



**BSR/ASHRAE/IES Addendum ad
to ANSI/ASHRAE/IES Standard 90.1-2019**

Public Review Draft

Proposed Addendum ad to Standard 90.1-2019, Energy Standard for Buildings Except Low-Rise Residential Buildings

**First Public Review (May 2021)
(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 addendum proposes a structural reorganization of Chapter 9 and does not introduce any new requirements into the Standard. Most chapters in the Standard reserve #.6 for the Alternate Compliance Path. Table below shows the current structure of 90.1 and the different chapters.

Existing 90.1 Structure:

Envelope	HVAC	Water	Power	Lighting
5.4 Mandatory Provisions	6.4 Mandatory Provisions	7.4 Mandatory Provisions	8.4 Mandatory Provisions	9.4 Mandatory Provisions
5.5 Prescriptive Building Envelope	6.5 Prescriptive Compliance Path	7.5 Prescriptive Compliance Path	8.5 Prescriptive Path (not used)	9.5 Building Area Method
5.6 Building Envelope Trade-Off Compliance	6.6 Alternative Compliance Path	7.6 Alternative Compliance Path (not used)	8.6 Alternative Compliance Path	9.6 Alternative Compliance Path: Space-by-Space Method
5.7 Submittals	6.7 Submittals	7.7 Submittals	8.7 Submittals	9.7 Submittals

Section 9.6 of the lighting chapter is not an alternative compliance path. The space-by-space method is a prescriptive option. The lighting control requirements in section 9.6 are required if a user opts for 9.5, Building Area Method. shifts the existing text in 9.6 to a new subsection within 9.5, proposed as 9.5.2. This would locate all of the prescriptive lighting requirements into the same section. Further, it would align lighting with the other chapters. Finally, it would allow for potential future introduction of an alternative compliance path for lighting. The table below shows the structure that would result from this addendum.

Proposed 90.1 Structure:

Envelope	HVAC	Water	Power	Lighting
5.4 Mandatory Provisions	6.4 Mandatory Provisions	7.4 Mandatory Provisions	8.4 Mandatory Provisions	9.4 Mandatory Provisions
5.5 Prescriptive Building Envelope	6.5 Prescriptive Compliance Path	7.5 Prescriptive Compliance Path	8.5 Prescriptive Path (not used)	9.5 Prescriptive Compliance Path 9.5.1 Building Area Method 9.5.2 Space by Space Method
5.6 Building Envelope Trade-Off Compliance	6.6 Alternative Compliance Path	7.6 Alternative Compliance Path (not used)	8.6 Alternative Compliance Path	9.6 Alternative Compliance Path (not used)
5.7 Submittals	6.7 Submittals	7.7 Submittals	8.7 Submittals	9.7 Submittals

Many references to 9.6 occur in the Standard including through Chapter 11 and the proposal reflects all of those reference changes. The table below maps the restructuring.

Mapping of Restructuring

Existing 90.1 Structure	New 90.1 Structure and Titles
9.1.2 Alterations	9.1.1.3 Alterations
9.1.5 Climate	9.1.2 Climate
9.2.2 Additional Requirements...	Removed because of redundancy
9.2.3 Prescriptive Requirements	9.2.2 Prescriptive Requirements
Table 9.2.3.1	Table 9.2.2.1
Section title does not exist	9.5 Prescriptive Compliance Path
9.5 Building Area Method Compliance Path 9.5.1 Building Area Method of Calculating Interior Lighting Power Allowance	9.5.1 Building Area Method Compliance Path
9.6 Alternative Compliance Path: Space-by-Space Method	Heading title only, absorbed into new structure
9.6.1 Space-by-Space Method of Calculating Lighting Power Allowance	9.5.2 Space-by-Space Method Compliance Path
9.6.2 Additional Lighting Power	9.5.2.2 Additional Lighting Power
9.6.3 Additional Interior Lighting Power Using Nonmandatory Controls	9.5.2.3 Additional Interior Lighting Power Using Nonmandatory Controls
9.6.4 Room Geometry Adjustment	9.5.2.4 Room Geometry Adjustment
Table 9.6.1	Table 9.5.2.1 (no name change)
Table 9.6.3	Table 9.5.2.3 (no name change)
---	9.6 Alternative Compliance Path

The addendum modifies the initial diagram that starts section 9 to reflect this new proposed structure.

