



**BSR/ASHRAE/IES Addendum cj
to ANSI/ASHRAE/IES Standard 90.1-2016**

Public Review Draft

**Proposed Addendum cj to
Standard 90.1-2016, Energy Standard
for Buildings Except Low-Rise
Residential Buildings**

**First Public Review (February 2019)
(Draft Shows Proposed Changes to Current 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. Unresolved objectors on informative material are not offered the right to appeal at ASHRAE or ANSI.)

FOREWORD

This proposed addendum makes the following changes to the lighting provisions of the Energy Cost Budget Method.

- Specifies that there is no tradeoff credit for plug-in lighting in multifamily occupancies and other space types where lighting design relies on plug-in fixtures not shown on drawings.
- Establishes the baseline lighting power density (LPD) for dwelling units based on the design that meets high efficacy lamp requirements of Section 9.4.4. The LPD matches the permanently installed lighting LPD from the analysis used to set Building Performance Factors in Appendix G.
- Clarifies modeling methodology to capture lighting control savings, and aligns it with the relevant rules of Appendix G.

In addition, it makes the following changes to the lighting provisions of the Appendix G:

- Establishes the baseline LPD for dwelling units based on the standard practice design prior to introduction of high efficacy lamp requirements in 9.4.4. The LPD matches the hard-wired LPD from the analysis used to set Building Performance Factors in Appendix G, reflecting the values used in the Standard 90.1-2004 progress indicator models.
- Clarifies that the proposed lighting must be modeled the same as in the baseline for spaces in dwelling units and hotel/motel guest rooms where some or all lighting is provided by plug-in fixtures.
- Adds an exception to allow performance credit for spaces in dwelling units and hotel/motel guest rooms where permanently installed lighting fixtures are intended for the space.

This addendum impacts an optional performance path in the standard designed to provide increased flexibility and therefore was not subjected to cost effectiveness analysis.

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. Only these changes are open for review and comment at this time. Additional material is provided for context only and is not open for comment except as it relates to the proposed substantive changes.

Addendum cj to 90.1-2016

Revise the Standard as follows (IP Units)

Table 11.5.1 Modeling Requirements for Calculating Design Energy Cost and Energy Cost Budget

Proposed Design (Column A) Design Energy Cost (DEC)	Budget Building Design (Column B) Energy Cost Budget (ECB)
1. Design Model	

6. Lighting

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

- a. Where a complete *lighting system* exists, the actual lighting power for each *thermal block* shall be used in the model.
 - b. Where a complete lighting system has been designed, lighting power for each thermal block shall be determined in accordance with Sections [9.1.3](#) and [9.1.4](#).
 - c. Where no lighting exists or is specified, lighting power shall be determined in accordance with the *Building Area Method* for the appropriate *building area* space 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). For spaces within multifamily dwelling units, hotel/motel guest rooms, and other spaces in which lighting systems consist of plug-in light fixtures that are not shown or provided for on design documents, assume identical lighting power for the proposed design and baseline building design in the simulations.
 - e. The lighting schedules in the *proposed design* shall reflect the mandatory *automatic lighting control* requirements in Section [9.4.1](#) (e.g., *programmable controls* or *occupancy sensors*).
- Exception:** ~~Automatic daylighting controls required by Section [9.4.1](#) shall be modeled directly in the proposed design or through schedule adjustments determined by a daylighting analysis approved by the building official.~~
- f. ~~Automatic lighting daylighting controls included in the proposed design but not required by Section [9.4.1](#) may be modeled directly in the building simulation or be modeled in the building simulation through schedule adjustments determined by a separate analysis approved by the authority having jurisdiction. As an alternative to modeling such lighting controls, the proposed design lighting power may be reduced for each luminaire under control by dividing the rated lighting schedule each hour power of the luminaire by the factor $(1 + \sum CF)$, where $\sum CF$ indicates the sum of all applicable control factors (CF) per Section [9.6.3](#) and Table [9.6.3](#). Modeling and schedule adjustments shall separately account for *primary sidelighted areas*, *secondary sidelighted areas*, and *toplighted areas*.~~

g. Automatic lighting controls included in the proposed design, but not required by Section [9.4.1](#) shall be modeled using the following methods for each luminaire under control:

- a) Manual-ON or partial-auto-ON occupancy sensors shall be modeled by reducing the lighting schedule each hour by the occupancy sensor reduction factors in Table G3.7 for the applicable space type multiplied by 0.25.

a. Where a complete lighting system exists, lighting power in the budget building design shall be the same as in the proposed design.

