

# ADDENDA

**ANSI/ASHRAE/IES Addendum ce 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 May 30, 2025; and by the Illuminating Engineering Society on May 2, 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 (<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).

© 2025 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>	Benjamin Edwards	Nathan Kahre	Robert Ross*
Thomas Culp*, <i>Co-Vice Chair</i>	Kurt Fester	Maria Karpman*	Marty Salzberg*
Leonard Sciarra*, <i>Co-Vice Chair</i>	Francisco Flores	Andrew Klein	Christopher Schaffner
Rahul Athalye*	D. Andrew Fouss	Vladimir Kochkin*	Greg Schluterman
William Babbington	Phillip Gentry*	Toby Lau	Kelly Seeger*
John Bade*	Jason Glazer*	Chonghui Liu	Wayne Stoppelmoor*
Sean Beilman*	Melissa Goren*	Emily Lorenz	Matthew Swenka*
Daniel Bersohn	Skye Gruen	Samuel Mason*	Christian Taber*
Paula Cino*	Charles Haack*	Benjamin Meyer*	Steven Taylor*
Glen Clapper	David Handwork*	Julian Mills-Beale	Kevin Teakell
Ernest Conrad*	Armin Hauer	Nazme Mohsina	Douglas Tucker
Shannon Corcoran*	Rick Heiden	Frank Morrison*	Jason Vandever
Jay Crandell*	Gary Heikkinen	Michael Myer	Martha VanGeem*
Kelly Cunningham	Mark Heizer*	Frank Myers*	Michael Waite*
Brandon Damas*	David Herron*	Michael Patterson*	McHenry Wallace*
Hayley Davis	Mike Houston*	Timothy Peglow*	Theresa Weston
Thomas Deary*	Harold Jepsen*	Christopher Perry*	Jerry White*
Darryl Dixon	Greg Johnson*	Laura Petrillo-Groh	Jeffrey Whitelaw
Julie Donovan*	Zac Johnson	Patrick Riley	Jeremiah Williams
Craig Drumheller*	Duane Jonlin*	Michael Rosenberg*	
James Earley	Michael Jouaneh*	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 objections on informative material are not offered the right to appeal at ASHRAE or ANSI.)

## FOREWORD

*The intent of the original language related to rotating the baseline model four times was to provide an incentive for good orientation of a building's facades with large window areas. Along with this was the concept that rotating a building is generally simple to do in most simulation programs by simply changing the overall orientation of the building and rerunning the simulation. The existing language has been interpreted by some people to mean that all the rules of creating a baseline are repeated for each rotation—essentially exercising the Appendix G rules four times—but that creates additional work and may be counter to the original intent of rewarding good orientation. Most modelers follow this original intent already, and now Addendum ce includes changes to more clearly reflect the intended language. Of four software program vendors that were contacted that provide some automation for Appendix G, three of them were supportive of the proposed clarification. Similar changes were made in Section 12 and Appendix C. In addition, a change to how the shading should be performed to provide incentives for buildings intending to shade themselves has been added.*

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

## Addendum ce to Standard 90.1-2022

**Modify Table 12.5.1, #5 “Building Envelope,” Column B as shown.**

- d. No shading projections are to be modeled. *Manual fenestration* shading devices such as blinds or shades are not required to be modeled. *Automatically controlled fenestration* shading devices shall not be modeled. *Fenestration* shall be assumed to be flush with the wall or roof. If the fenestration area for new buildings or additions exceeds the maximum allowed by Section 5.5.4.2, the area shall be reduced proportionally along each exposure until the limit set in Section 5.5.4.2 is met. If the vertical fenestration area facing west or east of the proposed design exceeds the area limit set in Section 5.5.4.5 then the energy cost budget shall be generated by simulating the budget building design with its actual orientation and again after rotating the entire budget building design 90, 180, and 270 degrees and then averaging the results. calculated by averaging the results from simulating the *budget building design* with its actual orientation and again after rotating the entire building model 90, 180, and 270 degrees. Changes to the building azimuth, or azimuths of all surfaces, shall be made for the building model for the 90, 180, or 270 degree simulations. Changes to the equipment capacities, airflow rates, and water flow rates shall be made for the building model for the 90, 180, or 270 degree simulations for those modeling inputs sized by the simulation software. No other changes to the building model for the 90, 180, or 270 degree simulations shall be made. All budget rules, including HVAC system type and equipment efficiencies, shall be determined based solely on the *building's* actual orientation. The *building* shall be modeled so that it does not shade itself. Fenestration U-factor shall be equal to the criteria from Tables 5.5-0 through 5.5-8 for the appropriate climate, and the SHGC shall be equal to the criteria from Tables 5.5-0 through 5.5-8 for the appropriate climate. For portions of those tables where there are no SHGC requirements, the SHGC shall be equal to that determined in accordance with Section C3.6(d). The VT shall be equal to that determined in accordance with Section C3.6(d). The fenestration model for building envelope alterations shall reflect the limitations on area, U-factor, and SHGC as described in Section 5.1.4.

**Revise Section C3.6 as shown.**

### C3.6 Calculation of Base Envelope Performance Factor

[...]

d. [...]

2. Where the fenestration area facing west or east of the proposed design exceeds the area limit set in Section 5.5.4.5, the baseline building performance shall be generated by simulating the building with its actual orientation and again after rotating the entire building 90, 180, and 270 degrees and averaging the results of the four simulations. The *base envelope performance factor* shall be calculated by

averaging the results from simulating the *proposed design* with its actual *orientation* and again after rotating the entire building model 90, 180, and 270 degrees. Changes to the building azimuth, or azimuths of all surfaces, shall be made for the building model for the 90, 180, or 270 degree simulations. Changes to the equipment capacities, airflow rates, and water flow rates shall be made for the building model for the 90, 180, or 270 degree simulations for those modeling inputs sized by the simulation software. No other changes to the building model for the 90, 180, or 270 degree simulations shall be made. All rules for determining the *base envelope performance factor* shall be determined based solely on the *building's* actual orientation.

***Revise Table G3.1, #5 "Building Envelope," Column B as shown.***

- a. Orientation. The *baseline building performance* shall be ~~generated by simulating the *building* with its actual *orientation* and again after rotating the entire *building* 90, 180, and 270 degrees, then averaging the results.~~ calculated by averaging the results from simulating the *baseline building design* with its actual *orientation* and again after rotating the entire *building* model 90, 180, and 270 degrees. Changes to the building azimuth, or azimuths of all surfaces, shall be made for the building model for the 90, 180, or 270 degree simulations. Changes to the equipment capacities, airflow rates, and water flow rates shall be made for the building model for the 90, 180, or 270 degree simulations for those modeling inputs sized by the simulation software. No other changes to the building model for the 90, 180, or 270 degree simulations shall be made. All baseline rules, including HVAC system type and equipment efficiencies, shall be determined based solely on the *building's* actual orientation. The *building* shall be modeled so that it does not shade itself and is not shaded by any adjacent buildings, site topography, or local shading devices.

**Exceptions to (a):**

1. If it can be demonstrated to the satisfaction of the *rating authority* that the *building orientation* is dictated by site considerations.
2. Buildings where the vertical fenestration area on each orientation varies by less than 5%.

## **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.**