ADDENDA

ANSI/ASHRAE/IES Addendum ct to
ANSI/ASHRAE/IES Standard 90.1-2013

Energy Standard for Buildings Except Low-Rise Residential Buildings

Approved by the ASHRAE Standards Committee on June 25, 2016; by the ASHRAE Technology Council on June 29, 2016; by the IES Board of Directors on June 27, 2016; and by the American National Standards Institute on June 30, 2016.

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. The change submittal form, instructions, and deadlines may be obtained in electronic form from the ASHRAE website (www.ashrae.org) or in paper form from the Senior Manager of Standards.

The latest edition of an ASHRAE Standard may be purchased on the ASHRAE website (www.ashrae.org) or from ASHRAE Customer Service, 1791 Tullie Circle, NE, Atlanta, GA 30329-2305. E-mail: 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.

© 2016 ASHRAE ISSN 1041-2336

ASHRAE® IES Illuminating ENGINEERING SOCIETY Approved American National Standard ANSI www.ansi.org

ASHRAE Standing Standard Project Committee 90.1
Cognizant TC: 7.6, Systems Energy Utilization
SPLS Liaison: Roger Hedrick
ASHRAE Staff Liaison: Steven C. Ferguson
IES Liaison: Rita M. Harrold

Drake Erbe*, *Chair*	Harry Misuriello*	John Dunlap
Thomas Culp*, *Vice-Chair*	Frank Morrison*	Chuck Foster
Richard, Lord*, *Vice-Chair*	Frank Myers*	Sam Francis
Peter Baselici *	Ron Nickson*	John Green
Sean Beilman*	Tim Peglow*	Chad Groshart
Jeff Boldt*	Eric Richman*	David Handwork
Ernie Conrad*	Steve Rosenstock*	Stan Harbuck
Charles Cottrell*	Bob Ross*	Mike Houston
Jay Crandall*	Marty Salzburg*	Richard Hermans
Craig Drumheller*	Leonard Sciarra*	Michael Ivanovich
Jim Garrigus*	Frank Stanonik*	Hy Kaplan
Jason Glazer*	Wayne Stoppelmoor*	Neil Leslie
Krishnan Gowri*	Christian Taber*	Merle McBride
Pekka Hakkarainen*	William Talbert*	Benjamin Meyer
Susanna Hanson*	Steven Taylor*	Keith Nelson
Richard Heinisch*	Martha VanGeem*	Steve Orlowski
Ned Heminger*	McHenry Wallace*	Amy Schmidt
Dave Herron*	Jerry White*	David Shepherd
Scott Hintz*	Jeremy Williams*	Don Surrena
John Hogan*	Karim Amrane	Stephen Szoke
Jonathan Humble*	Gary Ash	Mike Tillou
Itzhak Maor*	Joseph Brooks	Doug Tucker
Chris Mathis*	Don Brundage	Richard Watson
Michael Mehl*	Brandon Damas	Jason Wilen

** Denotes voting member at time of publication.*

ASHRAE STANDARDS COMMITTEE 2015–2016

Douglass T. Reindl, *Chair*
Rita M. Harrold, *Vice-Chair*
James D. Aswegan
Niels Bidstrup
Donald M. Brundage
John A. Clark
Waller S. Clements
John F. Dunlap
James W. Earley, Jr.
Keith I. Emerson
Steven J. Emmerich
Julie M. Ferguson
Walter T. Grondzik
Roger L. Hedrick
Srinivas Katipamula
Rick A. Larson
Lawrence C. Markel
Arsen K. Melikov
Mark P. Modera
Cyrus H. Nasseri
Heather L. Platt
David Robin
Peter Simmonds
Dennis A. Stanke
Wayne H. Stoppelmoor, Jr.
Jack H. Zarour
Julia A. Keen, *BOD ExO*
James K. Vallort, *CO*

Stephanie C. Reiniche, *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 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.

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.

© ASHRAE (www.ashrae.org). For personal use only. Additional reproduction, distribution,
or transmission in either print or digital form is not permitted without ASHRAE's prior written permission.

(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

While water is the most popular heat transfer fluid in economizers that indirectly cool supply air and reject heat to the atmosphere, any fluid may be used. Lately products using refrigerant as the fluid have come onto the market. These products still have to meet the same requirements for sizing and integration as economizers using water as the fluid.