~~ab. Lighting power in the baseline building design~~ Where a lighting system has been designed the interior lighting power allowance shall be determined using the same categorization procedure (either the Building Area Method or Space-by-Space Method) and the space use classification shall be the same categories as the proposed design with lighting power set equal to the maximum allowed for the corresponding method and category in Section [9.2](#). Additional interior lighting power for nonmandatory controls allowed under Section [9.6.3](#) shall not be included in the budget building design. Lighting power density in dwelling units shall be 0.60 W/ft²SF (6.5 W/m²).

c. Where lighting neither exists nor is submitted with design documents the lighting power in the budget building design shall be the same as in the proposed design.

~~bd.~~ Power for fixtures not included in the lighting power calculation shall be modeled identically in the proposed design and budget building design.

ce. Mandatory automatic lighting controls required by Section [9.4.1](#) shall be modeled the same as the proposed design.

b) Automatic lighting controls listed in Table 9.6.3 shall be modeled using the sum of the applicable control factors (CF). Apply control CF to only the portion of wattage of the fixtures in the space controlled by said lighting control. Divide each hour of the lighting schedule by $(1+\sum CF)$, where $\sum CF$ indicates the sum of all applicable control factors for that space per Section 9.6.3 and Table 9.6.3.

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

No.	Proposed Building Performance	Baseline Building Performance
6.	Lighting	

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

- a. Where a complete *lighting system* exists, the actual lighting power for each *thermal block* shall be used in the model.
- b. Where a complete *lighting system* has been designed and submitted with design documents, lighting power shall be determined in accordance with Sections [9.1.3](#) and [9.1.4](#).
- c. Where lighting neither exists nor is submitted with design documents, lighting shall comply with but not exceed the requirements of Section 9. Lighting power shall be determined in accordance with the ~~Building~~Building Area Method.
- 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).

Exceptions: ~~e. For multifamily dwelling units, hotel/motel guest rooms, and other spaces in which *lighting systems* are connected via receptacles and are not shown or provided for on *building plans*, on *design documents*, assume identical lighting power for the *proposed design* and *baseline building design* in the simulations. lighting power used in the simulation shall be equal to the lighting power allowance in Table 9.6.1 for the appropriate space type or as designed, whichever is greater. For the dwelling units, lighting power used in the simulation shall be equal to 0.60 W/ft² (6.5 W/m²) or as designed, whichever is greater.~~

Exception: Lighting use can be reduced for the portion of the space illuminated by the specified fixtures provided that they maintain the same illuminance level as in the baseline. Such reduction shall be demonstrated by calculations.

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Table G3.7 Performance Rating Method Lighting Power Density Allowances and Occupancy Sensor Reductions Using the Space-by-Space Method

Common Space Types ^a	Lighting Power Density, W/ft ² (W/m ²)	Occupancy Sensor Reduction ^b
...		
....
<u>Dwelling Unit</u>	<u>1.07 (11.5)</u>	<u>None</u>
...

Addendum AF modifies language in the same section of Appendix G Table G3.1 as part of this addendum, if this addendum is published the section will appear as follows.

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

No.	Proposed Building Performance	Baseline Building Performance
6. Lighting		

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

- a. Where a complete *lighting system* exists, the actual lighting power for each *thermal block* shall be used in the model.
- b. Where a complete *lighting system* has been designed and submitted with design documents, lighting power shall be determined in accordance with Sections [9.1.3](#) and [9.1.4](#).
- c. Where lighting neither exists nor is submitted with design documents, lighting shall comply with but not exceed the requirements of Section [9](#). Where space types are known, lighting power shall be determined in accordance with the Space-by-Space Method. Where space types are not known, lighting power shall be determined in accordance with the *Building Area Method*.
- 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*).
- e. For *dwelling units*, hotel/motel guest rooms, and other spaces in which *lighting systems* are connected via receptacles and are not shown on *design documents*, lighting power used in the simulation shall be equal to the lighting power allowance in Table 9.6.1 for the appropriate space type or as designed, whichever is greater. For the dwelling units, lighting power used in the simulation shall be equal to 0.60 W/ft² (6.5 W/m²) or as designed, whichever is greater.

Exception: Lighting use can be reduced for the portion of the space illuminated by the specified fixtures provided that they maintain the same illuminance level as in the baseline. Such reduction shall be demonstrated by calculations.

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