ANSI/ASHRAE/IESNA Addendum *ac* to
ANSI/ASHRAE/IESNA Standard 90.1-2001

ASHRAE® STANDARD

Energy Standard for Buildings Except Low-Rise Residential Buildings

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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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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,
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[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.]

FOREWORD

Addendum ac consists of a number of unrelated changes to the Energy Cost Budget (ECB) Method section of Standard 90.1. The changes are intended to add clarity and specificity to a number of different paragraphs.

During the development of the draft for the Appendix G Performance Rating Method, many sections from Section 11 were examined to determine if items in Appendix G were applicable. Some of these changes are incorporated into Section 11 by this addendum.

This addendum also includes some paragraphs that were refined based on feedback from various users of the ECB Method.

Note: In this addendum, changes to the current standard are indicated in the text by underlining (for additions) and strikethrough (for deletions).

Addendum ac to 90.1-2001 (I-P and SI editions)

Revise the following sections and note 7 to Table 11.4.3A as shown:

11.3.1 Proposed Design Model. The simulation model of the *proposed design* shall be consistent with the design documents, including proper accounting of ~~window and wall~~ fenestration and opaque envelope types and area; interior lighting power and controls; HVAC system types, sizes, and controls; and service water heating systems and controls.

Exceptions to 11.3.6: The following building elements are permitted to differ from architectural drawings.

(a) Any envelope assembly that covers less than 5% of the total area of that assembly type (e.g., exterior walls) need not be separately described. If not separately described, the area of an envelope assembly must be added to the area of the adjacent assembly of that same type.

(b) Exterior surfaces whose azimuth orientation and tilt differ by no more than 45 degrees and are otherwise the same may be described either as a single surface or by using multipliers.

(c) For exterior roofs other than roofs with ventilated attics, the roof surface may be modeled with a reflectance of 0.45 if the reflectance of the *proposed design* roof is greater than 0.70 and its emittance is greater than 0.75. The reflectance and emittance shall be tested in accordance with the Exception to 5.3.1.1. All other roof surfaces shall be modeled with a reflectance of 0.3.

(d) Manually operated fenestration shading devices such as blinds or shades shall not be modeled. Permanent shading devices such as fins, overhangs, and light shelves shall be modeled.

11.3.8 Lighting. Lighting power in the *proposed design* shall be determined as follows:

a. Where a complete lighting system exists, the actual lighting power shall be used in the model.

b. Where a lighting system has been designed, lighting power shall be determined in accordance with ~~9.3~~ 9.2.4 and 9.2.5.

c. Where no lighting exists or is specified, lighting power shall be determined in accordance with the Building Area Method for the appropriate building type.

d. Lighting system power shall include all lighting system components shown or provided for on plans (including lamps, ballasts, task fixtures, and furniture-mounted fixtures).

~~**11.3.9 Other Systems.** Other systems, such as motors, covered by Section 10, may be modeled. If they are modeled, performance shall be as indicated on design drawings. Miscellaneous internal loads, such as those due to office and other equipment, shall be estimated based on the building type or space type category as approved by the *authority having jurisdiction.*~~

11.3.9 Miscellaneous Loads. Receptacle, motor, and process loads shall be modeled and estimated based on the building type or space type category and shall be assumed to be identical in the *proposed* and *budget building design.* These loads shall be included in simulations of the building and shall be included when calculating the *energy cost budget* and *design energy cost*. All end-use load components within and associated with the building shall be modeled, unless specifically excluded by 11.3.10, including, but not limited to, exhaust fans, parking garage ventilation fans, exterior building lighting, swimming pool heaters and pumps, elevators and escalators, refrigeration equipment, and cooking equipment.

Table 11.4.3A (Note 7)

7. ~~The boiler in the *budget building design* system shall use the same fuel as the *proposed design* and shall be natural draft. If no boilers exist in the *proposed design*, the budget building boilers shall be fossil fuel. Other boiler parameters shall be as described in Note 6.~~ Water-source heat pumps shall be connected to a common heat pump water loop controlled to maintain temperatures between 60×F (16×C) and 90×F (32×C). Heat rejection from the loop shall be provided by an axial fan closed circuit evaporative fluid cooler with two-speed fans if required in 6.3.5. Heat addition to the loop shall be provided by a boiler that uses the same fuel as the *proposed design* and shall be natural draft. If no boilers exist in the *proposed design*, the budget building boilers shall be fossil fuel. The *budget building design* boiler plant shall be modeled with a single boiler if the *budget building design* plant load is 600,000 Btu/h (176 kW) or less and with two equally sized boilers for plant capacities exceeding 600,000 Btu/h (176 kW). Boilers shall be staged as required by the load. Piping losses shall not be modeled in either building model. Pump system power shall be the same as the *proposed design*; if the *proposed design* has no pumps, the *budget building design* pump power shall be 22 W/gpm (349 kW/1000L/s), which is equal to a pump operating against a 75 foot (23 m) head, with

a 65% combined impeller and motor efficiency. Loop flow shall be variable with flow shut off at each heat pump when its compressor cycles off as required by 6.3.4.4. Loop pumps shall be modeled as riding the pump curve or with variable speed drives when required by 6.3.4.1.

Section 11.4.3 k(1)

(1) Enter Figure 11.4.3 at "Water" if the *proposed design* system condenser is water or evaporatively cooled; enter at "Air" if the condenser is air-cooled. Closed-circuit dry-coolers shall be considered air-cooled. Systems utilizing district cooling shall be treated as if the condenser water type were "water." If no mechanical cooling is specified or the mechanical cooling system in the *proposed design* does not require heat rejection, the system shall be treated as if the condenser water type were "Air." For proposed designs with ground-source or groundwater-source heat pumps, the budget system shall be water source heat pump (System 6).

11.4.5 Lighting. Lighting power in the *budget building design* shall be determined using the same categorization procedure (*building area* or *space function*) and categories as the *proposed design* with lighting power set equal to the maximum allowed for the corresponding method and category in 9.3. Power for fixtures not included in the lighting power density calculation shall be modeled identically in the proposed and budget building. Lighting controls shall be the minimum required.

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.