

ANSI/ASHRAE/IESNA Addenda ae and ai to  
ANSI/ASHRAE/IESNA Standard 90.1-2004



# ASHRAE STANDARD

## Energy Standard for Buildings Except Low-Rise Residential Buildings

Approved by the ASHRAE Standards Committee on January 27, 2007; by the ASHRAE Board of Directors on March 2, 2007; by IESNA on January 18, 2007; and by the American National Standards Institute on March 27, 2007.

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](mailto:orders@ashrae.org). Fax: 404-321-5478. Telephone: 404-636-8400 (worldwide), or toll free 1-800-527-4723 (for orders in US 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 a 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**

The changes to Section 11 and Appendix G clarify the way lighting power is to be modeled. An average lighting power density for each thermal block should be determined and used in the simulation model.

*Note:* In this addendum, changes to the current standard are indicated in the text by underlining (for additions) and strikethrough (for deletions) unless the instructions specifically mention some other means of indicating the changes.

**Addendum ae to 90.1-2004 (I-P and SI Editions)**

Make the following changes to Table 11.3.1.

**TABLE 11.3.1 Modeling Requirements for Calculating Design Energy Cost and Energy Cost Budget**

No.	Proposed Building Performance	Baseline Building Performance
<b>6. Lighting</b>		
	Lighting power in the <i>proposed design</i> shall be determined as follows: (a) Where a complete lighting system exists, the actual lighting power <u>for each thermal block</u> shall be used in the model. (b) Where a lighting system has been designed, lighting power shall be determined in accordance with 9.5 and 9.6. (c) Where lighting neither exists nor 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 the plans (including lamps and ballasts and task and furniture-mounted fixtures).	Lighting power in the <i>budget building design</i> shall be determined using the same categorization procedure (building area or space function) and categories as the <i>proposed design</i> with lighting power set equal to the maximum allowed for the corresponding method and category in either 9.5 or 9.6. Power for fixtures not included in the lighting power density calculation shall be modeled identically in the <i>proposed design</i> and <i>budget building design</i> . Lighting controls shall be the minimum required.

Make the following changes to Table G3.1.

**TABLE G3.1 Modeling Requirements for Calculating Proposed and Baseline Building Performance**

No.	Proposed Building Performance	Baseline Building Performance
<b>6. Lighting</b>		
	Lighting power in the <i>proposed design</i> shall be determined as follows: (a) Where a complete lighting system exists, the actual lighting power <u>for each thermal block</u> shall be used in the model. (b) Where a lighting system has been designed, lighting power shall be determined in accordance with 9.1.3 and 9.1.4. (c) Where lighting neither exists nor 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 the plans (including lamps and ballasts and task and furniture-mounted fixtures).	Lighting power in the <i>baseline building design</i> 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 9.2. No automatic lighting controls (e.g., programmable controls or automatic controls for daylight utilization) shall be modeled in the <i>baseline building design</i> , as the lighting schedules used are understood to reflect the mandatory control requirements in this standard.

**(This foreword is not a 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**

*The existing additional lighting power allowances for retail display lighting have proven to be problematic from an application and compliance standpoint. The categories have been found to be too arbitrary for many applications leading to potential gaming and at a minimum confusion on the part of designers as well as building officials. These revised allowances are based more specifically on the actual retail lighting function, which helps eliminate confusion. The expansion of the categories also ensures better flexibility for the designer while restricting additional allowances where it may not be warranted. For example, the lowest category (applying to most additional display lighting needs) is now set at 1.0 instead of 1.6 with only those few functions requiring additional wattage retained in the higher 1.7 watt category. The highest category is now set at 4.2 watts to recognize the need for higher light levels based on IESNA design guidance but is more restrictive in its application by eliminating the arbitrary “valuable merchandise” label. These revised allowances are also now based on more specific foot-candle-based modeling that more closely represents actual practice than the previous values. The additional allowances has a base of 1000 watts that is intended to help smaller spaces meet the power requirements where it is more difficult because of the higher wall-to-floor ratio (more potential wall display and light absorption by walls).*

*The allowance for visual display terminals is being removed because it is an obsolete application given widespread use of flatter screen and lower glare computer terminals.*

***Note:** In this addendum, changes to the current standard are indicated in the text by underlining (for additions) and strikethrough (for deletions) unless the instructions specifically mention some other means of indicating the changes.*

**Addendum ai to 90.1-2004 (I-P and SI Editions)**

*Make the following changes to Section 9.6.2 (I-P edition).*

**9.6.2 Additional Interior Lighting Power.** When using the space-by-space method, an increase in the interior lighting power allowance is allowed for specific lighting functions. Additional power shall be allowed only if the specified lighting is installed and automatically controlled, separately from the general lighting, to be turned off during non business hours. This additional power shall be used only for the specified luminaires and shall not be used for any other purpose ~~or in any other space.~~

~~9.6.3~~ An increase in the interior lighting power allowance is permitted in the following cases:

