ADDENDA

ANSI/ASHRAE/IES Addendum dt to
ANSI/ASHRAE/IES Standard 90.1-2013

Energy Standard for Buildings Except Low-Rise Residential Buildings

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FOREWORD

Addendum dt corrects the definition of lighting power density (LPD), adds two related terms, and corrects the use of these terms in Sections 9 and 11.

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 dt to 90.1-2013

Revise the Standard as follows (I-P and SI)

3.2 Definitions

……

lighting power density (LPD): the ~~maximum~~ *lighting power* per unit area of a building, space, or outdoor area expressed in watts per square foot (watts per square meter). ~~classification of space function.~~

[. . .]

9.1.2 Lighting Alterations. For the alteration of any lighting system in an interior space, that space shall comply with the lighting power density (LPD) ~~requirements~~ allowances of Section 9 applicable to that space and the automatic shutoff requirements of Section 9.4.1.1. For the alteration of any lighting system in an exterior building application, that lighting system shall comply with the lighting power density (LPD) ~~requirements~~ allowances of Section 9 applicable to the area illuminated by that lighting system and the applicable control requirements of Sections 9.4.1.7(a) and 9.4.1.7(b). Such alterations shall include all luminaires that are added, replaced or removed. This requirement shall also be met for alterations that involve only the replacement of lamps plus ballasts. Alterations do not include routine maintenance or repair situations.
Exception: Alterations that involve less than 10% of the connected lighting load in a space or area need not comply with these requirements, provided that such alterations do not increase the installed ~~LPD~~lighting power.

[. . .]

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, for the appropriate space type in column A, and as described below, shall be implemented. All control functions labeled with an “REQ” are mandatory and shall be implemented. If a space type has control functions labeled “ADD1” then at least one of those functions shall be implemented. If a space type has control functions labeled “ADD2” then at least one of those functions shall be implemented. For space types not listed, select a reasonably equivalent type. If using the Space-by-Space Method ~~for LPD requirements~~, the space type used for determining control requirements shall be the same space type ~~used to determine~~ that is used for determining the LPD allowance.

[. . .]

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g. *Automatic partial OFF (full OFF complies):* The general lighting power in the space shall be automatically reduced by at least 50% within 20 minutes of all occupants leaving the space.
Exceptions: This requirement does not have to be complied with in spaces that meet all three of the following requirements:
1. The space has an installed LPD of no more than 0.80 W/ft2
2. The space is lighted by HID
3. The general lighting power in the space is automatically reduced by at least 30% within 20 minutes of all occupants leaving the space

[. . .]

TABLE 9.4.2-2 Individual Lighting Power Allowances for Building Exteriors *(Continued)*

	Zone 0	Zone 1	Zone 2	Zone 3	Zone 4
Base Site Allowance (base allowance may be used in tradable or non-tradable surfaces)					
	No base site in Zone 0	500 W	600 W	750 W	1300 W
Tradable Surfaces (~~LPDs~~ LPD allowances for uncovered parking areas, building grounds, building entrances, exits and loading docks, canopies and overhangs, and outdoor sales areas may be traded.)					
…… **……**					
Nontradable Surfaces (LPD ~~calculations~~ allowances for the following applications can be used only for the specific application and cannot be traded between surfaces or with other exterior lighting. The following allowances are in addition to any allowance otherwise permitted in the "Tradable Surfaces" section of this table.)					

[. . .]

TABLE 9.5.1 Lighting Power ~~Densities~~ Density Allowances Using the Building Area Method

Building Area Type[a]	LPD Allowance, W/ft^2
Automotive facility	0.80
……	……

[. . .]

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TABLE 9.6.1 Lighting Power Density Allowances Using the Space-by-Space Method and Minimum Control Requirements Using Either Method *(Continued)*

