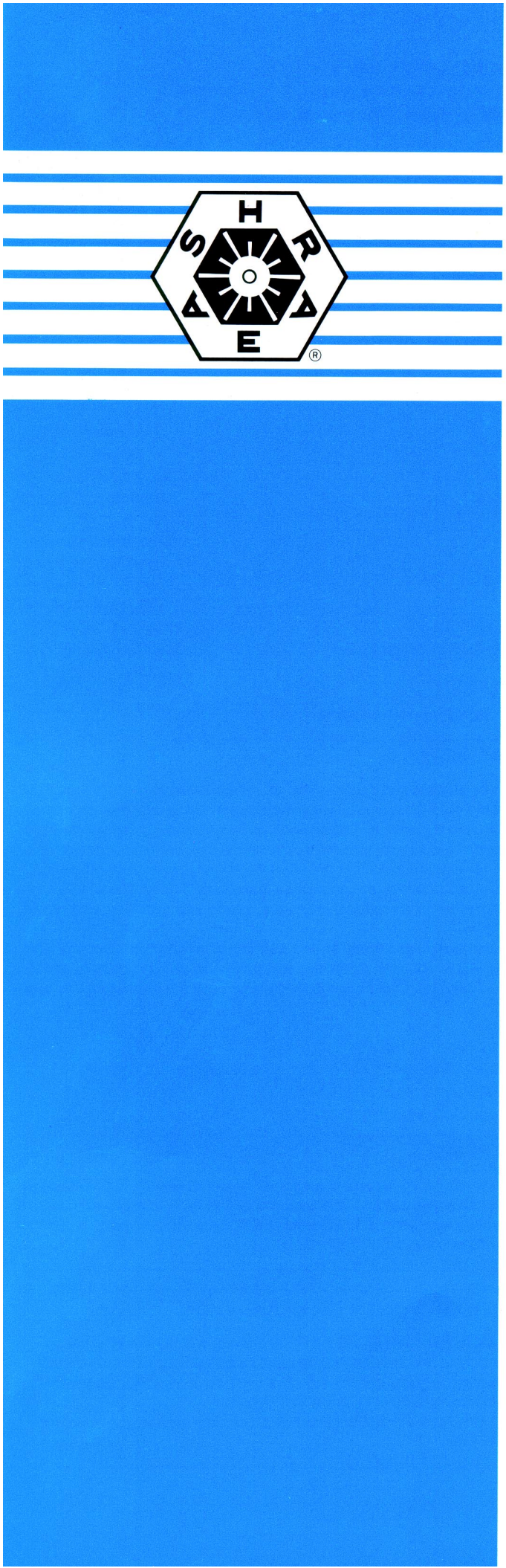

ANSI/ASHRAE/IESNA Standard 90.1-1999
(with minor editorial changes)

ASHRAE® STANDARD

Energy Standard for Buildings Except Low-Rise Residential Buildings

I-P Edition

Approved by the ASHRAE Standards Committee June 19, 1999; by the ASHRAE Board of Directors June 24, 1999; and by the American National Standards Institute April 4, 2000.

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 are given at the back of this document and may be obtained in electronic form from ASHRAE's Internet Home Page, *http://www.ashrae.org*, or in paper form from the Manager of Standards. The latest edition of an ASHRAE Standard and printed copies of a public review draft may be purchased from ASHRAE Customer Service, 1791 Tullie Circle, NE, Atlanta, GA 30329-2305. E-mail: *orders@ashrae.org*. Fax: 404-321-5478. Telephone: 404-636-8400 (worldwide), or toll free 1-800-527-4723 (for orders in U.S. and Canada).

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NOTE

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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,
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c. offering constructive criticism for improving the Standard,
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When addenda or interpretations to this standard have been approved, they can be downloaded free of charge from the ASHRAE Home Page at *www.ashrae.org/STANDARDS/addenda.htm* or *www.ashrae.org/STANDARDS/intpstd.htm*.

CONTENTS

ASHRAE/IESNA 90.1-1999
Energy Standard for Buildings Except Low-Rise Residential Buildings

SECTION **PAGE**

(This forward is not part of this standard but is included for information purposes only.)

FORWARD

Initial development of *ASHRAE/IESNA Standard 90.1-1999* began in early 1990 following the publication of *ASHRAE/IESNA Standard 90.1-1989*. A group consisting of the existing project committee members and other interested persons sat down to begin mapping out a strategy for the development of the successor to the 1989 standard. Drawing upon the lessons learned from the recently completed 1989 standard, this group identified the need for a consistent approach to be used in evaluating criteria for the next version of the standard. Two key decisions were reached by this group: (1) economics should be used as the basis for informing the professional judgment of the project committee in setting the criteria, and (2) all sections of the new standard should apply the economic approach as consistently as possible to ensure that the standard was balanced among the respective sections (e.g., envelope, lighting, mechanical).