This addendum makes proposed changes to the current standard. These changes are indicated in the text by underlining (for additions) and ~~strikethrough~~ (for deletions) except where the reviewer instructions specifically describe some other means of showing the changes.

Addendum ct to 90.1-2013

Revise definitions in Section 3 as follows (I-P and SI):

water economizer: see *economizer, fluid.*

economizer, ~~water~~fluid: a system by which the supply air of a cooling system is cooled indirectly with ~~water~~ a fluid that is itself cooled by heat or mass transfer to the environment without the use of mechanical cooling. Examples of commonly used fluids are water, glycol mixtures, and refrigerants.

Revise Table 6.5.1-3 as follows ((I-P and SI):

Table 6.5.1-3 Eliminate Required Economizer for Comfort Cooling by Increasing Cooling Efficiency

Climate Zone	Efficiency Improvement[a]
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 IPLV, IEER, or SEER then to eliminate the required ~~air or water~~ economizer, the 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

© ASHRAE (www.ashrae.org). For personal use only. Additional reproduction, distribution,
or transmission in either print or digital form is not permitted without ASHRAE's prior written permission.

Revise Section 6.5.1 as follows (I-P and SI):

6.5.1 Economizers. Each cooling system that has a fan shall include either an air or ~~water~~ fluid economizer meeting the requirements of Sections 6.5.1.1 through 6.5.1.6.

Revise Section 6.5.1.2 as follows (I-P and SI):

6.5.1.2 ~~Water~~ Fluid Economizers

6.5.1.2.1 Design Capacity. ~~Water~~ Fluid economizer systems shall be capable of providing up to 100% of the expected system cooling load at outdoor air temperatures of 50°F dry bulb/45°F wet bulb and below.
Exceptions:
1. Systems primarily serving computer rooms in which 100% of the expected system cooling load at the dry-bulb and wet-bulb listed in Table 6.5.1.2.1 is met with ~~evaporative water~~ water-cooled fluid economizers
2. Systems primarily serving computer rooms in which 100% of the expected system cooling load at the dry-bulb temperatures listed in Table 6.5.1.2.1 is met with ~~dry cooler water~~ air-cooled fluid economizers
3. Systems where dehumidification requirements cannot be met using outdoor air temperatures of 50°F dry-bulb/45°F wet-bulb and where 100% of the expected system cooling load at 45°F dry-bulb/40°F wet-bulb is met with ~~evaporative water~~ water-cooled fluid economizers

6.5.1.2.2 Maximum Pressure Drop. Precooling coils and ~~water~~fluid-to-water heat exchangers used as part of a ~~water~~ fluid economizer system shall either have a water-side pressure drop of less than 15 ft of water, or a secondary loop shall be created so that the coil or heat exchanger pressure drop is not seen by the circulating pumps when the system is in the normal cooling (noneconomizer) mode.

Revise Table 6.5.1.2.1 as follows (I-P and SI):

TABLE 6.5.1.2.1 ~~Water~~ Fluid Economizer Sizing Dry-Bulb and Wet-Bulb Requirements for Computer Rooms

Zone	~~Evaporative Water~~ Water-Cooled Economizer		~~Dry Cooler Water~~Air-Cooled Economizer
	Dry Bulb, °F	Wet Bulb, °F	Dry Bulb, °F

Revise Section 6.5.1.6 as follows (I-P and SI):

6.5.1.6 Economizer Humidification System Impact. Systems with hydronic cooling and humidification systems designed to maintain inside humidity at a dew-point temperature greater than 35°F shall use a ~~water~~ fluid economizer if an economizer is required by Section 6.5.1.

6.5.4.5.1 Each hydronic heat pump and water-cooled unitary air-conditioner shall have a two-position automatic valve interlocked to shut off water flow when the compressor is off.
Exception: Units employing ~~water~~ fluid economizer

Revise Section 11.5.2 as follows (I-P and SI):

e. Budget building systems as listed in Table 11.5.2-1 shall have outdoor air economizers or ~~water~~ fluid economizers, the same as in the proposed building, in accordance with Section 6.5.1. The high-limit shutoff shall be in accordance with Table 11.5.2-4.

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 · 1791 Tullie Circle NE · Atlanta, GA 30329 · www.ashrae.org

8/16