- a. For spaces in which lighting is specified to be installed in addition to the general lighting for the purpose of decorative appearance, such as chandelier-type luminaires or sconces or for highlighting art or exhibits, provided that the additional lighting power shall not exceed 1.0 W/ft<sup>2</sup> of such spaces.
- b. For spaces in which lighting is specified to be installed to meet the requirements of visual display terminals as the primary viewing task, provided that the additional lighting power shall not exceed 0.35 W/ft<sup>2</sup> of such spaces and that the specified luminaire meets requirements for use in such spaces. Maximum average luminance measured from the vertical in candelas per square foot of not more than 80 cd/ft<sup>2</sup> at 65 degrees, 33 cd/ft<sup>2</sup> at 75 degrees, and 17 cd/ft<sup>2</sup> at 85 to 90 degrees.
- b. (e)For lighting equipment installed in retail spaces and specifically designed and directed to highlight merchandise, calculate the additional lighting power as follows:

$$\begin{aligned} \text{Additional Interior Lighting Power Allowance} = & \\ & \underline{1000 \text{ watts} + (\text{Retail Area 1} \times 1.0 \text{ W/ft}^2)} \\ & \underline{+ (\text{Retail Area 2} \times 1.7 \text{ W/ft}^2)} \\ & \underline{+ (\text{Retail Area 3} \times 2.6 \text{ W/ft}^2)} \\ & \underline{+ (\text{Retail Area 4} \times 4.2 \text{ W/ft}^2)}. \end{aligned}$$

where

Retail Area 1 = the floor area for all products not listed in Retail Area 2, 3 or 4.

Retail Area 2 = the floor area used for the sale of vehicles, sporting goods and small electronics.

Retail Area 3 = the floor area used for the sale of furniture, clothing, cosmetics and artwork.

Retail Area 4 = the floor area used for the sale of jewelry, crystal, and china.

**Exception:** Other merchandise categories may be included in Retail Areas 2 through 4 above, provided that justification documenting the need for additional lighting power based on visual inspection, contrast, or other critical display is approved by the authority having jurisdiction.

For lighting equipment installed in retail spaces that is specifically designed and directed to highlight merchandise, provided that the additional lighting power shall not exceed

- ~~1. 1.6 W/ft<sup>2</sup> times the area of specific display or~~
- ~~2. 3.9 W/ft<sup>2</sup> times the area of specific display for valuable merchandise, such as jewelry, fine apparel and accessories, china and silver, art, and similar items, where detailed display and examination of merchandise are important.~~

*Make the following changes to Section 9.6.2 (SI Edition).*

**9.6.2 Additional Interior Lighting Power.** When using the space-by-space method, an increase in the interior lighting power allowance is allowed for specific lighting functions. Additional power shall be allowed only if the specified lighting is installed and automatically controlled, separately from the general lighting, to be turned off during non business hours. This additional power shall be used only for the specified luminaires and shall not be used for any other purpose ~~or in any other space.~~

**9.6.3** An increase in the interior lighting power allowance is permitted in the following cases:

- a. For spaces in which lighting is specified to be installed in addition to the general lighting for the purpose of decorative appearance, such as chandelier-type luminaires or sconces or for highlighting art or exhibits, provided that the additional lighting power shall not exceed 10.8 W/m<sup>2</sup> of such spaces.
- b. For spaces in which lighting is specified to be installed to meet the requirements of visual display terminals as the primary viewing task, provided that the additional lighting power shall not exceed 3.8 W/m<sup>2</sup> of such spaces and that the specified luminaire meets requirements for use in such spaces. Maximum average luminance measured from the vertical in candelas per square foot of not more than 850 cd/m<sup>2</sup> at 65 degrees, 350 cd/m<sup>2</sup> at 75 degrees, and 175 cd/m<sup>2</sup> at 85 to 90 degrees.
- b. (e) For lighting equipment installed in retail spaces and specifically designed and directed to highlight merchandise calculate the additional lighting power as follows:

$$\begin{aligned} \text{Additional Interior Lighting Power Allowance} = & \\ & \underline{1000 \text{ watts} + (\text{Retail Area 1} \times 11 \text{ W/m}^2)} \\ & + (\text{Retail Area 2} \times 18 \text{ W/m}^2) \\ & + (\text{Retail Area 3} \times 28 \text{ W/m}^2) \\ & + (\text{Retail Area 4} \times 45 \text{ W/m}^2). \end{aligned}$$

where

Retail Area 1 = the floor area for all products not listed in Retail Area 2, 3 or 4.

Retail Area 2 = the floor area used for the sale of vehicles, sporting goods and small electronics.

Retail Area 3 = the floor area used for the sale of furniture, clothing, cosmetics and artwork.

Retail Area 4 = the floor area used for the sale of jewelry, crystal, and china.

**Exception:** Other merchandise categories may be included in Retail Areas 2 through 4 above, provided that justification documenting the need for additional lighting power based on visual inspection, contrast, or other critical display is approved by the authority having jurisdiction.

~~For lighting equipment installed in retail spaces that is specifically designed and directed to highlight merchandise, provided that the additional lighting power shall not exceed~~

- ~~1. 17 W/m<sup>2</sup> times the area of specific display or~~
- ~~2. 42 W/m<sup>2</sup> times the area of specific display for valuable merchandise, such as jewelry, fine apparel and accessories, china and silver, art, and similar items, where detailed display and examination of merchandise are important.~~

**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.