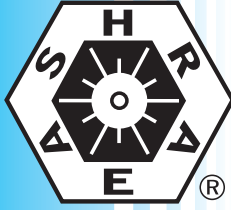


ANSI/ASHRAE Standard 90.2-2004
(Includes ANSI/ASHRAE Addenda listed in Appendix C)



ASHRAE STANDARD

Energy-Efficient Design of Low-Rise Residential Buildings

See Appendix C for approval dates by the ASHRAE Standards Committee, the ASHRAE Board of Directors, and the American National Standards Institute.

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 Web site, <http://www.ashrae.org>, or in paper form from the Manager of Standards. The latest edition of an ASHRAE Standard 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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1791 Tullie Circle NE, Atlanta, GA 30329

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NOTE

When addenda, interpretations, or errata to this standard have been approved, they can be downloaded free of charge from the ASHRAE Web site at <http://www.ashrae.org>.

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FOREWORD

This edition of ANSI/ASHRAE Standard 90.2-2004 represents a major overhaul in formatting and improvements in energy conservation provisions from the 2001 edition. All of the revisions are reflected by the summary of the addenda listed in Informative Appendix C. Changes of significance include modifications to the title, purpose and scope of the document, consolidation of provisions into a simpler format, revisions to envelope requirements, including newer criteria based on current economic information and revised climate data to assist in application of the provisions in the standard. These notable changes are summarized as follows.

Addendum "d" added provisions to permit slab edge insulation to be omitted in areas of the United States where termite infestation is known to be heavy. Experience has shown that insulation materials placed at the outside edge of slabs that came in contact with the ground provide a means for termites to infest the buildings by burrowing into or behind the insulation and into the building without a readily visible means of detecting their presence. Energy savings were typically offset by increased costs for structural repair of damage caused by the termites.

Addendum "f" placed provisions into the standard to permit the user to consider the use of high-albedo roofs in hot and hot-humid climates in order to reduce air-conditioning energy use. The installation of these reflective roofs permits the user to modify the thermal transmittance of the ceilings as a credit for their use.

Addendum "g" changed the title, purpose and scope of 90.2 by removing the provisions for manufactured housing from the standard. Energy conservation for these types of resi-

dential dwellings is already covered by the requirements enumerated in 24 CFR 3280. Those requirements, developed through the rulemaking process for the U.S. Department of Housing and Urban Development, preempt energy codes and standards such as 90.2.

Addendum "i" made major revisions to the Standard by reducing the number of tables needed to apply the envelope provisions of the standard and simplifying their application. Many individuals, groups and entities that use energy codes that govern one- and two-family dwellings and low-rise multi-family structures have been stating that the contents of the 2001 Standard were too design intensive and complex for simple residential structures, that the Standard was not written in mandatory language, and that the Standard was not up to date in their energy conservation requirements. Addendum "i" overcame these perceptions and observations by developing a standard that contains only the essential information necessary to design and enforce energy conservation requirements for single family houses and multi-family structures.

For example, over 45 figures and tables regarding thermal envelope provisions were replaced with two tables. In addition, provisions were added to address floor and roof/ceilings constructed with cold-formed steel frame members. Also, a new normative appendix has been added that allows the user comply with the prescriptive envelope provisions by applying an envelope trade-off procedure as an alternative. It provides the same flexibility in the standard that was previously covered by the existing envelope trade-off procedure but with simpler format and easier application. The third envelope compliance path, the annual energy cost method that is in the 2001 edition, has also been maintained.

This addendum also deleted the existing climate tables and replaced them with a new map and tables of the U.S. that illustrate the 8 primary zones (12 individual zones overall) presently considered representative of climate zones most applicable for current-day energy standards. The development of this new map was a result of work by the U.S. Department of Energy and Pacific Northwest National Laboratory. The section was also expanded to include international data.

1. PURPOSE

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

2. SCOPE

2.1 This standard provides minimum energy efficiency requirements for the design and construction of

- (a) new residential dwelling units and their systems, and
- (b) where explicitly specified,
 1. new portions of residential dwelling units and their systems, and
 2. new systems and equipment in existing dwelling units.

Note: There are no requirements in this standard that apply to new portions of residential dwelling units and their systems, nor to new systems and equipment in existing dwelling units.

For the purposes of this standard, “residential dwelling units” include single-family houses, multi-family structures (of three stories or fewer above grade), and modular houses. This standard does not include “transient” housing such as hotels, motels, nursing homes, jails, and barracks, or manufactured housing.

2.2 This standard applies to the building envelope, heating equipment and systems, air-conditioning equipment and systems, domestic water-heating equipment and systems, and provisions for overall building design alternatives and trade-offs.

2.3 This standard does not apply to

- (a) specific procedures for the operation, maintenance, and use of residential buildings;
- (b) portable products such as appliances and heaters; and
- (c) residential electric service or lighting requirements.

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

3. DEFINITIONS, ABBREVIATIONS, ACRONYMS, AND SYMBOLS

3.1 Purpose

The purpose of this section is to define all terms, abbreviations, acronyms, and symbols unique to this standard.

3.2 Scope

These terms, abbreviations, acronyms, and symbols are applicable to all sections of this standard. Definitions as contained in the *ASHRAE Terminology of Heating, Ventilation, Air Conditioning, & Refrigeration* shall apply to all terms in this standard unless specifically listed here.

3.3 Definitions

air films: interior and exterior air surface film coefficients for winter design conditions.

area of all ceiling assemblies: interior surface area of such assemblies that enclose conditioned space.

area of all door assemblies: opaque area of such assemblies (including the frame) that enclose conditioned space. For doors where the daylight opening area is greater than or equal to 50% of the door area, the entire area of the door assembly is considered fenestration area.

area of all exterior walls (gross): exterior surface area of the following assemblies that enclose conditioned space: opaque wall assemblies, including between-floor spandrels and peripheral edges of flooring; fenestration assemblies, including all glazed surfaces and sash and framing elements; and door assemblies. Areas of vents, grilles, and pipes are excluded.

area of all fenestration assemblies: interior surface area of such assemblies including all glazed surfaces (such as windows, skylights, and sliding glass doors), sashes, curbing, or framing elements that enclose conditioned space. For doors where the daylight opening area is less than 50% of the door area, the fenestration area is the daylight opening area. For all other doors, the fenestration area is the door area.

area of all floor assemblies: interior surface area of such assemblies that enclose conditioned space.

area of all opaque wall assemblies: gross area of exterior walls measured on the exterior consisting of all opaque wall areas (including foundation walls, between-floor spandrels, peripheral edges of floors, etc.) that enclose conditioned space (including interstitial areas).

assembly: portion of an envelope component represented by an arrangement and connection of building construction materials with a specific thermal transmittance or thermal conductance.

conditioned space: cooled space, heated space, or indirectly conditioned space.

envelope component: major section of the entire envelope, such as the opaque walls above grade, ceilings, slabs, floors, glazings, doors, or walls below grade.

fenestration: all light-transmitting assemblies in a building envelope, including the glazing material, sash, frame, and permanently affixed external or internal shading devices, where such component assemblies enclose conditioned space.

heat trap: a device or arrangement of the piping entering and leaving a water heater, constructed to counteract the convective forces of the heated water (thermosyphoning) during standby periods.

heated slab: concrete slab-on-grade floor containing wires, cables, pipes, or ducts that transfers heat to the conditioned space.

living unit: one or more rooms designed or used as living quarters providing complete, independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking, and sanitation.