, either stated or implied, that the product has been approved by ASHRAE.

**(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 av clarifies existing building envelope alteration provisions in Section 5.1.4 and improves upon similar updates to the 2024 IECC, Chapter 5, "Existing Buildings." In some cases, the existing exceptions in Section 5.1.4 are exceptions; in other cases, they are requirements. The list of exceptions is incomplete or lacking appropriate triggers for when alteration requirements should or should not apply and to what degree. This addendum reformats the provisions of Section 5.1.4 to address alteration requirements, exceptions, triggers, and allowances to better accommodate alterations for various building thermal envelope assemblies while promoting energy efficiency improvements. It also seeks to provide flexibility in allowing deviation from the provisions for new construction by way of an "approved" design to accommodate existing building conditions that may sometimes inhibit full compliance with the envelope requirements for new construction (similar to the approach already used with roof replacements).*

**Note:** In this addendum, changes to the current standard are indicated in the text by underlining (for additions) and ~~striketrough~~ (for deletions) unless the instructions specifically mention some other means of indicating the changes.

### Addendum av to Standard 90.1-2022

**Revise Section 3.2 as shown below (add new definition).**

**approved:** acceptable to the *authority having jurisdiction*.

**Revise Section 5.1.4 as shown below.**

**5.1.4 Alterations to Building Envelopes.** *Alterations to the building envelope in accordance with Section 4.2.1.3(a) shall comply with this section, the requirements of Section 5.2 for insulation, ~~air leakage, and fenestration~~ applicable to those specific portions of the *building* that are being altered. Building envelope alterations shall not increase the energy use of the building.*

**Informative Note:** Where an *approved* design is referenced in Section 5.1.4, it is a design for a *building envelope alteration* that is sufficiently documented by a qualified entity such that the *authority having jurisdiction* can make a determination of the design's compliance with the intent of this section.

**~~Exceptions to 5.1.4:~~** ~~The following *alterations* need not comply with these requirements, provided such *alterations* will not increase the energy use of the *building*:~~

- ~~1. Installation of storm windows or glazing panels over existing glazing, provided the storm window or glazing panel contains a low-emissivity coating. However, a low-emissivity coating is not required where the existing glazing already has a low-emissivity coating. Installation is permitted to be either on the inside or outside of the existing glazing.~~
- ~~2. Replacement of glazing in existing sash and frame, provided the *U-factor* and *SHGC* will be equal to or lower than before the glass replacement.~~
- ~~3. *Alterations* to roof, wall, or floor cavities that are insulated to full depth with insulation having a minimum nominal value of R 3.0/in.~~
- ~~4. *Alterations* to walls and floors, where the existing *structure* is without framing cavities and no new framing cavities are created.~~
- ~~5. *Roof recovering*.~~
- ~~6. *Roof replacements*, where the existing *roof* insulation is integral to or is located below the *roof* deck.~~
- ~~7. *Roof replacement*, provided the area of the replacement *roof covering* complies with the *opaque* element requirements for *roofs* in Tables 5.5-0 through 5.5-8 and Section 5.5.3.1.4.~~
- ~~8. Replacement of existing *doors* that separate a *conditioned space* from the exterior shall not require the installation of a vestibule or revolving *door*, provided that an existing vestibule that separates a *conditioned space* from the exterior shall not be removed.~~
- ~~9. Replacement of existing *fenestration*, provided that the area of the replacement *fenestration* does not exceed 25% of the total *fenestration area* of an existing *building* and that the *U-factor* and *SHGC* will be equal to or lower than before the *fenestration* replacement.~~

**5.1.4.1 Roof, Ceiling, and Attic Alterations.** Alterations to the *roof*, ceiling, or attic shall comply with the following as applicable:

- a. Alterations of Roof Construction Below the Roof Deck: Insulation shall be installed where existing insulation below the *roof deck* or on an attic *envelope floor* does not comply with the insulation requirements of Section 5.2. Insulation installed in existing *roof cavities* is not required to be increased where insulated to the full depth, excluding space required for *roof ventilation*. Where such full-depth insulation is less than 75% of the *rated R-value of insulation* required by Section 5.2, compliance shall be determined by an *approved design* minimizing deviation from the insulation requirements of Section 5.2.
- b. Roof Replacement or Roof Recovering:
  1. ~~5.1.4.1~~ Roof Replacement for Roofs with Insulation Entirely Above Deck: *Roof replacement* for roofs with insulation entirely above deck shall comply with Section 5.5.3.1 and shall not be required to comply with the requirements of Section 5.4.3, and shall not increase the energy use of the building. Where the insulation requirements in Section 5.5.3.1.1 cannot be met due to existing *roof conditions*, the *roof replacement* shall be in accordance with an *approved design* minimizing deviation from the *approved construction documents* and insulation requirements of Section 5.2, which shall include:
    - a. a *roof inspection report* documenting existing *roof conditions* and
    - b. a *roof design* minimizing deviation from the requirements of Section 5.5.3.1.1.

**Informative Note:** The proposed *roof design* should be prepared by an approved entity capable of determining whether the design complies with the requirements of Section 5.1.4.1 to the extent practical.
  2. Roof Replacement for Roofs where All Insulation is Integral to or Located Below the Roof Deck: Compliance with Section 5.2 shall not be required, and the replacement roof surface shall comply with Section 5.5.3.1.4.
  3. Roof Recovering: Compliance with Section 5.2 shall not be required, and the recovered *roof surface* shall comply with Section 5.5.3.1.4.

