

# ADDENDA

**ANSI/ASHRAE/IES Addendum f to  
ANSI/ASHRAE/IES Standard 90.1-2019**

# Energy Standard for Buildings Except Low-Rise Residential Buildings

Approved by ASHRAE and the American National Standards Institute on February 26, 2021, and by the Illuminating Engineering Society on February 18, 2021.

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 on the ASHRAE website ([www.ashrae.org](http://www.ashrae.org)) or from ASHRAE Customer Service, 180 Technology Parkway NW, 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).

© 2021 ASHRAE

ISSN 1041-2336



**ASHRAE Standard Project Committee 90.1**  
**Cognizant TC: 7.6 Systems Energy Utilization**  
**SPLS Liaison: Charles Barnaby**  
**ASHRAE Staff Liaisons: Emily Toto**  
**IES Liaison: Mark Lien**

Donald Brundage*, <i>Chair</i>	Phillip Gentry	Andrew Klein	Michael Rosenberg*
Thomas Culp*, <i>Co-Vice Chair</i>	Jason Glazer*	Vladimir Kochkin*	Steven Rosenstock*
Richard Lord*, <i>Co-Vice Chair</i>	Melissa Goren	Michael Lane*	Loren Ross*
Rahul Athalye	Krishnan Gowri	Toby Lau	Robert Ross*
William Babbington	Aaron Guzner	Chonghui Liu	Martha Salzberg*
John Bade	David Handwork*	Joel Martell*	Greg Schluterman
Sean Beilman*	Armin Hauer	Samuel Mason	Amy Schmidt
Jeffrey Boldt*	Gary Heikkinen	Christopher Mathis*	Leonard Sciarra*
Scott Campbell	Mark Heizer	Merle McBride	Kelly Seeger*
Elizabeth Cassin	David Herron*	James McClendon*	Sean Smith
Paula Cino	Scott Hintz*	Benjamin Meyer*	Wayne Stoppelmoor*
Glen Clapper	Emily Hoffman	Darren Meyers	Matthew Swenka
Ernest Conrad*	Mike Houston*	Harry Misuriello	Christian Taber*
Shannon Corcoran*	Jonathan Humble*	Frank Morrison*	Steven Taylor*
Jay Crandell*	Michael Ivanovich	Michael Myer	Douglas Tucker
Brandon Damas*	Harold Jepsen	Frank Myers*	Martha VanGeem*
Julie Donovan*	Greg Johnson	Michael Patterson*	McHenry Wallace*
Craig Drumheller*	David Fouss	Timothy Peglow*	Jerry White*
Charles Foster	Duane Jonlin*	Tien Peng	Jeremiah Williams*
Chad Johnson	Michael Jouaneh	Christopher Perry*	
David Fouss	Maria Karpman	Laura Petrillo-Groh*	

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

---

**ASHRAE STANDARDS COMMITTEE 2020–2021**

Drury B. Crawley, <i>Chair</i>	Susanna S. Hanson	Cesar L. Lim	Christian R. Taber
Rick M. Heiden, <i>Vice Chair</i>	Jonathan Humble	James D. Lutz	Russell C. Tharp
Els Baert	Srinivas Katipamula	Karl L. Peterman	Theresa A. Weston
Charles S. Barnaby	Gerald J. Kettler	Erick A. Phelps	Craig P. Wray
Robert B. Burkhead	Essam E. Khalil	David Robin	Jaap Hogeling, <i>BOD ExO</i>
Thomas E. Cappellin	Malcolm D. Knight	Lawrence J. Schoen	William F. McQuade, <i>CO</i>
Douglas D. Fick	Jay A. Kohler	Steven C. Sill	
Walter T. Grondzik	Larry Kouma	Richard T. Swierczyna	

Connor Barbaree, *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

*Historically, the required efficiency increases to eliminate economizer has been a point of confusion for the industry. The confusion stems from whether you need to increase both the full load efficiency and part-load efficiency or just the part-load efficiency of the equipment. Additionally, if the metric is not in the format of work out divided by energy in (e.g., IPLV), then you could get different efficiency levels required based on how you do the math. The changes made by Addendum f address both issues. The language was also changed to allow for a broader range of rating metrics that are being utilized in different rating standards.*

*There is no cost impact to this revision, as it only clarifies use of the standard.*

**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 f to Standard 90.1-2019

**Modify the standard as follows (I-P units).**

**Table 6.5.1-2 Eliminate Required Economizer for Comfort Cooling by Increasing Cooling Efficiency**

Climate Zone	Efficiency Improvement <sup>a</sup>
2A	17%
2B	21%
3A	27%
3B	32%
3C	65%
4A	42%
4B	49%
4C	64%
5A	49%
5B	59%
5C	74%
6A	56%
6B	65%
7	72%
8	77%

a. If a unit is rated with an annualized or part-load metric IPLV, IEER, or SEER, then to eliminate the required economizer, only the annualized or part-load minimum cooling efficiency of the HVAC-unit must be increased by the percentage shown. If the HVAC-unit is only rated with a full-load metric like EER cooling then these must be increased by the percentage shown. To determine the efficiency required to eliminate the economizer when the unit equipment efficiency is rated with an energy-input divided by a thermal-output metric, the metric shall first be converted to COP by the efficiency improvement percentage shown. The COP shall then be converted back to the original rated metric to establish the efficiency required to eliminate the economizer.

**Informative Note:** Some examples of annualized or part-load metrics are: IPLV, IP, IEER, and SEER.

**Modify the standard as follows (SI units).**

**Table 6.5.1-2 Eliminate Required Economizer for Comfort Cooling by Increasing Cooling Efficiency**

Climate Zone	Efficiency Improvement <sup>a</sup>
2A	17%
2B	21%
3A	27%
3B	32%
3C	65%
4A	42%
4B	49%
4C	64%
5A	49%
5B	59%
5C	74%
6A	56%
6B	65%
7	72%
8	77%

a. If a unit is rated with an annualized or part-load metric *IPLV*, *ICOP*, or *ISCOP*, then to eliminate the required economizer, only the annualized or part-load minimum cooling efficiency of the HVAC unit must be increased by the percentage shown. If the HVAC unit is only rated with a full-load metric like *COP* cooling then these must be increased by the percentage shown.

**Informative Note:** Some examples of annualized or part-load metrics are: *IPLV*, *SI*, *ISCOP<sub>C</sub>*, and *SCOP<sub>C</sub>*.

## **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 NW · 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 version. 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.**