Informative Note: **This table is divided into two sections; this first section covers space types that can be commonly found in multiple building types. The second part of this table covers space types that are typically found in a single building type.**			**The control functions below shall be implemented in accordance with the descriptions found in the referenced paragraphs within Section 9.4.1.1. For each space type: (1) All REQs shall be implemented. (2) At least one ADD1 (when present) shall be implemented. (3) At least one ADD2 (when present) shall be implemented.**								
			Local Control (See Section 9.4.1.1[a])	**Restricted to Manual ON (See Section 9.4.1.1[b])**	**Restricted to Partial Automatic ON (See Section 9.4.1.1[c])**	**Bilevel Lighting Control (See Section 9.4.1.1[d])**	**Automatic Daylight Responsive Controls for Sidelighting (See Section 9.4.1.1[e][6])**	**Automatic Daylight Responsive Controls for Toplighting (See Section 9.4.1.1[f][6])**	**Automatic Partial OFF (See Section 9.4.1.1[g] [Full Off complies])**	**Automatic Full OFF (See Section 9.4.1.1[h])**	**Scheduled Shutoff (See Section 9.4.1.1[i])**
Common Space Types[1]	**LPD Allowances, W/ft[2]**	**RCR Threshold**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**
.....											
.....											
Stairway	The space containing the stairway shall determine the LPD allowance and control requirements for the stairway.										
.....											
.....											

[. . .]

9.5 Building Area Method Compliance Path

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:

a. Determine the appropriate building area type from Table 9.5.1 and the corresponding ~~allowed~~ LPD ~~(watts per unit area) from the "Building Area Method" column~~ allowance. For building area types not listed, selection of a reasonably equivalent type shall be permitted.
b. Determine the gross lighted floor area (square feet) of the building area type.
c. Multiply the gross lighted floor areas of the building area type(s) times the LPD.
d. The interior lighting power allowance for the building is the sum of the lighting power allowances of all building area types. Trade-offs among building area types are permitted, provided that the total installed interior lighting power does not exceed the interior lighting power allowance.

[. . .]

9.6 Alternative Compliance Path: Space-by-Space Method

9.6.1 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. 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. Any of these subspaces that are smaller in floor area than 20% of the original space and less than 1000 ft^2 need not be broken out separately. Include the floor area of balconies and other projections in this calculation.
b. In calculating the area of each space and subspace, the limits of the area are defined by the centerline of interior walls, the dividing line between subspaces, and the outside surface of exterior walls.
c. Based on the space type selected for each space or subspace, determine the lighting power allowance of each space or subspace by multiplying the calculated area of the space or subspace by the appropriate LPD allowance determined in Section 9.6.1(a). For space types not listed, selection of a reasonable equivalent category shall be permitted.

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d. The interior lighting power allowance is the sum of lighting power allowances of all spaces and subspaces. Tradeoffs among spaces and subspaces are permitted, provided that the total installed interior lighting power does not exceed the interior lighting power allowance.

[. . .]

9.6.4 Room Geometry Adjustment. When using the Space-by-Space Method, an adjustment of the space LPD allowance is ~~allowed~~ 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 9.6.1.

…….

The LPD allowance for these spaces may be increased by the following amount:
LPD increase = Base Space LPD × 0.20
where
Base space LPD = the applicable LPD allowance from Table 9.6.1.

[. . .]

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

No.	Proposed Building Design (Column A) Design Energy Cost (DEC)	Budget Building Design (Column B) Energy Cost Budget (ECB)
……		
6. Lighting		
	Lighting power in the proposed building design shall be determined as follows: …….. f. Automatic lighting controls included in the proposed building 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 building design lighting power ~~density~~ may be reduced for each luminaire under control by dividing the rated lighting power of the luminaire by the factor (1+£CF), where £CF indicates the sum of all applicable control factors "CF"~~additional allowances~~ per Section 9.6.3 and Table 9.6.3~~, which are calculated individually as the lighting power under control multiplied by CF, where "CF" is the appropriate control factor given in Table 9.6.3 corresponding to the space type and the lighting controls designed to be used~~.	…….. b. Power for fixtures not included in the ~~LPD~~ lighting power calculation shall be modeled identically in the proposed building design and budget building design. ……..
……		

[. . .]

C3.5.7 Lighting. ~~L~~The modeled lighting power shall be determined using the lighting power density allowances in Table 9.5.1 for the applicable building area type. ~~L~~The modeled lighting power shall be adjusted in accordance with the lighting schedule in the building envelope trade-off schedules and loads for the applicable building area type. Fifty percent (50%) of lighting in daylight areas shall be modeled

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with continuous daylight dimming controls such that when sufficient daylight is available at the corresponding photosensor, lighting power is reduced to maintain a minimum 50 fc for conditioned spaces and 30 fc for semiheated spaces. The minimum light output for the continuous daylight dimming shall be 6% of peak light output. Power input shall be modeled as 20% of lighting power ~~density~~ at the minimum light output and scaled linearly to 100% of lighting power ~~density~~ at peak light output.

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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.

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