**5.1.4.2 Fenestration Alterations.** Alterations of *fenestration* shall comply with the following as applicable:

- a. Added Fenestration Area: The addition of new vertical fenestration area or skylight area that results in total building vertical fenestration area or skylight area less than or equal to the maximum permitted by Section 5.5.4.2 shall comply with Section 5.4.2 and Sections 5.5.4.1 through 5.5.4.6, or with Section 5.6. Addition of new vertical fenestration area or skylight area that results in total building vertical fenestration area or skylight area greater than the maximum permitted by Section 5.5.4.2 shall comply with Section 5.5.4.2 for the space adjacent to the new vertical fenestration or skylight only, or comply with Section 5.6.
- b. Replacement Fenestration: Where replacement of existing *fenestration* is more than 25% of the total *fenestration area* of an *existing building*, replacement *fenestration* shall comply with Sections 5.4.2, 5.5.4.1, 5.5.4.3, 5.5.4.4, and 5.5.4.6, or with Section 5.6. Where replacement of existing *fenestration* is not more than 25% of the total *fenestration area* of an *existing building*, compliance with Section 5.5.4 shall not be required for the replacement *fenestration* provided the *U-factor* and *SHGC* is equal to or lower than before the *fenestration* replacement.
- c. Replacement Glazing: Compliance with Sections 5.4.2 and 5.5.4 shall not be required for the replacement of glazing in existing sash and frame, provided the *U-factor* and *SHGC* is equal to or lower than before the glazing replacement.
- d. Replacement Doors: Replacement of existing doors that separate a conditioned space from unconditioned space shall not require the installation of a vestibule or revolving door, provided that an existing vestibule that separates a conditioned space from unconditioned space is not removed.
- e. Storm Windows or Glazing Panels Over Existing Glazing: Installation of storm windows or glazing panels over the inside or outside of existing glazing shall be permitted and shall include a low-emissivity coating where not already present on the existing glazing.

**5.1.4.3 Above-Grade Wall Alterations.** Alterations to *above-grade walls* shall comply with the following as applicable:

- a. Wall Cavities Exposed: Insulation shall be installed where existing insulation in the *wall cavity* does not comply with the insulation requirements of Section 5.2. Insulation installed in existing *wall cavities* is not required to be increased where insulated to the full depth. Where such full-depth insulation results in less than 75% of the *rated R-value of insulation* required by Section 5.2 for the *wall cavity*, compliance shall be determined by an *approved design* minimizing deviation from the insulation requirements.

- b. Exterior Wall Covering Removed and Fenestration Replaced: Where exterior wall coverings are removed and the vertical fenestration is replaced for not less than one entire side of a building, continuous insulation shall be installed in the altered portions where required by Section 5.2 or an approved design minimizing deviation from the insulation requirements. Continuous insulation is not required where the wall cavities contain insulation that satisfies the insulation requirements of Section 5.2.
- c. Other Wall Alterations: For other wall alterations where the extent of the alteration or existing wall conditions prevent full compliance with the insulation requirements of Section 5.2, the wall alteration shall be constructed in accordance with an approved design minimizing deviation from the insulation requirements.

**5.1.4.4 Envelope Floor Alterations.** Where envelope floor cavities are exposed prior to or during alteration of an envelope floor assembly, such cavities shall be insulated in accordance with Section 5.2 or an approved design that minimizes deviation from the insulation requirements. Insulation installed in existing envelope floor cavities is not required to be increased where insulated to the full depth. Where such full-depth insulation results in less than 75% of the rated R-value of insulation required by Section 5.2, compliance shall be determined by an approved design minimizing deviation from the insulation requirements.

**5.1.4.5 Below-Grade Wall Alterations.** Where below-grade walls are altered to expose cavities, enclose existing cavities, or add finish and framing materials other than paint or similar coatings, they shall be insulated in accordance with Section 5.2 or an approved design that minimizes deviation from the insulation requirements.

**5.1.4.6 Air Barrier.** Building envelope assemblies altered in accordance with Section 5.1.4 shall have a continuous air barrier installed in accordance with Section 5.4.3.2 or an approved design. The air barrier shall be made continuous with an existing air barrier where present in adjacent assemblies provided access is unobstructed. Measurement of air leakage in accordance with Section 5.4.3.1.4 shall not be required.

## **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.

**ASHRAE · 180 Technology Parkway · Peachtree Corners, GA 30092 · [www.ashrae.org](http://www.ashrae.org)**

### **About ASHRAE**

Founded in 1894, ASHRAE is a global professional society committed to serve humanity by advancing the arts and sciences of heating, ventilation, air conditioning, refrigeration, and their allied fields.

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.

To stay current with this and other ASHRAE Standards and Guidelines, visit [www.ashrae.org/standards](http://www.ashrae.org/standards), and connect on LinkedIn, Facebook, Twitter, and YouTube.

### **Visit the ASHRAE Bookstore**

ASHRAE offers its Standards and Guidelines in print, as immediately downloadable PDFs, and via ASHRAE Digital Collections, which provides online access with automatic updates as well as historical versions of publications. Selected Standards and Guidelines are also offered in redline versions that indicate the changes made between the active Standard or Guideline and its previous edition. For more information, visit the Standards and Guidelines section of the ASHRAE Bookstore at [www.ashrae.org/bookstore](http://www.ashrae.org/bookstore).

### **IMPORTANT NOTICES ABOUT THIS STANDARD**

**To ensure that you have all of the approved addenda, errata, and interpretations for this Standard, visit [www.ashrae.org/standards](http://www.ashrae.org/standards) to download them free of charge.**

**Addenda, errata, and interpretations for ASHRAE Standards and Guidelines are no longer distributed with copies of the Standards and Guidelines. ASHRAE provides these addenda, errata, and interpretations only in electronic form to promote more sustainable use of resources.**