The addendum also removes some redundant structure in 9.2.

Energy Savings:

No savings because this is a structural reorganization to match other chapters.

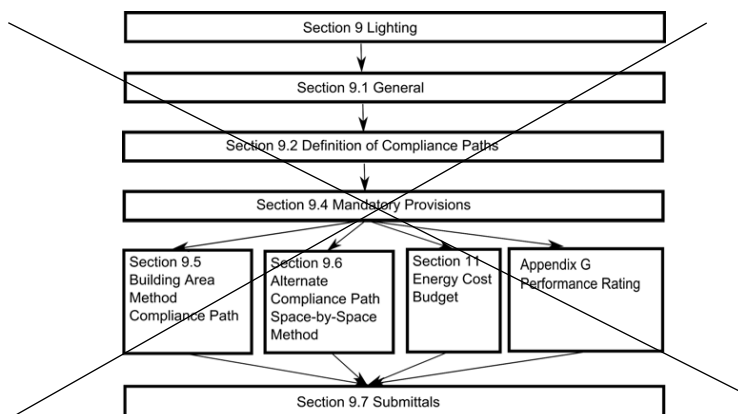
Cost Effectiveness:

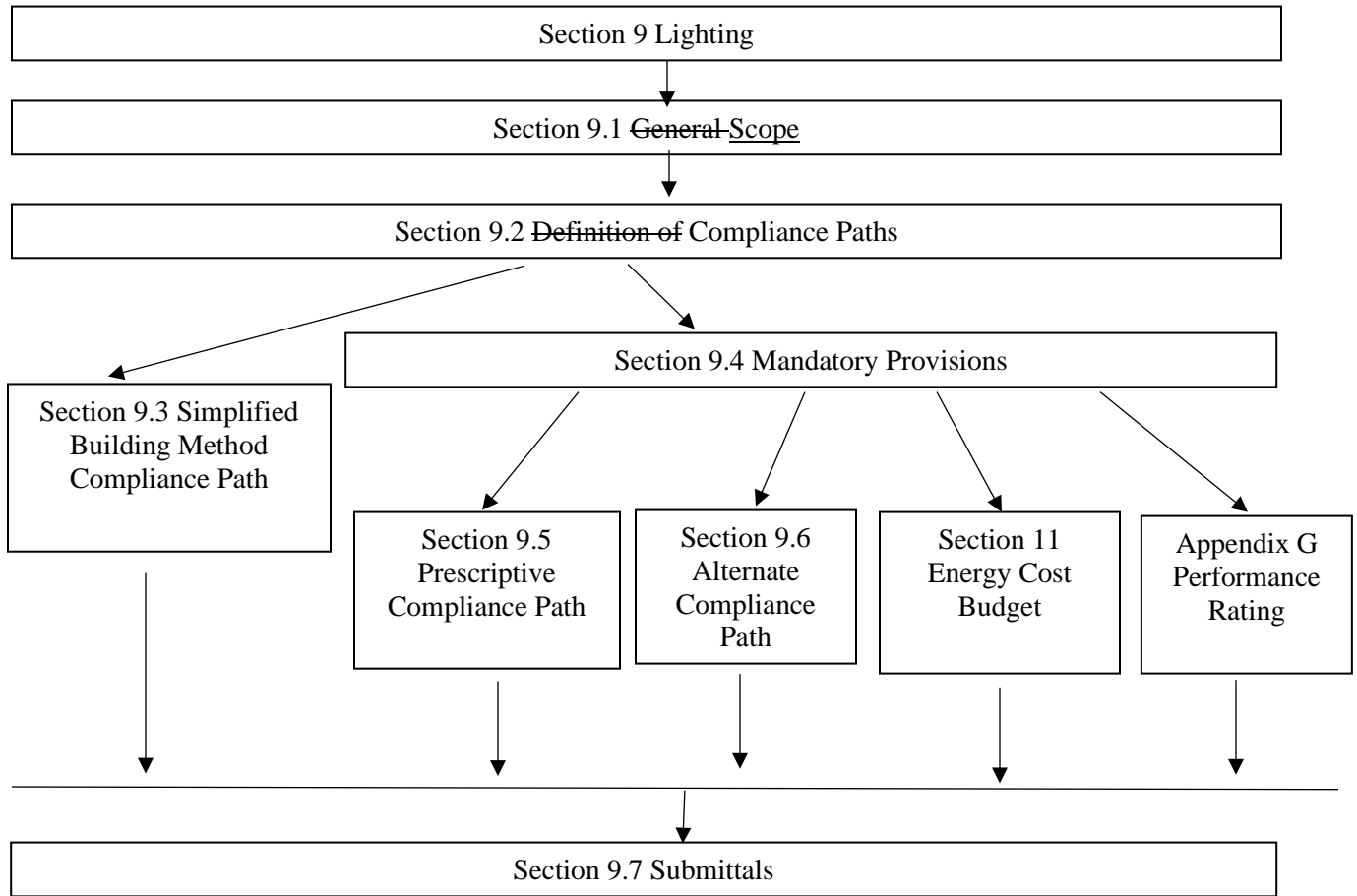
No costs associated with this proposal because it is a structural reorganization.