A Criteria Development Panel was formed from members of the project committee to formulate the details of the standards development approach. The Criteria Development Panel produced a simplified National Energy Model (NEM) that was used to estimate the potential energy-saving impacts of a new standard as a function of the economic parameters chosen by the project committee. Based on the work of the Criteria Development Panel, the committee reached a consensus decision on the target level of economics for the new standard, as well as an optional higher alternate level of efficiency. Each of these target efficiency levels included a corresponding savings goal based on runs from the NEM.

Subsequently, the project committee began development of a new standard using the consensus economics as a guiding principle. Each major section of the standard was developed by individual subcommittees, which were free to apply the economic approach in a fashion deemed most appropriate to the building components and systems within their purview. This effort resulted in the project committee's approval of the first public review draft of the revised standard in December 1995. The public review period for the first public review draft closed in June 1996. The first public review draft received a substantial number of public comments, primarily from certain manufacturing and utility interests.

The project committee decided to completely revise the proposed standard and approved a second public review draft in March 1997. The public review period for the second public review draft closed in March 1998, and this draft also received a large number of comments, primarily from two major groups (utility and environmental interests). A final round of Independent Substantive Change proposals were issued to attempt to resolve the remaining comments, and the project committee voted for final approval of the standard at the ASHRAE Annual Meeting in June 1999 at Seattle. At that time the project committee also recommended changing the method of maintenance of Standard 90.1 from periodic maintenance to continuous maintenance.

ASHRAE/IESNA Standard 90.1-1999 contains numerous improvements over the 1989 version, including enhancements in energy efficiency levels; an expanded scope to include existing buildings; an entire document written in mandatory, enforceable language suitable for code adoption; availability in both IP and SI units to meet national and international needs; expanded climatic data and range of requirements to address international needs; simplification of efficiency requirements; true prescriptive options for all components in addition to performance-based approaches; and many other changes. The popular ENVSTD Envelope Tradeoff Software first introduced with the 1989 edition of Standard 90.1 has been updated to a Windows version and will be included with a revised Users Manual to support implementation and use of *ASHRAE/IESNA Standard 90.1-1999*.

This new energy standard represents ASHRAE's entry into the next millennium by providing a document that is both maintainable and ready for use by the many end users in the code community.

1. PURPOSE

The purpose of this standard is to provide minimum requirements for the energy-efficient design of buildings except low-rise residential buildings.

2. SCOPE

2.1 This standard provides

(a) minimum energy-efficient requirements for the design and construction of
   1. new buildings and their systems,
   2. new portions of buildings and their systems, and
   3. new systems and equipment in existing buildings and

(b) criteria for determining compliance with these requirements.

2.2 The provisions of this standard apply to

(a) the envelope of buildings, provided that the enclosed spaces are
   1. heated by a heating system whose output capacity is greater than or equal to 3.4 Btu/h·ft^2 or
   2. cooled by a cooling system whose sensible output capacity is greater than or equal to 5 Btu/h·ft^2, and

(b) the following systems and equipment used in conjunction with buildings:
   1. heating, ventilating, and air conditioning,
   2. service water heating,
   3. electric power distribution and metering provisions,
   4. electric motors and belt drives, and
   5. lighting.

2.3 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),

(b) buildings that do not use either electricity or fossil fuel, or

(c) equipment and portions of building systems that use energy primarily to provide for industrial, manufacturing, or commercial processes.

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

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

3. DEFINITIONS, ABBREVIATIONS, AND ACRONYMS

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 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 adopting authority.

3.2 Definitions

above-grade wall: see *wall.*

access hatch: see *door.*

addition: an extension or increase in floor area or height of a building outside of the existing building envelope.

adopting authority: the agency or agent that adopts this standard.

alteration: a replacement or addition to a building or its systems and equipment; routine maintenance, repair, and service or a change in the building's use classification or category shall not constitute an alteration.

annual fuel utilization efficiency (AFUE): an efficiency descriptor of the ratio of annual output energy to annual input energy as developed in accordance with the requirements of U.S. Department of Energy (DOE) 10CFR Part 430.

application part-load value (APLV): a single number part-load efficiency figure of merit calculated in accordance with the method described in ARI Standard 550 or 590 referenced to modified rating conditions described in those standards.

attic and all other roofs: see *roof.*

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

automatic: self-acting, operating by its own mechanism when actuated by some nonmanual influence, such as a change in current strength, pressure, temperature, or mechanical configuration. (See *manual*.)

automatic control device: a device capable of automatically turning loads off and on without manual intervention.

ballast: a device used in conjunction with an electric-discharge lamp to cause the lamp to start and operate under the proper circuit conditions of voltage, current, wave form, electrode heat, etc.

(a) ***electronic ballast:*** a ballast constructed using electronic circuitry.

(b) ***hybrid ballast:*** a ballast constructed using a combination of magnetic core and insulated wire winding and electronic circuitry.

(c) ***magnetic ballast:*** a ballast constructed with magnetic core and a winding of insulated wire.

below-grade wall: see *wall*.

boiler: a self-contained low-pressure appliance for supplying steam or hot water.