STANDARD

ANSI/ASHRAE/IES Standard 100-2015
(Supersedes ANSI/ASHRAE/IESNA Standard 100-2006)

Energy Efficiency in Existing Buildings

Approved by the ASHRAE Standards Committee on January 28, 2015; by the ASHRAE Board of Directors on January 28, 2015; by the Illuminating Engineering Society on February 1, 2015; and by the American National Standards Institute on February 2, 2015.

This standard is under continuous maintenance 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 from 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.

 ISSN 1041-2336

ASHRAE®

IES Illuminating ENGINEERING SOCIETY

Approved American National Standard ANSI www.ansi.org

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

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.

CONTENTS

ANSI/ASHRAE/IES Standard 100-2015, Energy Efficiency in Existing Buildings

NOTE

Approved addenda, errata, or interpretations for this standard can be downloaded free of charge from the ASHRAE Web site at www.ashrae.org/technology.

(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

This revision of ANSI/ASHRAE/IES Standard 100-2006 provides greater guidance and a more comprehensive approach to the retrofit of existing buildings for increased energy efficiency, and also brings the standard in line with other published ASHRAE documents, specifically ANSI/ASHRAE/IES Standard 90.1-2013, Energy Standard for Buildings Except Low-Rise Residential Buildings, *and the 2011* ASHRAE Handbook—HVAC Applications.

The revised standard provides comprehensive and detailed descriptions of the processes and procedures for the retrofit of existing residential and commercial buildings in order to achieve greater measured energy efficiency. The standard addresses major and minor modifications for both residential and commercial buildings. It addresses single and multiple activity buildings with variable occupancy periods (one shift, two shift, three shift) and it identifies the approach for 53 building types (per CBECS and RECS) in 17 climate zones/subzones. At the same time, it identifies requirements for buildings with energy targets undergoing major retrofit and for buildings without energy targets (mostly industrial, agricultural, and special laboratories) and provides multiple levels of compliance. The standard is not intended to be a rating system, such as those defined by ASHRAE or EPA. This standard directly addresses a building's energy-use efficiency in a quantitative manner and provides a means to improve that efficiency with an objective benchmark.

Included in the revised standards are criteria for energy-use surveys and auditing and requirements related to implementation and verification. Appendices are included for life-cycle cost analysis procedures as well as identification of potential energy conservation measures.

Recognizing that the actual occupancy of the building plays a key role in its performance, the standard establishes the need for development of an energy management plan and an operation and maintenance program. It also addresses the requirements for ongoing commissioning.

The standard takes advantage of the fact that any building that has been in operation for at least twelve months can quickly determine its performance relative to some benchmark, which is defined in the standard as an energy-use intensity target. This concept is the new paradigm for energy-conscious design, construction, and operation of buildings.

1. PURPOSE

1.1 This standard provides criteria that will result in energy efficiency in existing buildings.

1.2 This standard is directed toward providing procedures and programs essential to energy efficient operation, maintenance, management, and monitoring; increasing the energy efficiency of the energy-using systems and components; and upgrading the thermal performance of the building envelope.

2. SCOPE

This standard applies to existing buildings, portions of buildings, and building complexes, including the envelope and all systems in the building. This standard excludes industrial and agricultural processes in buildings for which the energy targets do not include those processes.

3. DEFINITIONS

3.1 General

Certain terms, abbreviations, and acronyms are defined in this section for the purposes of this standard. These definitions are applicable to all sections of this standard.

Terms that are not defined herein, but that are defined in standards that are referenced herein shall have the meanings as defined in those standards.

Other terms that are not defined shall have their ordinarily accepted meanings within the context in which they are used. Ordinarily accepted meanings shall be based upon American Standard English language usage, as documented in an unabridged dictionary accepted by the authority having jurisdiction.

analog control: a control loop in which data is expressed or measured by means of one or more physical properties that can express any value along a continuous scale. All types of control systems may provide analog control.

authority having jurisdiction (AHJ): the agency or agent responsible for enforcing this standard.

baseline: the first-year energy-use intensity for the building at the beginning of the compliance determination process.

binary control: a control loop in which there are only two states—for example, on-off or open-closed.

building: a structure, including mobile homes, manufactured homes, and other factory-built buildings, wholly or partially enclosed within exterior walls, or within exterior and party walls, and a roof, that affords shelter to persons, animals, or property.

building manager: the person responsible for maintaining the building, its envelope, and its energy-using systems. The building manager may also be the person responsible for expending funds on capital improvements to the building.

building operator: the person or persons who have responsibility to inspect, operate, and maintain the building systems and components that fall within the scope of this standard. The building operator may be an employee of the building owner, the building manager, or a contractor.

building owner: the holder of the property title for the building and/or the land upon which the building sits.

capital management plan: a financial plan to set aside capital to replace or upgrade building systems at the end of their useful life and/or to improve performance and energy efficiency.