[Note to Reviewers: This addendum makes proposed changes to the current standard. These changes are indicated in the text by underlining (for additions) and ~~strikethrough~~ (for deletions) except where the reviewer instructions specifically describe some other means of showing the changes. Only these changes to the current standard 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 changes.]

Addendum ad to 90.1-2019

Modify the standard as follows (IP and SI Units): Revise original graphic with the one below.





9.1.1 Scope

9.1.1.1 New buildings

Lighting equipment and systems serving the lighting needs of new buildings shall comply with the requirements of this section as described in Section 9.2.

This section shall apply to the following:

- a. Interior spaces of buildings.
- b. Exterior lighting that is powered through the building's electrical service.

Exception to 9.1.1.1

1. Emergency lighting that is *automatically* off during normal building operation.
2. Lighting, including exit signs, that is specifically designated as required by a health or life safety statute, ordinance, or regulation.
3. Decorative gas lighting systems.

9.1.1.2 Additions to Existing Buildings

Equipment installed in addition to existing buildings shall comply with the requirements of section 9.1.1.1.

9.1.1.23 Lighting Alterations to Existing Buildings

The alteration of a lighting system in an interior space shall comply with Section 9.1.2.1. The alteration of a lighting system in an exterior area shall comply with Section 9.1.2.2.

[...]

9.1.2.4 9.1.1.3.1 Lighting Alterations for Interior Building Spaces

The *alteration* of a *lighting system* in an interior *space* shall meet one of the following;

- a. The *alteration* shall comply with Section 9.2 when the total wattage of all new and retrofitted *luminaires* is greater than 2000 watts.
- b. When the total wattage of all new and retrofitted *luminaires* is 2000 watts or less, each altered *space* shall comply with the *LPA* of ~~Table 9.6.1~~ Table 9.5.2.1 and Section ~~9.6.1~~ 9.5.2.2, or the *alteration* shall result in a new wattage at least 50% below the original wattage of each altered *lighting system*. Additionally, the new and retrofitted lighting shall comply with the control requirements of Sections 9.4.1.1(a), 9.4.1.1(h), 9.4.1.1(i) as applicable to each altered *space* as shown on ~~Table 9.6.1~~ 9.5.2.1 and Section ~~9.6.2~~ 9.5.2.2.

[...]

9.1.2.5 Climate

Climate zones shall be determined in accordance with Section 5.1.4.

[...]

9.2 Compliance Paths

Lighting systems and *equipment* shall comply with Section 9.2.1 and ~~Section 9.2.2~~.

9.2.1 Requirements for All Compliance Paths

Lighting systems and *equipment* shall comply with Section 9.1 “General”; ~~Section 9.4, “Mandatory Provisions”; and Section 9.7, “Submittals.”~~

~~Compliance with Section 9 shall be achieved by meeting all of the requirements of Section 9.1, “General”; Section 9.7, “Submittals”; Section 9.9, Verification, Testing, and Commissioning; and one of the following:~~

- a. Section 9.3, “Simplified Building Method Compliance Path,” or
- b. Section 9.4, “Mandatory Provisions,” and Section ~~9.5~~ 9.5.1, “Building Area Method Compliance Path,” or
- c. Section 9.4, “Mandatory Provisions,” and Section ~~9.6~~ 9.5.2, “Space-by-Space Method Compliance Path,” or
- d. Section 9.4, “Mandatory Provisions,” and Section 9.6 “Alternative Compliance Path,” or
- e. Section 9.4, “Mandatory Provisions,” and Chapter 11, “Energy Cost Budget Method,” or
- f. Section 9.4, “Mandatory Provisions,” and Appendix G, “Performance Rating Method”

The installed lighting power identified in accordance with Section 9.1.3 shall not exceed the *lighting power allowance* developed in accordance with Section 9.2.1(a), (b), or (c).

