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.
SPECIAL NOTE

This American National Standard (ANS) is a national voluntary consensus standard developed under the auspices of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (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.
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### 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.
FOREWORD

The original Standard 90 was published in 1975 and revised editions were published in 1980, 1989, and 1999 using the ANSI and ASHRAE periodic maintenance procedures. Based upon these procedures, the entire standard was publicly reviewed and published in its entirety each time. As technology and energy prices began changing more rapidly the ASHRAE Board of Directors voted in 1999 to place the standard on continuous maintenance, permitting the standard to be updated several times each year through the publication of approved addenda to the standard. Starting with the 2001 edition, the standard is now published in its entirety in the fall of every third year. This schedule allows the standard to be submitted and proposed by the deadline for inclusion or reference in model building and energy codes. All approved addenda and errata are included in the new edition, issued every three years. This procedure allows users to have some certainty of the timing of publication of new editions.

The 2010 edition of the standard has extensive changes resulting from continuous maintenance proposals from the public and the committee volunteers. The committee welcomes suggestions for improving the standard. Users of the standard are encouraged and invited to use the continuous maintenance procedure to suggest changes. A form for submitting continuous maintenance proposals (CMP) to suggest changes is included in the back of this standard. The committee takes formal action on every CMP received.

The Committee’s unanimously approved Workplan goal for the 2010 edition was to reduce energy cost by 30% compared to the 2004 version of the standard. Toward that goal, 109 addenda were processed by the committee and approved by the ASHRAE and IES Boards of Directors and are included in this edition. This edition also corrects all known typographical errors in the 2007 standard.

The most significant changes included are:

1. The Scope has been expanded so that 90.1 can cover receptacles and process loads (e.g., data centers).
2. The building envelope (opaque elements and fenestration) requirements have become more stringent. Continuous air barrier and cool/high albedo roof requirements have been added.
3. Most interior lighting power densities have been lowered, additional occupant sensing controls and mandatory daylighting requirements are added for specific spaces, and a new five-zone exterior lighting power density table has been added.
4. Most equipment efficiencies are higher. Energy recovery is required in more applications, economizers are required in more climates, and more energy-conserving controls are required.
5. Modeling requirements (e.g., for LEED® certification) have been clarified and expanded.

For brief descriptions and publication dates of the addenda to 90.1-2007, see Appendix F.

At the time of printing, energy cost savings are estimated to be 23.4% and energy savings are estimated at 24.8%. However, not all addenda had been included in analysis for these energy savings estimates. Final saving estimates will be issued by ASHRAE when available.

The 90.1 standard is a fluid document. As technology evolves the project committee is continually considering new changes and proposing addenda for public review. When addenda are approved, notices will be published on the ASHRAE and IES Web sites. Users are encouraged to sign up for the free ASHRAE and IES Internet Listserv for this standard to receive notice of all public reviews and approved and published addenda and errata.

The Chair and Vice Chairs extend grateful thanks to the committee volunteers, public review commentors, and all involved throughout the open, consensus-building process.

1. PURPOSE

To establish the minimum energy efficiency requirements of buildings, other than low rise residential buildings, for:

1. design, construction, and a plan for operation and maintenance, and
2. utilization of on-site, renewable energy resources.

2. SCOPE

2.1 This standard provides:

a. minimum energy-efficient requirements for the design, construction, and a plan for operation and maintenance of:
   1. new buildings and their systems
   2. new portions of buildings and their systems
   3. new systems and equipment in existing buildings
   4. new equipment or building systems specifically identified in the standard that are part of industrial or manufacturing processes

b. criteria for determining compliance with these requirements.

2.2 The provisions of this standard do not apply to:

a. single-family houses, multi-family structures of three stories or fewer above grade, manufactured houses (mobile homes), and manufactured houses (modular), or
b. buildings that use neither electricity nor fossil fuel.

2.3 Where specifically noted in this standard, certain other buildings or elements of buildings shall be exempt.

2.4 This standard shall not be used to circumvent any safety, health, or environmental requirements.