~~Trade-offs of *lighting power allowance* among portions of the *building* for which a different calculation method has been used for compliance are not permitted.~~

9.2.2 — Additional Requirements to Comply with Section 9

Lighting systems and *equipment* shall comply with

- a. ~~Section 9.3, “Simplified Building Method Compliance Path,~~
- b. ~~Section 9.5, “Building Area Method Compliance Path,”~~ or
- c. ~~Section 9.6, “Alternative Compliance Path: Space by Space Method.”~~

~~Projects using the Energy Cost Budget Method (see Section 11 of this standard) must comply with Section 9.4, “Mandatory Provisions,” as a portion of that compliance path.~~

Exception to 9.2.2

~~When compliance is shown using Section 9.2.2(a), compliance with Section 9.4 is not required.~~

9.2.3 9.2.2 Prescriptive Requirements

9.2.3.4 9.2.2.1 Interior Lighting Power Allowance

The *interior lighting power allowance* for a *building* or a separately metered or permitted portion of a *building* shall be determined by either Simplified Building Method described in Section 9.3, the ~~*Building*~~ *Building Area* Method described in Section ~~9.5~~9.5.1, or the Space-by-Space Method described in Section ~~9.6~~9.5.2.

Exception to 9.2.3.4.2.2.1

When using the compliance methods in Section ~~9.5~~ 9.5.1 or ~~9.6~~ 9.5.2 only, the lighting *equipment* and applications listed in ~~Table 9.2.3.1~~ Table 9.2.2.1 shall not be considered when determining the *interior lighting power allowance* developed in accordance with Section ~~9.5~~ 9.5.1 or ~~9.6~~ 9.5.2, nor shall the wattage for such lighting be included in the *installed interior lighting power* identified in accordance with Section 9.1.3. This exemption shall only apply when the lighting and controls are in compliance with the requirements of ~~Table 9.2.3.1~~ Table 9.2.2.1. Lighting controls noted in this table are the only required controls for this equipment and these applications.

Trade-offs of *lighting power allowance* among portions of the *building* for which a different calculation method has been used for compliance are not permitted.

Table 9.2.3.4 9.2.2.1 Exceptions to Interior Lighting Power and Minimum Control Requirements

Item #	Equipment/Application	In Addition to and Controlled Separately From <i>General Lighting</i>	Required Controls
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(...contents of Table 9.2.2.1 are unchanged and therefore not shown here...)

9.2.3.2 9.2.2.2 Exterior Lighting Power Allowance

The *exterior lighting power allowance* for a *building*, or a separately metered or permitted portion of a *building*, shall be determined by

- a. Section 9.3.2, “Simplified Building Method of Calculating Exterior Lighting Power Allowance,” when using Section 9.3 to determine the *interior lighting power allowance*, or
- b. Section 9.4.2, “Exterior Building Lighting Power,” when using Section ~~9.5~~ 9.5.1 or Section ~~9.6~~ 9.5.2 to determine the *interior lighting power allowance*.

[...]

9.4.1.1 Interior Lighting Controls

For each *space* in the *building*, all of the lighting *control* functions indicated in ~~Table 9.6.1~~Table 9.5.2.1, for the appropriate *space* type in the first column, and as described below, shall be implemented. All *control* functions indicated as “REQ” are mandatory and shall be implemented. If a *space* type has *control* functions indicated as “ADD1,” then at least one of those functions shall be implemented. If a *space* type has *control* functions indicated as “ADD2,” then at least one of those functions shall be implemented. For *space* types not listed, select a reasonably equivalent type.

[...]

9.4.1.3 Special Applications

Lighting controls noted in this section are the only required controls for this equipment and these applications. Lighting exempt from interior lighting power shall be controlled in accordance with Table 9.2.3.1. Lighting using additional interior lighting power applications shall be controlled in accordance with Section ~~9.6.2~~9.5.2.2.

[...]

Table 9.4.2-2 Individual Lighting Power Allowances for *Building* Exteriors

	Zone 0	Zone 1	Zone 2	Zone 3	Zone 4
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[...]

For areas that are not listed in this table or are not comparable to areas listed in this table, use the comparable interior space type from Table 9.6.4 <u>9.5.2.1</u> as modified by factors in this row.	No allowance	65% of the <i>interior lighting power allowance</i> value	65% of the <i>interior lighting power allowance</i> value	80% of the <i>interior lighting power allowance</i> value	100% of the <i>interior lighting power allowance</i> value
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[...]

9.4.3 Dwelling Units

Not less than 75% of the *permanently installed lighting fixtures* shall use *lamps* with an *efficacy* of at least 55 lm/W or have a total *luminaire efficacy* of at least 45 lm/W. No other provisions of Section 9 apply to dwelling units.

Exception to 9.4.3:

1. Lighting that is controlled with *dimmers* or controlled in accordance with Section 9.4.1.1(h).
2. Hotel/motel guest rooms. The requirements for hotel/motel guest rooms are covered in ~~Table 9.6.1~~ Table 9.5.2.1 and Section 9.4.1.3(b).

[...]

9.5 ~~Prescriptive Building Area Method~~ Compliance Path

Interior lighting power shall comply with either Section 9.5.1 or Section 9.5.2. Lighting control requirements shall comply with Section 9.4.1 and Table 9.5.2.1

9.5.1 Building Area Method of Calculating Interior Lighting Power Allowance

Use the following steps to determine the *interior lighting power allowance* by the *Building Area Method*:

[...]

~~9.6.5.2 Alternative Compliance Path (to be used):~~ Space-by-Space Method Compliance Path

~~9.6.4~~ 9.5.2.1 Space-by-Space Method of Calculating Interior Lighting Power Allowance

Use the following steps to determine the *interior lighting power allowance* by the *Space-by-Space Method*:

- a. For each *space* enclosed by partitions that are 80% of the ceiling height or taller, determine the appropriate *space* type and the corresponding *LPD* allowance from Table ~~9.6.1~~ 9.5.2.1. If a *space* has multiple functions, where more than one *space* type is applicable, that *space* shall be broken up into smaller subspaces, each using its own *space* type from Table ~~9.6.1~~ 9.5.2.1. Any of these subspaces that are smaller in floor area than 20% of the original *space* and less than 1000 ft² (300 m²) need not be broken out separately.

[...]

~~Table 9.6.1~~ 9.5.2.1 **Lighting Power Density Allowances Using the Space-by-Space Method and Minimum Control Requirements Using Either Method**

(...contents of table are unchanged with the exception of footnote #4 shown below...)

4. For accent lighting, see Section ~~9.6.2(b)~~ 9.5.2.2(b).

~~9.6.2~~ 9.5.2.2 **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 controlled independently of the *general lighting* in accordance with Section 9.4.1.1(j). This additional power shall be used only for the specified *luminaires* and shall not be used for any other purpose unless otherwise indicated. Lighting control requirements referenced in Section ~~9.6.2~~ 9.5.2.2 are the only required controls for

these applications.

[...]

Exception to 9.6.29.5.2.2

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*.

Table number change, for brevity entire table is not shown

Table 9.6.39.5.2.3 Control Factors Used in Calculating Additional Interior Lighting Power Allowance
(...contents of table are unchanged...)

9.6.39.5.2.3 Additional Interior Lighting Power Using Nonmandatory Controls

An additional lighting power allowance shall be permitted for *space* types with nonmandatory *controls* installed as identified in Table 9.6.39.5.2.3 when all mandatory *controls* are used according to Section 9.4. This allowance is added to the *interior lighting power allowance* and is calculated as follows:

$$\text{Additional Interior Lighting Power Allowance} = \text{Lighting Power Under Control} \times \text{Control Factor}$$

where

Lighting Power Under *Control* = the total input watts of all *lamps* being controlled using the *control* method indicated

Control Factor = the value given in Table 9.6.39.5.2.3 for the corresponding *space* type and *control* method

9.6.49.5.2.4 Room Geometry Adjustment

When using the Space-by-Space Method, an adjustment of the *space LPD* allowance is permitted for individual *spaces* where *room cavity ratio (RCR)* calculated for the empty room is documented to be greater than the *RCR* threshold for that *space* type shown in Table 9.6.49.5.2.1.

$$RCR = 2.5 \times \text{Room Cavity Height} \times \text{Room Perimeter Length} / \text{Room Area}$$

where Room Cavity Height = *Luminaire* Mounting Height – Workplane.

For corridor/transition *spaces*, this adjustment is allowed when the corridor is less than 8 ft (2.4 m) wide, regardless of the *RCR*.

The *LPD* allowance for these *spaces* may be increased by the following amount:

$$LPD \text{ Increase} = \text{Base Space LPD} \times 0.20$$

where Base *Space LPD* = the applicable *LPD* allowance from Table 9.6.49.5.2.1.

9.6 Alternate Compliance Path (reserved)

Section 11 Changes

[...]

11.1.2 Trade-Offs Limited to Building Permit

[...]

Parameters relating to unmodified existing conditions or to future *building* components shall be identical for both

the *energy cost budget* and the *design energy cost* calculations. Future *building* components shall meet the prescriptive requirements of Sections 5.5, 6.5, 7.5, and 9.5 ~~either 9.5 or 9.6~~.

[...]

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

<i>Proposed Design Energy Cost</i> (DEC)	<i>Design</i> (Column A)	<i>Budget Building Design Energy Cost Budget</i> (ECB)	<i>Design</i> (Column B)
3. Space Use Classification			
<p>The <i>building</i> area type or <i>space</i> type classifications shall be chosen in accordance with Section 9.5.1 or 9.6.4 9.5.2. The user or designer shall specify the <i>space</i> use classifications using either the <i>building</i> area type or <i>space</i> type categories but shall not combine the two types of categories within a single permit application. More than one <i>building</i> area type category may be used for a <i>building</i> if it is a mixed-use facility.</p> <p>Exception: Where <i>space</i> types neither exist nor are designated in design documents, use type shall be specified in accordance with Section 9.5.1.</p>		<p>Same as <i>proposed design</i>.</p>	

[...]

6. Lighting			
		<p>a. Where a complete lighting system exists, lighting power in the <i>budget building design</i> shall be the same as in the <i>proposed design</i>.</p> <p>b. Where a lighting system has been designed the <i>interior lighting power allowance</i> shall be determined using either the <i>Building Area Method</i> or <i>Space-by-Space Method</i> and the space use classification shall be the same as the <i>proposed design</i> 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 <i>controls</i> allowed under Section 9.6.3 Section 9.5.2.3 shall not be included in the <i>budget building design</i>. Lighting power density in dwelling units shall be 0.60 W/ft² 6.5 W/m².</p>	

[...]

14. Modeling Exceptions			
<p>All elements of the <i>proposed design building envelope</i>, HVAC, <i>service water heating</i>, lighting, and electrical systems shall be modeled in the <i>proposed design</i> in accordance with the requirements of Section 1 through 12 of Table 11.5.1.</p> <p>Exceptions: Components and systems in the <i>proposed design</i> may be excluded from the simulation model provided that</p> <ol style="list-style-type: none"> component <i>energy</i> use does not affect the <i>energy</i> use of systems and components that are being considered for trade-off and the applicable prescriptive requirements of Sections 5.5, 6.5, 7.5, and 9.5 either 9.5 or 9.6 applying to the excluded components are met. 			

[...]

Appendix E Changes

[...]

Subsection No.	Reference	Title/Source
9.6.1 9.5.2	IES RP-6-15	Recommended Practice for Sports and Recreational Area Lighting

[...]

Appendix G Changes

G1.2 Performance Rating

G1.2.1 Mandatory Provisions

The proposed *building* design shall comply with all of the following:

- a. Sections 5.2.1, 6.2.1, 7.2.1, 8.2.1, 9.2.1, and 10.2.1; and
- b. Interior lighting power shall not exceed the *interior lighting power allowance* determined using either
 1. Table G3.7 and the methodology described in Section ~~9.6.1~~9.5.2, or
 2. Table G3.8 and the methodology described in Section 9.5.1; and
- c. For new *buildings*, one of the following is met:
 1. The *building envelope* complies with Section 5.5, “Prescriptive Building Envelope Compliance Path”; or
 2. Using Section 5.6, “Building Envelope Trade-Off Option”, the *proposed envelope performance factor* shall not exceed the *base envelope performance factor* by more than 15% in multifamily, hotel/motel, and dormitory *building* area types. For all other *building* area types, the limit shall be 7%. For buildings with both *residential* and *nonresidential* occupancies, the limit shall be based on the area weighted average of the *gross conditioned floor area*.

[...]

G1.3 Submittals

G1.3.1 General

Compliance documentation and supplemental information shall be submitted in accordance with Section 4.2.2 of this standard.

G1.3.2 Application Documentation

- a. The following documentation shall be submitted to the *rating authority*: The *simulation program* used, the version of the *simulation program*, and the results of the *energy analysis* including the calculated values for the baseline building unregulated energy cost (BBUEC), baseline building regulated energy cost (BBREC), Building Performance Factor (BPF), *baseline building performance*, the *proposed building performance* Performance Cost Index (PCI), and Performance Cost Index Target (PCIt).
- b. An overview of the project that includes the number of stories (above and below *grade*), the typical *floor* size, the uses in the *building* (e.g., office, cafeteria, retail, parking, etc.), the gross area of each use, and whether each use is *conditioned space*.
- c. A list of the *energy*-related features that are included in the design and on which the performance rating is based. This list shall document all *energy* features that differ between the models used in the *baseline building performance* and *proposed building performance* calculations.
- d. A list showing compliance for the *proposed design* with all the requirements of Sections 5.4, 6.4, 7.4, 8.4, 9.4, and 10.4 (mandatory provisions).
- e. A list identifying those aspects of the *proposed design* that are less stringent than the requirements of 5.5, 6.5, 7.5,

and 9.5, and 9.6 (prescriptive provisions).

[...]

3. *Space Use Classification*

The space use classification within each thermal block shall be determined using the *space type* lighting classifications in accordance with Section ~~9.6.4~~ 9.5.2.

Same as proposed design.

Exceptions:

Where space types neither exist nor are designated in design documents, use type shall be specified in accordance with 9.5.1.

The user may simplify the placement of the various *space* types within the *building* model, provided that *building* total areas and orientation of glazed exterior walls for each *space* type are accurate.

[...]

6. *Lighting*

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

Interior lighting power in the *baseline building design* shall be determined using the values in Table G3.7. However, where lighting neither exists nor is submitted with design documents, and the *proposed design* lighting power is determined in accordance with the Building Area Method, the *baseline building design* lighting power shall be determined in accordance with Table G3.8. Where retail display lighting is included in the proposed building design in accordance with Section ~~9.6.2~~ 9.5.2.2b, the *baseline building design* retail display lighting additional power shall be equal to the limits established by Section ~~9.6.2~~ 9.5.2.2b or same as proposed which ever less.

- 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 ~~9.6.4~~ 9.5.2 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.

Lighting shall be modeled having the *automatic* shutoff *controls* in *buildings* >5000 ft² 500 m² and *occupancy sensors* in employee lunch and break rooms, conference/meeting rooms, and classrooms (not including shop classrooms, laboratory classrooms, and preschool through 12th-grade classrooms). These *controls* shall be reflected in the *baseline building design* lighting schedules. No additional *automatic* lighting *controls*, e.g., *automatic* *controls* for daylight utilization and *occupancy sensors* in *space* types not listed above, shall be modeled in the *baseline building design*.

Exterior lighting in areas that are designed to be illuminated and identified as "Tradable Surfaces" in Table G3.6 shall be modeled with the baseline lighting power shown in Table G3.6. Other exterior lighting shall be modeled the same in the *baseline building design* as in the *proposed design*.

- 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.
- f. Exterior lighting power and lighting power for parking garages shall be modeled.
- g. For lighting *controls*, at a minimum, the proposed design shall contain the mandatory *automatic* lighting *controls* specified in Section 9.4.1 (e.g., *automatic* daylight responsive *controls*, *occupancy sensors*, programmable *controls*, etc.). These *controls* shall be modeled in accordance with (h) and (i).
- h. *Automatic* daylighting responsive *controls* shall be modeled directly in the *proposed design* or through schedule adjustments determined by a separate daylighting analysis approved by the *rating authority*. Modeling and schedule adjustments shall separately account for *primary sidelighted areas*, *secondary sidelighted areas*, and toplighted areas.
- i. Other *automatic* lighting *controls* included in the *proposed design* shall be modeled directly in the *building* simulation by reducing the lighting schedule each hour by the *occupancy*

sensor reduction factors in Table G3.7 for the applicable *space* type. This reduction shall be taken only for lighting controlled by the *occupancy sensors*. Credit for other programmable lighting *control* in *buildings* less than 5000 ft² 465 m² can be taken by reducing the lighting schedule each hour by 10%.